Rs.10

JIMA

Volume 66 (RNI) ◆ Number 02 ◆ FEBRUARY 2022 ◆ KOLKATA

JOURNAL *Of the* INDIAN MEDICAL ASSOCIATION

Official Publication of the Indian Medical Association

Indexed in

INDEX COPERNICUS INTERNATIONAL

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Volume 120 (JIMA) ♦ Number 02 ♦ February 2022 ♦ KOLKATA

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ISSN 0019-5847

92ND YEAR OF PUBLICATION

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JOURNAL
Of the
INDIAN MEDICAL ASSOCIATION

Volume 120 (JIMA)
Number 02
February 2022
KOLKATA
ISSN 0019-5847

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Editorial

Screening for Peripheral Artery Disease : Putting Prevention into Practice

Atherosclerotic disease involves coronary, cerebral, and often peripheral arteries. Lower extremity Peripheral Artery Disease (PAD) is the third leading cause of atherosclerotic cardiovascular morbidity, followed by coronary artery disease and stroke. In the 21st century, PAD has become a global problem and a larger burden is to be expected in the foreseeable future[1]. Overall, the global prevalence of PAD is 5·56%, which increases consistently with age. A total of 236·62 million people globally, are living with PAD, among whom 72·91% are in low-income and middle-income countries[2].

Diabetes is a strong risk factor for atherosclerotic diseases and is second only to cigarette smoking in contributing to the magnitude of increased risk for PAD[1]. Hence, PAD is more prevalent among patients with diabetes mellitus than in the general population. The current publication by aaaaa *et al* has estimated the prevalence of PAD 31% among diabetics, using a ABPI (Ankle Brachial Pressure Index) value of $\leq$0.9 which is consistent with many other prevalence studies from India.

PAD can lead to acute or chronic symptoms,but manyare asymptomatic. Underlying atherosclerotic disease may be present in the absence of symptoms and there are three times as many asymptomatic patients with lower extremity PAD as symptomatic patients. The clinical manifestations of PAD, which include claudication, rest pain, ulceration, and gangrene, are predominantly due to progressive luminal narrowing from thrombosis or due to embolism from unstable atherosclerotic plaque.Patients of PAD with diabetes tend to present with more advanced disease and have a worse prognosis with higher rates of foot ulcers, lower extremity amputations and lower extremity function compared to those who do not have diabetes[3]. As atherosclerosis is a systemic disease that also involves coronary and cerebral vessels, patients with PAD are at increased risk for coronary and cerebrovascular events.The most important implication of PAD is that it serves as a strong surrogate marker for the severity of atherosclerotic disease in other vascular territories. Thus, the patient with diabetesand PAD is a high-risk clinical phenotype who should further be evaluated for other concomitant comorbidities, specially, coronary heart disease and cerebrovascular disease.

The current publication by aaaaa *et al* had concluded that PAD is common among diabetics and early detection is possible with a simple, non-invasive, and cost-effective method (ABPI). Hence, screening,and early detection with ABPI may help in implementing prompt treatment to prevent further complications. However, it is to be kept in mind that the sensitivity of ABPI varies greatly in diabetic subjects, ranging from as high as 100% to as low as 35%[4]. This low

sensitivity is attributable to arterial wall calcification and atherosclerotic changes that make the artery poorly compressible making ABPI measurement of limited value in advanced states of PAD in patients of diabetes.Management of patients with lower extremity PAD is similar to patients with or without diabetes and is focused on relieving symptoms and lowering the risk of cardiovascular disease progression. The medical therapyis aimed ataggressive risk factor modification (healthy diets, smoking cessation, antithrombotic therapy, lipid-lowering therapy,glycemic control, and antihypertensive therapy). Medical therapy reducesthe risk for future cardiovascular (myocardial infarction, stroke) and limb events (claudication, amputation) related to atherothrombosis. Revascularization, surgical or endovascular, is mostly reserved for treatment of symptomatic PAD[5].

US Preventive Services Task Force has recently reviewed the evidence of whether screening for PAD with the ABI in generally asymptomatic adults reduces morbidity or mortality from PAD or cardiovascular disease. However, the benefits of early detection and intervention must be balanced against the harms of early detection and intervention. Direct harms of screening, beyond the time needed for testing, are minimal but the current evidence is insufficient to assess the balance of benefits and harms of screening for PAD in asymptomatic adults[6]. As per American College of Cardiology and the American Heart Association (ACC/AHA) guideline, clinical assessment for PAD, which includes clinical history, pulse palpation, auscultation for femoral bruits, and ABPI, are reserved for patient at increased risk of PAD (Table 1).

Table 1 — *Patients at Increased Risk of PAD*

A	Age ≥65 years
B	Age 50-64 years, with risk factors for atherosclerosis (eg, diabetes mellitus, history of smoking, hyperlipidemia, hypertension) or family history of PAD
C	Age <50 years, with diabetes mellitus and 1 additional risk factor for atherosclerosis
D	Individuals with known atherosclerotic disease in another vascular bed (eg, coronary, carotid, subclavian, renal, mesenteric artery stenosis, or abdominal aortic aneurysm)

In contrast to commonly held belief, PAD appears to afflict Indian diabetics at similar to higher rates as those found in Western populations in the same age groups. Diabetes has some unique characteristics in Indians, as Asian Indian phenotype has a high prevalence of young onset diabetes occurring before age 40. Hence, PAD, whose prevalence increases with age, appear to increase their susceptibility at a much earlier age among Indian diabetics. So, the clinical assessment for PAD should start at an earlier age among Indian diabeticscompared to Western populations.

*Randomized control trials*in Indian population are needed to determine the value of using the ABPI to identify asymptomatic patients with PAD for therapies to reduce cardiovascular risk. Additional research in Indian population is also necessary to develop and validate an improved clinical classification system for PAD that include symptoms, anatomic factors, and patient-specific risk factors which can be used to predict more meaningful prognosis and optimize treatment approach.

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Original Article

A Study of Peripheral Arterial Disease in Type 2 Diabetes Mellitus with Relation to Ankle Brachial Pressure Index

Rupam Bhowmick[1], Bhaskar Kanti Nath[2], Prithwiraj Bhattacharjee[3]

Background : India shares a considerable share of the Global Disease Burden of Diabetes Mellitus which is a major public health concern. Among the many Vascular Complications of Diabetes, Peripheral Arterial Disease (PAD) is one and a major cause of Foot Related Disorders in Diabetics. The Ankle-Brachial Pressure Index (ABPI) is an efficient tool for objectively documenting the presence of lower extremity Peripheral Arterial Disease (PAD).The present study was conducted to find the prevalence of PAD in Diabetic Patients in a teaching hospital using ABPI.

Materials and Methods : A total number of 100 cases of Type 2 Diabetic patients who were more than 40 years of age were included in the study after fulfilment of the inclusion and exclusion criteria. Ankle Brachial Pressure Index was measured in all and used to assess PAD. ABPI value of $\leq$0.9 was taken as indicative of PAD.

Results : The prevalence of PAD using a ABPI Value of $\leq$0.9 was 31%. A significant association of PAD was found with duration of disease, hypertension, smoking and glycemic control.

Conclusion : Peripheral Arterial Disease (PAD) is more commonly associated with Diabetes Mellitus than is generally thought. ABPI (Ankle Brachial Pressure Index) is a simple, noninvasive and cost-effective method for early detection of PAD.

[*J Indian Med Assoc* 2022; **120(2):** 13-6]

***Key words* : Peripheral Arterial Disease, Prevalence, Ankle Brachial Index, Diabetes Mellitus Type 2, Hypertension.**

Globally, an estimated 422 million adults are living with Diabetes Mellitus, according to the latest 2016 data from the World Health Organisation (WHO)[1]. The International Diabetes Federation estimates prevalence of 8.7 percent of Diabetes in Adults in India[2]. PAD, a known complication of Diabetes Mellitus, is a manifestation of Atherosclerosis characterized by Atherosclerotic Occlusive Disease of the lower extremities and is a marker for Atherothrombotic disease in other Vascular Beds. Estimation of the prevalence of PAD in Diabetes should rely upon a validated and reproducible test. Such a test is the Ankle Brachial Index (ABI), which involves measuring the Systolic Blood Pressures in the Ankles (dorsalis pedis and posterior tibial arteries) and Arms (Brachial Artery) using a hand-held Doppler and then calculating a ratio. The Ankle-Brachial Index (ABI) is an efficient tool for objectively documenting the presence of lower extremity Peripheral Arterial Disease (PAD)[3-6]. An ABI of less than 0.90 has been shown to have a sensitivity of 90% and a specificity of 98% for detecting a lower extremity stenosis of greater than 50%[7,8]. This study aims to target this population and study Peripheral Arterial Disease in Diabetes with special reference to Ankle Brachial Pressure Index and Colour Doppler Sonography.

Editor's Comment :

- Peripheral arterial disease (PAD) is a common complication of Diabetes Mellitus.
- ABPI is a simple, noninvasive and cost effective method to identify PAD and can help in early intervention and timely management of PAD in Diabetics to prevent its complications and associated morbidity.

Materials and Methods

The present study was conducted from 1st June, 2018 to May, 2019 for a period of 1 year in the department of Medicine,Silchar Medical College and Hospital, Silchar, Assam. A total of 100 type 2 Diabetic patients from the IPD (In Patient Department) were included randomly for the study, after fulfillment of inclusion and exclusion criteria. Known Type 2 Diabetics who were above the age group of 40 years and on treatment for any duration were included. Patients having history of Type 1 DM, Limb Wounds, Ulcer, Amputation, Bypass Surgery to Lower Limb Arteries, Limb Ischaemia on Cuff Inflation were excluded. Pre-tested questionnaire (proforma) were used to record information of the participants. Information on

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Received on : 23/02/2020
Accepted on : 19/08/2020

demography, life style and Anthropometric measurements were taken. Weight, Height, BMI (Body Mass Index) calculation by Quetelet's formula and categorization according to WHO recommendation and Blood Pressure measurement and categorization according to JNC 7 were done in all subjects. Necessary Biochemical Parameters like RBS (Random Blood Sugar), FBS (Fasting Blood Sugar), PPBS (2 hours Postprandial Blood Sugar), Hba1c (Glycosylated Hemoglobin), Lipid Parameters like Total Cholesterol (TC), Triglyceride (TG), HDL (High Density Lipoprotein) Cholesterol, LDL (Low Density Lipoprotein) Cholesterol were measured. Diabetes Mellitus was defined as per the recent American Diabetes Association (ADA) criteria. For Serum Lipid reference level, National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) Guideline was referred.The student "t" test is used to determine whether there is a statistical significance between two groups in the parameters measured. In the above test, p-value of less than 0.05 was taken as the indicator of statistical significance.

Measurement of ABPI :

All patients were subjected to measurement of ABPI by dividing the Systolic Pressure detected at a single Posterior Tibial Artery by the Systolic Brachial pressure of one arm with the patient in supine position. A hand-held portable Doppler device with a frequency of 8-10MHz and a Sphygmomanometer was used for the purpose.If the patient's ABPI was ≤0.9 then this indicated Peripheral Artery Disease.

$$ABI = \frac{\text{Ankle Systolic Pressure}}{\text{Brachial Systolic Pressure}}$$

Results

In the study, out of 100 cases,66 (66%) no of cases were males and 34 (34%) were females.The mean age of the patients was 59.6 ± 9.94 years in the study. In the study, 11% patients had Diabetes for less than 5 years, 66 % between 5-9 years and 23% for 10 years or more. In the study,out of 100 cases the prevalence of PAD using a ABPI value of ≤0.9 was found to be 31%, that is out of 100 cases, 31 cases had ABPI ≤0.9 (either right or left leg). There were 21, 19 and 15 cases with mild PAD (ABPI 0.7-0.9) on the right side, left side and bilaterally respectively. And there were 6, 4 and 4 cases with moderate PAD (ABPI 0.41-0.69) on the right side, left side and bilaterally respectively. None of the case had ABPI <0.4 (Critical Ischaemia). Mean ABPI on the right side was 0.95±0.11 and mean ABPI on the left side was 0.96±0.10. Out of the 31 cases with PAD (based on ABPI), 22 cases were males (70.96%)and 9 cases were females(29.03%). Mean age in cases with ABPI ≤0.9 was 60.32 ±10.33 years. Mean age among cases with ABPI >0.9 was 59.27 ± 9.83 years (Tables 1-3 & Fig 1).

Discussion

There are numerous macro and microvascular complications associated with diabetes of which PAD is only one. The Ankle-Brachial Index is an efficient tool for objectively documenting the presence of lower extremity Peripheral Arterial Disease. The American Diabetes Association recommends measuring ABI in all diabetic patients older than 50 years or in any patient suffering from PAD symptoms or having other (Cardiovascular) risk factors.In the present study, we evaluated the prevalence of Peripheral Arterial disease using ABPI in all the Diabetic participants and also studied the correlation of various Anthropometric and other risk factors of PAD in Diabetic Patients.

In our observational study, out of 100 cases we have found that the prevalence of PAD using a ABPI value of ≤0.9 was 31%, that is out of 100 cases 31

Table 1 — *Table showing various baseline data of study group*

Risk factors	Value (mean)
Age (years)	59.6 ± 9.94
Sex distribution	Males=66, females=34
Duration of Diabetes Mellitus (years)	7.55 ± 2.45
BMI (kg/m^2)	23.40 ± 2.69
Hba1c (%)	8.264 ± 1.38
Systolic Blood Pressure (mm hg)	140.44 ±19.65
Diastolic Blood Pressure (mm hg)	85.5 ±7.94
Smoking habit	smokers=28, non smokers =72

Table 2 — *Showing ABPI distribution among cases*

ABPI value	Right side	Left side	Bilateral
0.91-1.30	73	77	81
0.7-0.9	21	19	15
0.41-0.69	6	4	4
<0.4	0	0	0

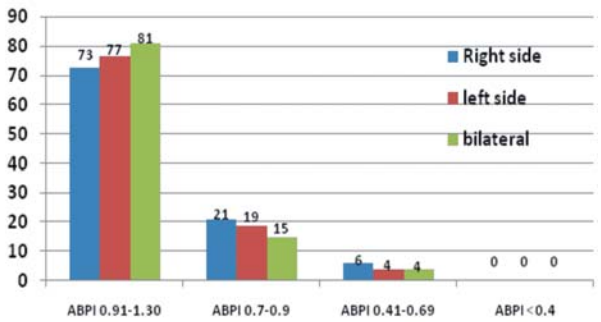

Fig 1 — Graph showing ABPI distribution among cases

Table 3 — *Showing comparison of different study parameters among PAD and Non PAD group*

Parameters	PAD (n=31)		PAD (n= 69)		P value
Male : Female	22(70.96%)/9(29.03)		44(63.76%)/25(36.23)		
Smokers/Non smokers	18(58.06%)/13(41.9%)		10(14.4%)/59(85.5%)		
	Mean	SD	Mean	SD	
Age (years)	60.32	10.33	59.27	9.83	0.31
Duration of DM (years)	8.95	2.30	6.92	2.26	<0.05
BMI (kg/m^2)	23.64	3.18	23.30	2.46	>0.05
Hba1c (%)	8.76	1.28	8.03	1.37	<0.05
Systolic Blood Pressure (mm hg)	145.87	15.78	138	20.80	0.031
Diastolic Blood Pressure (mm hg)	88.58	6.59	84.12	8.14	0.004
Total Cholesterol (mg/dl)	154.87	35.10	171.30	32.34	>0.05
LDL Cholesterol(mg/dl)	81.25	25.48	89.98	20.38	>0.05

cases had ABPI ≤0.9 (either right or left leg). Different Indian studies and studies done abroad have reported different prevalence of PAD using ankle ABPI among different population.Vinod Tyagi *et al*[9] in 2017, in their study reported a prevalence of 40% of PAD diabetics using ABPI. Similarly Vaibhav Shukla *et al*[10] in their study reported a prevalence of 36% PAD among Diabetics.

J D Solanki *et al*[11] reported a prevalence of 35% of PAD in their Study of Diabetic Patients and Marwaha *et al*[12]reported a prevalence of 33% of PAD in their study population.

In contrast A K Agarwal *et al*[13] in their study of 146 diabetic patients had found a prevalence of PAD using ABPI of 14.4% whereas Ramyashree Tummala *et al*[14] had found a prevalence as high as 57% of PAD in their study. There are studies which have shown that variability in ethnicity may be responsibe for the substantial difference in prevalence of the disease in different population.

There was no statistically significant correlation between age and presence of PAD in our study. AK Agarwal *et al*[13]and Marwaha *et al*[12] in their study found a significant association between PAD and increasing age of patient whereas in the study of Vaibhav Shukla *et al*[10] age did not emerge as a significant predictor of PAD.The prevalence of PAD was much higher among males in our study. A K Agarwal *et al*[13] , Marwaha *et al*[12], Vaibhav Shukla *et al*[10] reported a prevalence of 14.9% in males versus 13.9% in females, 62.1% in males *versus* 37.9% females and 44.4% in males versus 55.5% females respectively. We found a significant association(p value<0.05) between glycemic control and presence of PAD. Similarly A K Agarwal *et al*[13] and Marwaha *et al*[12] have also found a significant association between Inferior Glycemic Control and presence of PAD in their study. Mean duration of Diabetes in the PAD group was statistically significant when compared to individuals in the non PAD group (p value <0.05). Similarly,Vaibhav Shukla *et al*[10], Marwaha *et al*[12] and AK Agarwal *et al*[13] all have found duration of Diabetes to be significantly higher in PAD group compared to non PAD group.

In our study we did not find a statistical significant correlation between BMI and PAD. There was a prevalence of 58.06% of smokers out of 31 cases who recorded a ABPI ≤0.9.Jayesh D Solanki *et al*[11] in their study reported that 47 % smokers recorded a ABPI <0.9. A K Agarwal *et al*[13], they found a higher prevalence of smoking in those with PAD (9.52% *versus* 1.60% in those without PAD). We found a significant correlation of PAD with both Systolic and Diastolic Blood Pressure in our study (p value <0.05). A K Agarwal *et al*[13] in their study found significant association between hypertension and PAD whereas in the study of Vaibhav Shukla *et al*[10] hypertension did not show significant association.

We did not find a significant correlation with any of the lipid parameters studied in our study.Similarly, AK Agarwal *et al*[13] in their study found no significant differences between Serum Total Cholesterol, LDL cholesterol, HDL Cholesterol or Triglyceride Levels between the PAD and the Non-PAD subgroups. Vaibhav Shukla *et al*[10] found in their study increased Lipid Levels (Total Cholesterol and LDL) were significantly associated with PAD (p value 0.036).

From our study, it was seen that there was a significant correlation of PAD (based on ABPI) with duration of Diabetes Mellitus, Glycemic Status (Hba1c), Smoking and Blood Pressure. The two tailed p value in all the cases was <0.05.

Conclusion

It is concluded from the present study that Peripheral Arterial Disease is more commonly associated with Diabetes Mellitus than is generally thought. ABPI is a simple, non-invasive and cost-effective method for early detection of PAD in Diabetic Patients. The prevalence of PAD is particularly high among diabetic patients in our population with the presence of more than one risk factors in most. A positive correlation of modifiable risk factors such as Smoking, Uncontrolled Blood Sugar Level, Hypertension was found with presence of PAD based on ABPI. ABPI can be used as a screening test for early detection of PAD in Diabetic Patients and help in implementing prompt treatment and prevent further

complications. However,more elaborate and extensive Multi-centered studies is desirable in this regard to precisely establish the prevalence of PAD and its correlation with risk factors.Our study had the limitation of relatively small sample size and more studies with larger sample sizes are necessary.

Acknowledgement

We express sincere gratitude to all those persons whose constant guidance, advice, suggestions, encouragement & support have made this little piece of work see the light of the day.

It is our pleasure to express gratitude to Principal-cum-Chief Superintendent, Silchar Medical College & Hospital, Silchar, for permitting to carry out the work in this Institution.

We also offer our sincere gratitude & regards to respected Professor and Head, Department of Medicine, Silchar Medical College & Hospital, Silchar, for his constant support and supervision that encouraged us to complete my work in time.

We shall remain ever grateful to our respected teachers and Postgraduate Trainee Colleagues from Department of Medicine, Department of Pathology, Department of Biochemistry and Department of Radiology for extending their help for the same.

Funding : None

Conflict of Interest : None

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Original Article

Quantification of Pre-analytical Quality Indicators in a Clinical Laboratory and Formulating the Lean Six Sigma DMAIC Strategy

Pallavi Jain[1], Preeti Chauhan[2], Vibha Uppal[3], Ekta Debnath[4], Sanjib Gogoi[5], Priti Chatterjee[6]

Introduction : Quality control of the laboratory has gained increased importance in the present years. 70 % of the errors in the clinical laboratory occur in the pre-analytical phase. With various guidelines to gauge the quality of the laboratory, Six Sigma Metrics remains by far the most difficult benchmark that a laboratory can achieve. We aimed to quantify the performance of the quality indicators of the routine clinical Biochemistry laboratory in the pre-analytical phase in the form of sigma metrics and devise measures and identify steps to decrease the percentage of errors by defining the DMAIC approach.

Materials and Methods : One year retrospective data was collected from January, 2020 to December, 2020 from the data entry register and pre-analytical variables were quantified. Defects Per Million and sigma metric were calculated for each pre-analytical indicator. DMAIC approach was applied and post intervention sigma scores for the month of Jananuary, 2021, February, 2021 and March, 2021 were calculated.

Results : Postinterventional analysis was done on a month-to-month basis to monitor the trend and also to ensure corrective action can be taken without delay. Out of 5 quality indicators which were quantified, the pre *versus* post sigma scores (March'21) are as follows: missing location of the patient (Sigma 4 *versus* 3.6), missing registration number (Sigma 3.7 *versus* 4.3) and both registration number and location missing (Sigma 3.6 *versus* 4.0), Homolysed sample (4.2 *versus* 4.6), insufficient sample volume (sigma 3.9 *versus* 4.7). Encouraging results in the form of improved Sigma scores were seen in four of the quality indicators except for the fact that the patient location were still missing in the forms and hence warrants continuous monitoring.

[*J Indian Med Assoc* 2022; **120(2):** 17-22]

***Key words* : Six sigma metrics, Pre-analytical error, Quality indicators, Quality control, DMAIC, Fishbone, SIPOC.**

Patient safety initiatives across all working areas of the hospitals, which includes the laboratories[1] and technological advances have contributed to substantial decrease of errors in the analytical phase of lab processes. The leading source of errors in laboratory are the pre-analytical work processes and is of major patient safety concern[2]. Increased dependency of clinicians on laboratory results for therapeutic decision making has been observed and Evidence Based Medicine is the new way of clinical practice. Hence, accurate and reliable results are undeniably important. The Total Testing Process (TTP) have been traditionally separated into three phases: pre-analytical, analytical and post-analytical phase[3]. Studies in literature have also reported that the highest error rates are related with the pre-analytical phase and these are mostly generated from mistakes in sample containers, insufficient sample for processing, samplehandling, storage, transportation and wrong identification of sample. Homolysis, unclotted sample, inadequate anticoagulant-sample ratio are other common causes of sample rejections at the pre-analytical stage. With the ongoing expansion of diagnostic laboratory with same working hands and budget constraints, we need to simplify the lab processes and eliminate the waste from pre analytical , analytical and post analytical areas so as to keep up the quality as well as the quantity of work. The lean concept of Quality Improvement Focuses on elimination of the waste which are the processes which do not add value to the

Editor's Comment :

- The pre analytical errors, that comprise 70% of the errors in clinical laboratory, can be monitored as well controlled by applying Six sigma metrics.
- The formulation of DMAIC strategy and implementation of the same can lead to improvement of sigma scores in different work areas of laboratory.

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Received on : 18/11/2021
Accepted on : 03/02/2022

final outcome of the process and Six Sigma is the Philosophy which focuses on improving the quality of processes and focuses on identification and removal of defects by means of Define Measure Analyze Improvement Control (DMAIC).

In our laboratory we performed a lean mapping exercise to identify the sources of pre analytical errors and to devise appropriate solutions in the laboratory including providing training to the laboratory personnel and other related staff. These areas of pre analytical errors are quality indicators for the laboratory also and were identified in compliance with ISO 15189: 2012 Standard and International Federation of Clinical Chemistry (IFCC) Working Group on Laboratory Errors and Patient Safety (WG-LEPS) Guidelines.

Hence, taking into consideration these guidelines, we first quantified the quality indicators in the pre-analytical phase in terms of DPMO (Defects Per million Opportunities) and six sigma metrics and implemented corrective measures by following the DMAIC strategy and installation of LIS (Laboratory Information System) and reassessed the sigma metrics again to see the impact

Aims and Objectives

(1) To quantify the performance of the quality indicators of the Routine Clinical Biochemistry laboratory in the **pre-analytical** phase in the form of Defects Per Million Opportunities (DPMO) and further apply Sigma metrics.

(2) To formulate the DMAIC strategy for the quality indicators

(3) To reassess the DPMO and Sigma Metrics post intervention and see the impact of DMAIC strategy on sigma levels in the next three months

Materials and Methods

This study was designed to observe the before – after analysis of lab processes in the pre- analytical phase in a teaching hospital. A quality improvement team collected the following data: One year retrospective data was collected from January, 2020 to December, 2020 from the data entry register of the In-patient Department and pre-analytical variables was quantified. DPMO and Sigma Metric was calculated using the following formula : DPMO = (number of errors × 1,000,000)/total number of specimens or requests. The DPMO rate was then converted to a Sigma value based on online calculator[4].

DMAIC strategy was formulated by the laboratory team and post training of the Laboratory and Hospital Staff, data was again collected from January, 2021 to March, 2021 and quantified into DPMO and Six Sigma in a month wise manner.

The data was plotted on MS-EXCEL and all the statistical calculations were performed on the same.

Intervention : The intervention was focussed on reorganization of laboratory workflow along with staff training. To see the impact of training after sensitization and explaining the motive of the study, a semi-structured feedback questionnaire having both closed- and open-ended questions, which was validated by 3 Lab Faculty Members, was filled by the laboratory technicians and the Hospital Staff.

Pre-intervention : All samples were received by the Clinical Biochemistry Laboratory from the IPD during January, 2020 to December, 2020 were analyzed for pre analytical errors which were documented in laboratory records. Sample rejection criteria was as follows: unclotted sample, sample contaminated with Ethylenediaminetetraacetic Acid (EDTA), sample for which only the requisition form was received and sample was not received, samples which had been received with wrong test requests or samples which have been received in wrong vials.

Postintervention : DMAIC strategy was formulated and training session were initiated amongst the Laboratory and Hospital Staff. Laboratory Information System (LIS) was installed for the first time in the Clinical Laboratory making a headway for immediate improvements with respect to certain parameters particularly patient identifiers. DPMO and Sigma metrics were calculated again post intervention for the month of January, 2021, February, 2021 and March, 2021.

Results

A total of 26,343 samples were received by the Clinical Biochemistry Laboratory in a period of one year from the IPD during January, 2020 to December, 2020. The total number of pre-analytical errors was 1691 which amounted to 6.4 % of the total of 26,343 collected samples as seen in Table 1.

Preanalytical quality indicators and their DPMO along with Sigma metrics have been tabulated in Table 1.

Amongst the total pre-analytical errors in the pre-interventional period, the most common error, 34.29% (Sigma level=3.6) was unavailibity of both the information about the location as well as registration number of the patient out of which 24.83% (Sigma level=3.7) of the samples had missing registration numbers and 9.46 % (Sigma level=4) of the samples had the IPD location missing. So maximum percentage of error comprised of missing or incomplete patient

Table 1 — *Showing DPMO and six sigma of pre-analytical quality indicators in 26,343 samples from January, 2020 to December, 2020*

Pre-analytical Variables	Frequency of errors	% of total errors	% of total patient samples	DPMO	Six Sigma score
Location/Regn no missing	580	34.29	2.2	22017	3.6(minimum)
Quantity not sufficient	220	13.01	0.838	8351	3.9(minimum)
Regn no missing	420	24.83	1.59	15944	3.7(minimum)
Location missing	160	9.46	0.609	6074	4.0(minimum)
Hemolysed sample	97	5.73	0.3682	3682	4.2(good)
Sample not clotted	47	2.77	0.18	1791	4.5
Contaminated sample	79	4.67	0.299	2999	4.3
Diluted sample	7	0.41	0.0266	267	5
Sample not received	47	2.77	0.1784	1784	4.5
Wrong test	25	1.47	0.094	953	4.7
Wrong vial	6	0.35	0.023	229	5.1
Unlabelled sample	3	0.177	0.011	114	5.2
Empty Vial	2	0.11	0.008	76	5.3
Total	1691(6.4%)				

identifiers. These samples were not rejected but tested and reports were given to the patient based on their demographics wherever possible. Detailed comments were added notifying the clinicians of possible sources of errors and the need to rectify them or repeat the test to avoid identification fallacy.

Apart from this, the Sigma scores for inadequate volume of sample (13.01%) and hemolyzed samples (5.73%) was 3.9 and 4.2 respectively in the pre-intervention period.

After implementation of DMAIC strategy and optimization of work flow, postintervention Sigma metrics was tabulated and can be seen in Table 2.

Discussion

This study was undertaken in the Department of Clinical Biochemistry laboratory for a duration of one year with a view to identify the Sigma Metric Level at which the laboratory was functioning. Following this, DMAIC approach was applied and Six Sigma was reassessed to see improvement in the control processes. The main objective behind this study was to identify indicators which have poor or minimum acceptability and take steps in improvising those areas by careful utilization of the available manpower and resources, optimizing their use and thereby improving upon the Sigma score. Our goal was never to attain a sigma score of 6. However, improvement on the present scores has been the agenda. To attain the present aim, the basic scientific model that we decided to use was the 'DMAIC': Define, Measure, Analyze, Improve and Control approach. *Define* corresponds to the plan step *measure* to the do step, *analyze* to the check step, *improve* to the act step, and *control* to the prevention of the error occurring again. This is a powerful tool because we can plan more effectively until we obtain a desirable degree of quality. The pre-analytical quality indicators for which DMAIC was applied were Hemolysis, incomplete patient identifiers such as location/ward and registration number and insufficient sample volume. Training on sample collection techniques was provided whenever possible via both the online and the offline mode. The DMAIC strategy as applied has been mentioned below:

Define : The main objective in this stage was to identify with the problem areas in the pre-analytical phase. In a Medical Laboratory Six Sigma process focusses on improvement of patient/clinician satisfaction. The Critical to Quality (CTQ) indicators were the quality indicators chosen for this phase. The Suppliers Input Process Output Customers (SIPOC) map helped in defining the problem.

In our hospital, requisition forms received from the IPD are filled up by the Medical Interns and Nurses with patient particulars. Ideally the requisition form should include the patient particulars such as name, age, gender, ward, registration number, test name, sample type, clinical diagnosis and date and time of sample collection. It was noted that the requisition forms were mostly incomplete with details about patient identification such as location/ward and registration number missing. This was an eye-opener as even the WHO recommends that at least two patient identifiers should be present on vacutainers and requisition forms for identification of patient sample and dispatch of reports[5]. Since this study includes population from the IPD, it was deemed necessary to *define* this problem with the help of SIPOC map as shown below in Fig 1.

Table 2 — *Showing comparison of Six sigma metrics of the pre-analytical variables in the pre-intervention and postintervention period spread over a period of three months*

Pre-Analytical Variable	Pre-intervention Jan 2020 to Dec 2020		Postintervention (DMAIC and LIS) Jan 2021	Feb 2021	March 2021
Location/regn No missing	3.6(minimum)	DMAIC & LIS Installation	3.9	4	4(good)
Insufficient volume	3.9(minimum)		4.7	4.4	4.7(good)
Regn no missing	3.7(minimum)		3.9	4.2	4.3(good)
Location missing	4.0(minimum)		3.4	3.4	3.6(minimum)
Hemolysed sample	4.2(good)		4.2	4	4.6(good)

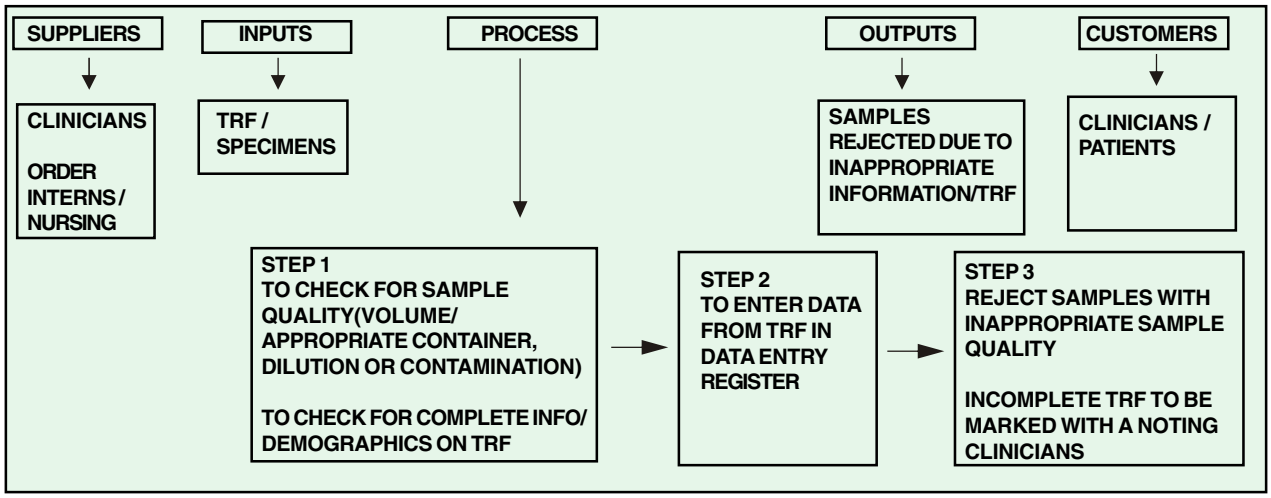

Fig 1 — Showing the SIPOC map for defining the pre-analytical phase of sample collection as a part of process improvement

Measure : In our study in the pre-interventional phase, we measured the DPMO and Six sigma scores. This phase tells us metrically where our lab performs. Hemolysis was seen to be the third most common pre-analytical error with sigma score of 4.2. However, Zaini *et al* in their study mentioned that Hemolysis was the most common error in their setting[6]. Grecu *et al* in their study also mentioned that the hemolysis was the most frequent error in their setting[3]. For Hemolyzed samples, the most recommended provisional specification is 0.6%which is equivalent to sigma value of 4.1 as reported by Gomez *et al*[5]. The most common location from where the Hemolyzed samples were received in our setting was the Hospital Nursery. It is not uncommon for the Sample from Neonates and Children to be hemolyzed . However, due to decreased admission rates in the age group <16 years during the COVID Pandemic, number of such samples received might have been less. However, when we converted our DPMO value into its corresponding Sigma value it turned to be 4.2 on the Sigma Metric Chart which showed an overall acceptable performance. The Sigma score for insufficient sample volume was 3.9 which depicts minimum acceptability. A study done by Alsina *et al* reported a Sigma value of 4.3-5 as specification for insufficient sample[5]. Sigma scores for unavailabity of both the information about the location as well as registration number of the patient, missing registration number and missing information about the ward was 3.6 , 3.7 and 4.1 respectively .

Analyze : By the data measured we tried to find out the root cause analysis of the pre- analytical errors. Qualitative analysis of the preanalytical errors by means of Fish bone diagram was done as shown in Fig 2.

Errors due to Haemolysis and insufficient sample volume demanded resampling and is identified as a non-value-added activity and bottleneck in blood collection in pre-analytical processes[7]. Observations and interviews of the Technical Staff, Nurses and Interns helped us identify error-prone practices and process variation. This needed to be addressed because resampling or double pricks would definitely add to the increase in the turn-around -time for the patient, over and above to the negative feedback and patient dissatisfaction. With regards to patient identifiers, it was observed that the data used to be either missing or incorrect. This would lead to wrong reporting against the sample tube in case the identification particulars are not mentioned on the sample tube and similarly on the requisition form. Maximum number of hemolyzed and insufficient samples mostly came from the Neonatal ICU, Pediatric Wards and Patients of the Geriatric Age Group. Hence, it was found to be pertinent enough to measure these pre-analytical errors, identify the particular ward and the particular phlebotomist.

Improve : The labelling errors in the pre-intervention phase were best solved by the installation of Laboratory Information System (LIS). The laboratory earlier did not have the facility of LIS and hence, installation of LIS along with proper training of the Hospital Staff reinforcing the importance of patient identifiers appeared to be the most common solution. Presence of LIS facilitated in data management and tracking. LIS can help us correctly identify the patient, the location where the patient is admitted, the treating physician, the name, age and gender of the patient. With this myriad of information which can be correctly obtained through the LIS and that too in an organized

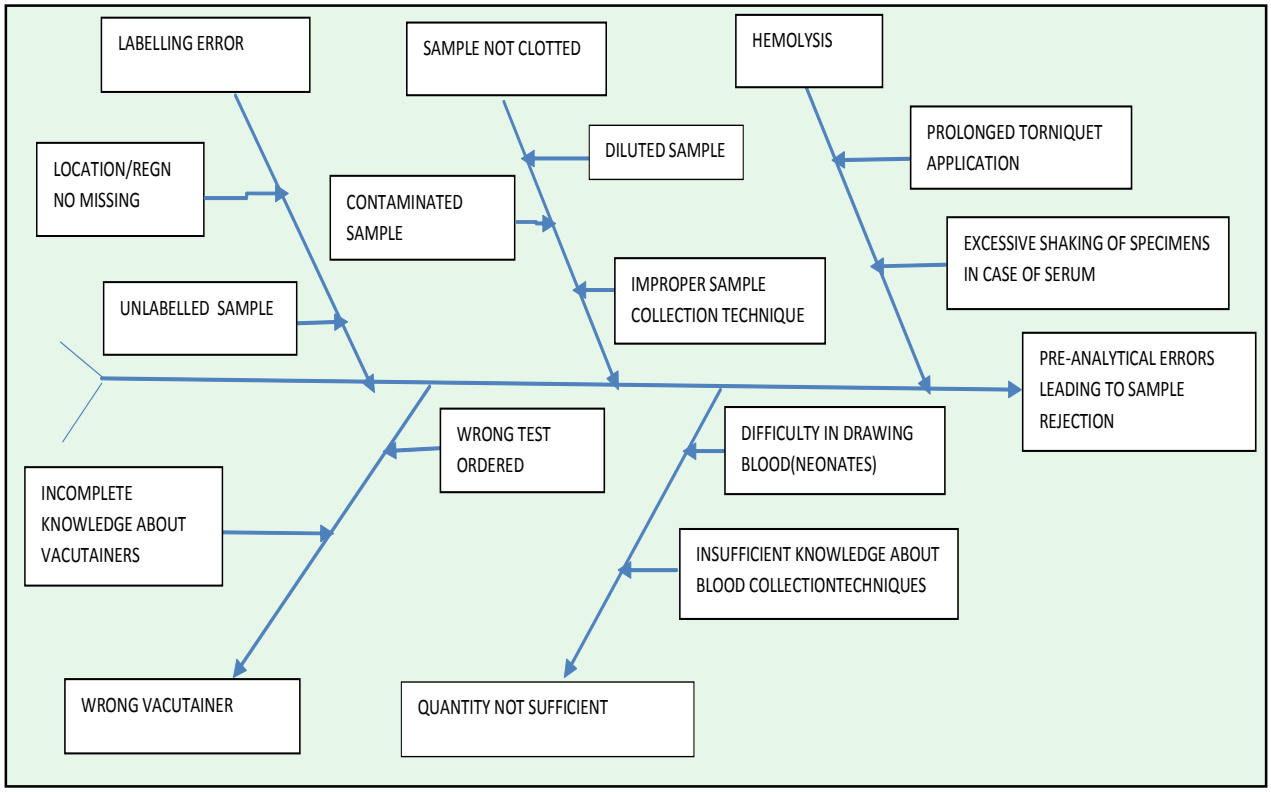

Fig 2 — Showing Root Cause Analysis using Fishbone Diagram/Ishikawa Technique as Part of the Analyze Phase of the DMAIC Strategy

manner, definitely warrants the installation of such a system in the laboratory. The benefits of the LIS further outweigh its cost. Hence, after installing the LIS in the month of January, 2021, a follow-up study was planned to validate the solution by comparing the pre- and postintervention DPMO and Sigma score.

The best possible way to improve the sample collection technique thereby controlling the rate of Haemolysis or inadequate sample volume, was training the phlebotomist, the nurses in the IPD and the Interns. Before starting the training process, we decided on assessing them via a pre-test with regards to their knowledge on sample collection techniques. Based upon their test scores problem areas were defined and identified with. It was important to put across the impact of Homolysed sample on patient results and the treatment that follows based on those results to make the workforce realise the impact of correct techniques. Study materials were prepared which included various causes of Haemolysis, appropriate sample collection techniques were dealt in details and included in the SOP of the sample collection centre and also circulated amongst the Nurses and the Interns via face-to -face classes and also via the online mode. Continuous training was provided and the work was properly monitored. A post- test assessment was then done to identify the improvement. We decided to calculate the Sigma Metric value post intervention to get a real time idea about the performance of the indicators. Overall increase in the Sigma score was seen for Haemolysis in the month of March with a Sigma score of 4.6 against 4.2 in the pre-interventional period as seen in Table 2.

Samples from Neonates, Geriatric, Pediatric population group, Ignorance amongst phlebotomist, samples from patients on chemotherapy, patients with Chronic disease are other causes for insufficient sample volume. Hence, this group was given special attention and training initiated according to the SOPs. The sigma scores in the pre-interventional period were 3.9 which improved to 4.7 in the month of March in the postinterventional phase.

The advantages of LIS were tapped in after its implementation. Postintervention in the period from January, 2021-March, 2021the Sigma value for the missing registration number, for missing location and for both the location and registration no missing was 4.3, 3.6 (minimum acceptability) and 4 respectively. This showed an improved performance and acceptability than the pre-intervention values.

Control : Our objective in the last stage was to develop metrics that would help monitor and document continued improvement. Six Sigma strategies are adaptive and ongoing. Adjustments can be made and new changes may be implemented as a result of the completion of this first cycle of the process. The performance of the quality indicators after improvement has to be measured routinely and accordingly adjustments have to be made in operations. If the Control phase is not implemented, the processes may revert the project to its previous state[7].

The DMAIC approach led to the improvement in the Sigma scores of patient identifiers, Hemolysis and insufficient sample volume. However, the Sigma scores for registering the location/ward showed a downtrend. Further training, optimization of resources, changes in the present techniques and adaptability of the workforce to these changes will be required.

Limitation :

The most important limitation of the present study was that the retrospective data was that of during the First wave of COVID in India. The number of samples received were less compared to Non-COVID times. However, we may assume that since the results were quantified in terms of percentage of defects and DPMO, it may help us in adjusting the biasness due to reduced sampling.

Conflicts of Interest : None declared.

Funding : This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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Original Article

Are the COVID Warriors Confident about COVID Vaccine? A Survey among the Healthcare Workers of West Bengal to Explore their Perception about COVID-19 Vaccine and causes of Vaccine Hesitancy

Aditi Chaudhuri[1], Dhritiman Chakraborty[2], Subhro Chakraborty[3], Pradip Kr Mitra[4]

Introduction : Deaths of Healthcare Workers (HCWs) from COVID-19 infection were reported from various parts of West Bengal months after rolling out of Vaccines for them. Empirical data suggested that those HCWs who died due to COVID- 19 were either not vaccinated or partially vaccinated. which points to Vaccine hesitancy among them.

Objectives : (1) To study the perception of HCWs of West Bengal about COVID-19 Vaccine. (2) To determine the level of vaccine hesitancy and its causes among the study population.

Methods : A cross sectional exploratory survey was conducted on 400 HCWs. A prevalidated questionnaire was administered which contained questions on profile of the study population, perception about COVID-19 Vaccine, Vaccine hesitancy.

Results : 70% of the study population were nurses and only 13% were trained in COVID-19 Vaccination. 44% chose Mask as the most effective strategy to prevent COVID infection followed by Vaccination (36%), social distancing and sanitization. 37% HCWss were hesitant to take Vaccine when offered. Causes of Vaccine hesitancy as admitted by the study population - doubts about Vaccine effectiveness (56%), concern about side effects (30%), difficulty in availability of Vaccine (9%) and confusion about Vaccination strategy (5%).

C**onclusion :** Vaccine confidence among HCWs can inspire the general public for a better coverage of Vaccine among all. The findings of this study will help the program managers to effectively plan strategies to enhance risk perception and Vaccine confidence among General Public. [*J Indian Med Assoc* 2022; **120(2):** 23-6]

***Key words* : Vaccine acceptance, Vaccine confidence, Vaccine hesitancy, COVID-19, HCWs.**

Since December 2019, COVID-19 has affected more than 3 million people of the World and continues to spread in cycles. A month later, the World Health Organization (WHO) announced COVID-19 as a Public Health Emergency[1]. By the end of 2020, United States (9,208,876 cases), India (8,229,313), and Brazil (5,545,705) were the three most affected countries due to this outbreak[2]. Due to increased exposure and higher rates of transmission among the medical fraternity, the Healthcare Workers (HCWs) with COVID-19 infection expressed symptoms of mood swings and sleep disorders[3]. Similar studies from Iran[4] and China[5] revealed that the nurses experienced extreme physical and mental fatigue while rendering patient care thus affecting the quality of care. A study in Greece[6] revealed that Nurses and Doctors working in public hospitals had issues of sleep disturbances during the pandemic.

Editor's Comment :

- Vaccine hesitancy is complicated, situtaion specific and it varies across time, place and vaccines. Various factors like complacency, convenience and confidence influence vaccine hesitancy. It is essential to generate vaccine confidence in general public to ensure higher coverages that ultimately will help to fight against a vaccine preventable disease.

In Ethiopia[7], HCWs reported that they were overburdened due to the increased number of COVID-19 patients admissions. Another study from Pakistan revealed that COVID-19 exposure had a considerable influence on the mental health of HCWs[8].

It is essential for all individuals to understand the risks of COVID-19 disease and also follow COVID Appropriate Behavior (CAB) like using Mask, regular Sanitization, maintaining Social Distance to limit its spread. This is more so in case of HCWs who should act as role models for general public in following CAB. Since the HCWs work at hospitals they have higher risk of secondary infection or spreading the Virus to colleagues, family and friends[9], which can only be prevented if the HCWs have appropiate knowledge of the disease and infection control measures. Another important aspect to mitigate pandemic risk is to ensure high immunization coverages against COVID-19, which is being rolled out in a prioritized strategic manner starting with HCWs. In India, Covishield a recombinant

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Received on : 08/12/2021
Accepted on : 15/02/2022

Vaccine against the spike proteins and Covaxin, an inactivated vaccine were offered exclusively to the HCWs and the Frontline workers to protection against COVID-19 infection and its complications and also to prevent the spread of COVID-19 infection among the community.

The VIN-WIN study, conducted on 1.59 million HCWs and Front Line Workers of Indian Armed Forces revealed that vaccination with Covishield Vaccine reduced the risk of breakthrough infections by around 91 - 94%.[9] But in West Bengal, deaths of HCWs were reported from various parts of the state even months after rolling out of Vaccines for HCWs. Empirical data suggested that those HCWs who died due to COVID- 19 were either not Vaccinated or partially Vaccinated. Till date there is no study in the State of West Bengal to investigate whether Vaccine hesitancy existed among the HCWs and the causes of such Vaccine hesitancy. Vaccine hesitancy refers to delay in acceptance or refusal of Vaccines despite availability of vaccine services[10]. Vaccine hesitancy is complicated, situation specific and it varies across time, place and Vaccines. Various factors like complacency, convenience and confidence[10]. It is essential to generate Vaccine confidence in general public to ensure higher coverages influence vaccine hesitancy. On the other hand, Vaccine confidence among HCWs can inspire even the general public to have better Vaccine confidence leading to a better coverage of Vaccine among the general population. This might help us to inform the program managers to effectively plan strategies to enhance knowledge and Vaccine confidence among general population.

With the above background, the present study was contemplated with the following objectives.

Aims and Objectives

(1) To study the perception of HCWs of West Bengal about COVID-19 Vaccine.

(2) To determine the level of vaccine hesitancy and its causes among the study population.

Materials and Methods

A cross sectional exploratory survey was conducted from August, 2021 to November, 2021 involving HCWs (Doctors and Nurses) presently working under Government of West Bengal. The study site was the Apex training centre for the HCWs of West Bengal.

Sample size and Sampling : According to the systemic review on Worldwide Vaccine Hesitancy conducted by Sallam M[11] eight surveys on HCWs were identified with Vaccine acceptance rates ranged between 27.7% in the Democratic Republic of Congo to 78.1% in Israel (average = 52%). Considering the above, we considered an average prevalence of Vaccine hesitancy as 48% among HCWs, the sample size for the survey will be =(1.96 x 1.96x 0.48 x 0.52)/ (0.05x0.05)= 383. Total 400 HCWs including Doctors and Nurses who attended any training program at the Apex training centre of West Bengal during the mentioned period were included in the study after obtaining informed consent from them. A prevalidated questionnaire was filled up by the study population after the instructions were explained to them. The questionnaire consisted of 3 parts- A. Profile of the study population included informations on job profile, specific role in COVID-19 mangement, training in COVID-19 vaccination, exposure in COVID ward, whether infected with COVID-19 etc. B Perception about COVID-19 Vaccine including safety measures against COVID-19. C Vaccine Hesitancy and its causes.

Data Entry & Analysis : Data was entered in MS EXCEL sheet and analysis was done.

Ethics : Ethical approval for the study was obtained from Institutional Ethics Committee.

Results

Table 1 shows the Profile of the study population relevant to the present study. Majority of the study population were nurses (70%), 56% involved in patient care, only 13% were trained in COVID-19 Vaccination, 16% had exposure in COVID Wards, and 21% were infected with COVID-19 Virus at least once in lifetime.

Table 2 describes the perception of the study population about COVID-19 Vaccine. Majority study participants chose Mask (44%) as the most effective strategy to prevent COVID infection followed by vaccination (36%), Social distancing and Sanitization. Most (46.5%) of the study participants opined that the vaccination roll out was done in a hurry. Majority admitted that they got information on vaccines from the Government Agency and preferred Indian made Vaccines over Foreign Vaccines. When asked about challenges against the vaccination program in India, 51% pointed out that emergence of new strains was the most important challenge followed by lack of awareness, large population size, rumours and social taboos.

Table 3 shows that in the present study, 148 out of 400 (37%) HCWs admitted that they were not ready to take vaccine when offered.

Fig 1 shows the distribution of study population (n=148) according to the cause of Vaccine hesitancy as admitted by the study population - doubts about vaccine effectiveness (56%), concern about side effects (30%), rumours about Vaccine in Social media (9%) and confusion about vaccination strategy (5%).

Fig 2 showing the bar diagram depicts the causes of non receipt of COVID -19 Vaccines among 40 participants (out of the 148 Vaccine Hesitant HCWs) who did not receive vaccines till the end due to reasons

Table 1 — *Profile of the study participants (n=400)*

Variables	Values in numbers
Gender :	
Male	108
Female	292
Age (years) :	
Mean	38
Marital Status :	
Married	268
Unmarried	132
Job profile :	
Doctor	120
Nurses	280
Educational status :	
Postgraduate	248
Graduate	152
Residence :	
Urban	324
Rural	76
Received training in COVID-19 vaccination :	
Yes	52
No	348
Specific role in COVID-19 management :	
Patient care	224
Monitoring	96
Training	28
Administration	52
Exposure in COVID wards :	
Yes	64
No	336
Infected with COVID-19 Virus at least once in lifetime :	
Yes	84
No	316

Table 2 — *Perception of study population about COVID-19 vaccine (n=400)*

Variables	Values
Most effective Preventive Strategy against COVID-19 infection :	
Vaccine	144
Mask	176
Social distancing	64
Sanitization	16
Source of information for COVID-19 vaccines :	
Government agencies	204
News/Television	112
Social Media	44
Friends	12
Health Personnel	28
Roll out time of vaccination :	
Appropriate	116
Delayed	98
Done in hurry	186
Challenges for vaccination programme : (multiple options)	
Emergence of new strain	188
Lack of awareness	96
Rumours	76
Social taboo	40
Large size of population	52
Budget constraint	12
Preference for vaccine manufacturer in future :	
Indian	364
Foreign	76

like- Allergy (13) , COPD (4), Fever (3), Lactating mother (4), COVID positive (4), doubt about effectiveness (4), fear of side effects (4), rheumatoid arthritis (4).

Discussion

This study assesses the perception of the HCWs of West Bengal about COVID-19 vaccine and the cause of Vaccine Hesitancy among them. Results were vital to increase the compliance to vaccination guidelines in order control the COVID-19 Pandemic. In the present study majority of the study population were involved in patient care (56%), 16% had exposure in COVID Wards and 21% were infected with COVID-19 virus at least once in lifetime, only 13% were trained in COVID-19 Vaccination and 46.5% of the study participants opined that the Vaccination roll out was done in a hurry. 51% study population admitted that they got information on Vaccines from the Government agency which is similar to the results of a study in Saudi Arabia where 65.4% obtained COVID-19 information from Ministry of Health[12]. This points to the fact that Government websites provides reliable and Updated health information for improving knowledge of HCWs. Majority (44%) study participants in the present study chose Mask as the most effective strategy to prevent COVID infection followed by vaccination (36%), social distancing and sanitization. When asked about challenges against the vaccination program in India, 51% of the study participants perceived that emergence of new strains was the most important challenge followed by lack of awareness, large population size, rumours and social taboos. Similarly in a study at Mumbai, Modi & Nair[13] found out that the 75% were aware of the various infection control measures like respiratory hygiene, cough etiquette and having a separate, well ventilated waiting area for suspected COVID-19 patients. In another study from Saudi Arabia[12] 96.85% nurses demonstrated excellent knowledge about COVID-19 and 83.2% reported significant knowledge of prevention. A study from Iran also showed good awareness and perception of nurses about COVID-19 infection[14]. In the present study 37% HCWs admitted that they were not ready to take vaccine when offered. According to the systemic review conducted by Sallam M[11] on Global Vaccine hesitancy, only eight surveys among HCWs (Doctors and Nurses) were found, with vaccine acceptance rates ranging

Table 3 — *Vaccine Hesitancy*

Vaccine hesitancy in the present study = 148/400 x 100 = 37%

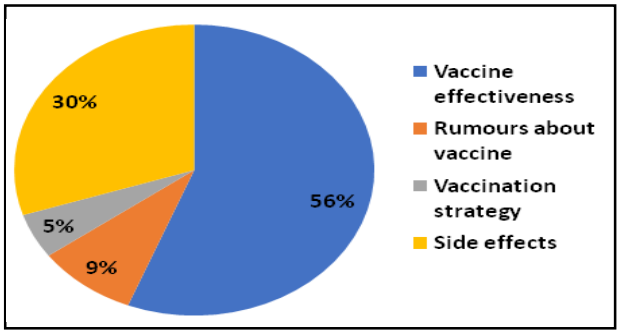

Fig 1 — Causes of Vaccine Hesitancy (n=148)

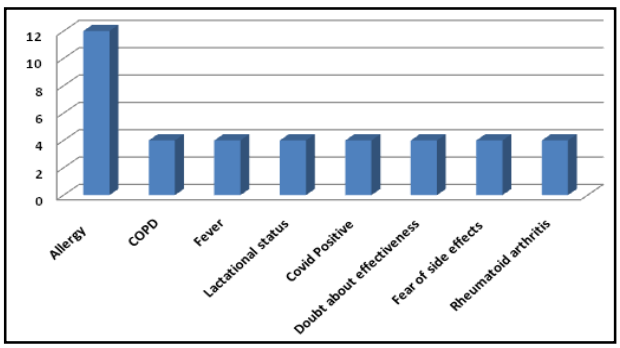

Fig 2 — Causes of non receipt of vaccine (n=40)

from 27.7% in the Democratic Republic of the Congo to 78.1% in Israel. When asked about the causes of vaccine Hesitancy, our study population admitted that they were hesitant about Vaccination due to doubts about Vaccine effectiveness (56%), concern about side effects (30%), rumours about vaccine in social media (9%) or confused with the vaccination strategy (5%). In a similar study from France[15] 80% of healthcare workers could accept the Vaccination against COVID-19 with willingness to get the vaccine increased over time and as Immunization programs became available. Among hesitant professionals, the fear of adverse events was the main concern.[15] According to the WHO/ UNICEF Joint Reporting Form data analysis over three years (2015-2017)[16], knowledge or awareness was the commonest cause of Vaccine Hesitancy in low income countries whereas in upper middle and high income countries risk/benefit (effectiveness *versus* side effect) was most important reason across all three years. In addition to these, religion/culture/socio-economic factors were determining factors behind vaccine hesitancy[10]. Similarly previous studies[10] on Vaccine Hesitancy has so far pointed out that the causes can be grouped under- Awareness, Apprehension, Access, Affordability which can be addressed by patience, learning, persuasion, partnership and planning[17,18]. The baseline information on the interplaying factors that influence vaccination decisions as found in the present study will enable Health Authorities to increase Vaccine coverage for combating the COVID-19 pandemic.

Conclusion :

The present study has a definite role for improvement of guidelines for COVID-19 prevention and control. Additionally the study identified key considerations for designing of a comprehensive training program for HCWs for improvement of their clinical knowledge. Simultaneously, regular updation of websites of MOHFW, WHO and CDC are necessary. Apart from the present COVID-19 pandemic, in future the HCWs may have to deal with many more newer communicable infections. Keeping this in mind, a long-term policy with appropriate infrastructures has to be planned for strengthening of Healthcare Systems. All these will prepare the HCWs to respond timely and appropiately to all future public health emergencies.

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Original Article

Comparative Efficacy of Hydrochlorthiazide and Chlorthalidone, used either alone or in Combination Therapy in Patients with Essential Hypertension in Tertiary Care Hospital of Uttrakhand

Manira Dhasmana[1], Amit Varma[2]

Aims : To study the comparative efficacy of Hydrochlorothiazide and Chlorthalidone, either used alone or in combination on Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Lipid Profile and Anthropometry.

Methods : It was a Prospective, Randomised, Longitudinal study, where consecutive patients presenting to medicine Out Patient Department (OPD) and In Patient Department (IPD) were screened for essential hypertension based upon the JNC VII Guidelines. Those subjects who satisfy the inclusion and exclusion criterias were included in the study. These subjects were divided into four subgroups. Each patient was assessed for Blood Pressure (BP), Lipid profile, Anthropometry for a period of 180 days.

Results : There was statistically significant reduction in both systolic blood pressure and DBP in both the groups over a period of 180 days. This trend was progressive during the observed period in both the groups till a stable state was reached. There was a greater reduction in the SBP in the chlorthalidone group as compared to the Hydrochlorothiazide group (P value 0.05). However, such trend was not observed on the DBP on the two groups. Over a six months follow up there was no change in the Lipid parameters either on the same group or while comparing the two groups. The body Anthropometry , especially waist Hip ratio and Body Mass Index also did not show any significant difference in the two groups(either used alone or in combination).

Conclusion : Chlorthalidone was found to be a relatively more potent Anti-hypertensive on SBP when compared with Hydrochlorothiazide .Both these drugs failed to show any significant difference in the Lipid Profile and Anthropometry in a period of six months.

[*J Indian Med Assoc* 2022; **120(2):** 27-31]

Key words **: Systolic Blood Pressure, Diastolic Blood Pressure, Hydrochlorithiazide, Chlorthalidone, Joint National Commitee.**

Hypertension is a Global Pandemic which has not respected the boundaries .Prevalence varying from 3.80-32.8% in men and 1.45-39.4% in women in the Urban areas and 1.57 to 36% in men and 2.38-37.21% in women in the Rural areas of India have been reported.

Recently an interest has been generated in the use of Chlorthalidone and Hydrochlorothiazide as an anti-hypertensive used alone or in combination with other anti-hypertensive agents. These two drugs came into existence almost simultaneously (Hydrochlorothiazide established in 1959 and Chlorthalidone in 1960) and had similar efficacy in terms of anti-hypertensive effect.

Hydrochlorothiazide and Chlorthalidone differ significantly in chemical structure but both contain a sulfonamide group that inhibits carbonic anhydrase activity, which may be associated with lower vascular contractility. Both drugs are concentrated in the Kidney and secreted into the Tubular Lumen[1]; therefore, their Therapeutic Diuretic Effects are often achieved with relatively Low Plasma Concentrations.

Low-dose Thiazide-type diuretics are recommended as initial therapy for most hypertensive patients. Chlorthalidone has significantly reduced Stroke and Cardiovascular End Points in several landmark trials; however, Hydrochlorothiazide remains favored in practice. Most clinicians assume that the drugs are interchangeable but their anti-hypertensive effects at lower doses have not been directly compared.The

Editor's Comment :

- Both these compounds were discovered at almost the same time with almost similar pharmacological profile.
- Both showed significant reduction of systolic and diastolic blood pressure. The reduction of systolic blood pressure was more statistically with chlorthalidone as compared to hydrochlorthiazide. The reduction in diastolic blood pressure was similar with the two drugs.
- There was no significant difference with these two drugs with respect to lipid profile and anthropometry.

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Received on : 13/10/2020
Accepted on : 22/11/2021

perspective of the study was to explore the strength and weakness of the two groups including their effects on various parameters effecting themorbidity and mortality.

Aims and Objectives

(1) To study the comparative efficacy of Hydrochlorothiazide and Chlorthalidone, either used alone or in combination on Systolic and DBP.

(2) To study the comparative efficacy of Hydrochlorothiazide and Chlorthalidone, either used alone or in combination on Lipid profile.

(3) To study the comparative efficacy of Hydrochlorothiazide and Chlorthalidone, either used alone or in combination and their effect on anthropometry

Material and Methods

The study was a Prospective, Randomised, Longitudinal study in the Department of internal medicine in Sri Guru Ram Rai Institute of Medical and Health Sciences and Sri Mahant and Indresh Hospital (SMIH), Dehradun where consecutive patients presenting to Medicine OPD and IPD were screened for essential Hypertension based upon the JNC VII Guidelines. Those subjects who satisfy the inclusion and exclusion criterias were included in the study. These subjects were divided into four subgroups

GROUP 1 : would include patients on Hydrochlorothiazidealone. GROUP 2: would include patients on Chlorthalidone alone.

GROUP 3 : would includepatients on Hydrochlorothiazide in Combination Therapy with other Anti-hypertensive .

GROUP 4 : would include patients on chlorthalidone in combination therapy with another anti-hypertensive.

Each patient was assessed for Blood Pressure, Lipid Profile, Anthropometry for a period of 180 days.

Results

There was statistically significant reduction in both Systolic Blood Pressure and Diastolic Blood Pressure in both the groups over a period of 180 days . This trend was progressive during the observed period in both the groups till a stable state was reached. It was interesting to observe that the reduction in the Systolic Blood Pressure was insignificant in the Hydrochlorothiazide and Chlorthalidone group until day 15 and the difference became significant beyond 30 days (Table 1). This clearly implies a greater reduction in the Systolic Blood Pressure in the Chlorthalidone group as compared to the Hydrochlorothiazide group. However, such trend was not observed on the Diastolic Blood Pressure on the two groups (Table 2). Also the serial reduction in Blood Pressure in the Hydrochlorothiazide and Chlorthalidone group was not as gradual and significant as was observed with the Systolic Blood Pressure. Over a six months follow up there was no change in the Lipid Parameters either on the same group or while comparing the two groups.

Table 1 — *Comparative Evaluation of Systolic Blood Pressure in Patients on HCTZ and CTD Used Alone (Group 1 and 2) and in Combination (Group 3 And 4)*

	Day 0 (a)	Day 15 (b)	Day 30 (c)	Day 60 (d)	Day 120 (e)	Day 180 (f)	P Value
GP 1	152.4 ± 5.42	148.65 ± 6.57	147.59 ± 5.07	144.78 ± 4.64	141.48 ± 5.15	138.41 ± 4.73	a-b<0.05 b-c>0.05 c-d<0.05 d-e<0.05 e-f<0.05
GP2	150.99 ± 6.49	145.68 ± 5.28	144.07 ± 5.76	140.56 ± 5.28	138.48 ± 5.21	133.96 ± 5.17	a-b<0.05 b-c<0.05 c-d<0.05 d-e<0.05 e-f<0.05
P Value	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	
GP 3	153.73 ± 6.07	149.09 ± 5.59	148.53 ± 5.68	144.30 ± 4.44	138.53 ± 4.39	132.24 ± 4.14	a-b<0.05 b-c>0.05 c-d<0.05 d-e<0.05 e-f<0.05
GP 4	152.44 ± 5.49	147.16 ± 5.21	144.75 ± 4.52	140.81 ± 3.44	135.98 ± 4.36	132.35 ± 4.13	a-b<0.05 b-c<0.05 c-d<0.05 d-e<0.05 e-f<0.05
P Value	>0.05	>0.05	<0.05	<0.05	>0.05	<0.05	

Table 2 — *Comparative Evaluation of Diastolic Blood Pressure in Patients on HCTZ and CTD Used Alone (Group 1 and 2)*

	Day 0 (a)	Day 15 (b)	Day 30 (c)	Day 60 (d)	Day 120 (e)	Day 180 (f)	P Value
GP 1	92.59 ± 4.47	91.15 ± 4.32	91.15 ± 3.26	90.42 ± 3.27	89.63 ± 1.93	85.42 ± 5.09	a-b<0.05 b-c>0.05 c-d>0.05 d-e>0.05 e-f<0.05
GP2	93.52 ± 4.43	90.00 ± 3.65	90.50 ± 3.04	89.59 ± 3.51	87.97 ± 4.35	84.23 ± 4.98	a-b<0.05 b-c>0.05 c-d<0.05 d-e<0.01 e-f <0.05
P Value	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	
GP 3	92.55 ± 3.66	89.69± 4.54	88.82 ± 3.25	90.00 ± 00	88.24 ± 3.85	81.90 ± 3.97	a-b<0.05 b-c>0.05 c-d<0.05 d-e<0.05 e-f<0.05
GP 4	92.44 ± 4.35	90.27± 1.64	89.50 ± 1.52	90.00 ± 00	86.59 ± 4.80	81.39 ± 3.51	a-b<0.05 b-c<0.05 c-d<0.05 d-e<0.05 e-f<0.05
P Value	>0.05	>0.05	<0.05	>0.05	>0.05	>0.05	

The body Anthropometry, especially waist Hip Ratio and Body Mass Index (BMI) also did not show any significant difference in the two groups (either used alone or in combination) (Figs 1 & 2).

Discussion

The study was planned with the background that the Thiazide Group of diuretics are often considered a homogenous therapeutic class, where all Agents reduce Blood Pressure consistently and also reduce life threatening events including Cardiovascular Risks. While Hydrochlorothiazide is a prototype Thiazide, Chlorthalidone is a thalimide persisting Distinct Pharmacokinetics. Whether this unique effect results in Meaningful Pharmacodynamic Differences in hypertensive patients needed active evaluation.

The two drugs in the same class where developed around 1957 (Hydrochorthiazide in 1957 and Chlorthalidone two years later) although they were developed at almost the same time but probably due to different marketing strategies, Hydrochlorothiazide became more popular in united states and Chlorthalidone in United Kingdom. India has followed the American Trend. The idea of this study was to further evaluate whether the Thiazide group is truly a homogenous group as recommended by the Joint National Committee or are there Intergroup Differences both in relation to the Systolic and Diastolic Blood pressure and also the effect on the Lipid Profile.

On comparing group 1 and group 2 it can be seen that at the beginning of the study they were matched for age, sex, mean duration of illness, Systolic Blood Pressure, Diastolic Blood Pressure, Lipid Profile and Anthropometry. In group 1 females outnumbered males (15:12) with a mean duration of illness of 4.2 ±2.1

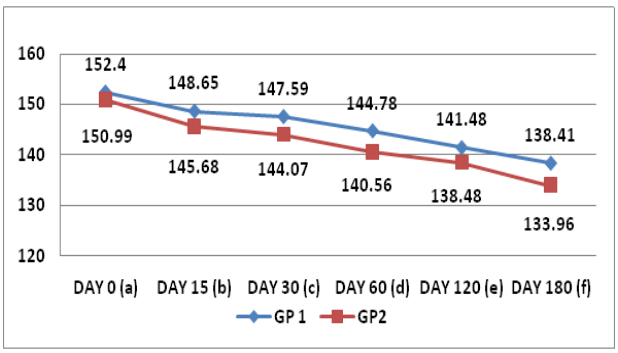

Fig 1 — SBP Changes (Group 1 *versus* 2)

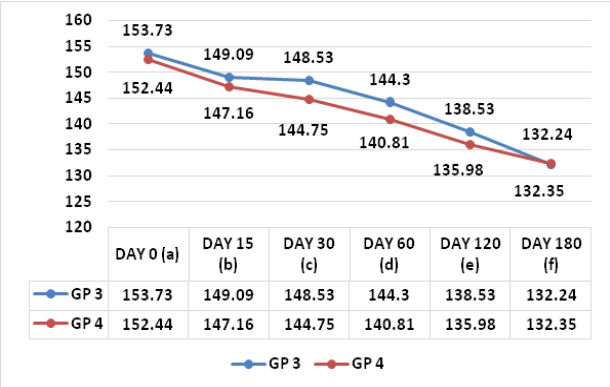

Fig 2 — SBP Changes (Group 3 *versus* 4)

years. Similarly , in subjects on Chlorthalidone (Group 2), females outnumbered males (50:31) with the mean duration of illness 4.8±1.8 years and hence the groups were comparable.

There was statistically significant reduction in both Systolic Blood Pressure and Diastolic Blood Pressure in both the groups over a period of 180 days (Tables 1 & 2). This trend was progressive during the observed period in both the groups till a stable state was reached. The serial reduction in Diastolic Blood Pressure in the Hydrochlorothiazide and Chlorthalidone group was not as gradual and significant as was observed with the Systolic Blood Pressure. The similar results were observed by Michael E Ernst *et al* where the reduction was more in the Systolic Blood Pressure in the Chlorthalidone Group[2].

It is known, that in the long term, Thiazide diuretics appear to reduce Blood Pressure by reducing peripheral resistance rather than by their diuretic effects[3], suggesting a Direct Vascular Dilating Action. Concentration-dependent relaxant effects of HCTZ have been demonstrated in animal and humanvascular smooth muscles. Mironneau et al. reported that HCTZ and Chlorthalidone, depressed isometric contractions, calcium contractures and membrane potentials in isolated longitudinal strips from Rat Portal Veins and suggested that this action was related to a decrease in the transmembrane Ca2+ influx. It has also been shown that HCTZ and CTD had direct relaxing actions in human subcutaneous resistance Arteries and that this action could be mediated by the Ca2+-activated K+ channel K(Ca2+)[4,5]. This vasodilator activity was also related to a decrease in intracellular Ca2+. In vivo, HCTZ at supra-therapeutic doses (3.5 0.3 lg/mL) exerted no vasodilator action in the human forearm[6]. However, at higher doses (11.0 1.6 lg/mL) HCTZ Demonstrated a Small Vasodilator Effect in the human forearm that was inhibited by tetraethylammonium, suggesting the involvement of vascular K(Ca2+) channels in these effects . At present, however, there is no concluding evidence to explain the decrease in Blood Pressure during the long-term treatment with HCTZ and CTD. On the other hand, it is known that Chlorothiazide causes a sustained raise in intracellular Ca2+ in distal convoluted and connecting tubules that is due to a Dihydropiridine-sensitive Calcium Influx through a Ca2+ channel composed of a1C and b3 subunits[7]. Also, little is known about the Cardiac cellular actions of Thiazide diuretics.

Also, those who were within 10 mm Hg goals Systolic Blood Pressure, had a higher likelihood of achieving goal Blood Pressure after they changed to Chlorthalidone. This difference may be attributed to a longer half-life of Chlorthalidone (45-60hours) in comparison to shorter acting Hydrochlorothiazide (half-life : 8 - 15) hours. In Hypertension detection and follow up programme Norman M Kaplan observed that in addition to the Blood Pressure control the mortality and morbidity was higher in hydrochlorothiazide group as with equivalent doses of Chlorthalidone Further the reduction in Diastolic Blood Pressure was not as satisfactory as the reduction in Systolic Blood Pressure[8].

Both these diuretics are commonly used in low doses in combination with other drugs. Most of the trails compared the mortality outcomes, only a few of them had head on compared the anti-hypertensive efficacy of this class. In combination as well, the reduction in the Systolic Blood Pressure was not as robust as when they were used alone. They showed a trend towards more reduction in Chlorthalidone group and this was observed maximum till 60 days. This is attributed to the fact that Chlorthalidone is 1.5 to 2 times more potent than Hydrochlorothiazide, although the observation by Norman N Kaplan was seen during the Ambulatory Blood Pressure Monitoring, In-clinic Monitoring showed a trend in favour of chlorthalidone (Table 1). As with the drugs when used alone the combination did show a consistent difference in Diastolic Blood Pressure Reduction. Possible mechanism of action include direct endothelial and vascular smooth muscle mediated vasodilatation and indirect compensation to acute decrease in the Cardiac output.

In our study an attempt was made to compare the effect of the two groups on Lipid Parameters. Over a six months follow up there was no change in the Lipid Parameters either on the same group or while comparing the two groups. Most of the studies like P. Weidmann et al. (1992), Richard P Ames *et al*, Thomas Pollare *et al*(1989), P Leren *et al*, showed an alteration in the Lipid Profile both in long term and short term[9]. The subjects in the either groups did not depict any significant difference in the Lipid Parmeters. This might be due to the fact that both the arms of the study were on the Lipid lowering medications in the form of statins. However, it has been observed that both Thiazide and Chlorthalidone alter Lipid parameters by increasing Plasma Triglycerides, Total Cholesterol and Low Density Lipoprotein on Hypertensive Subjects.

The diabetogenic potential of Thiazides has been implicated for single, as well as Combination Therapy. It has been attributed to increase hepatic glucose production, impaired peripheral glucose uptake, and

Hypokalaemia Mediated Beta Cell Dysfunction. Thiazides are effective in inhibiting sodium transport at the tubule in the Mammalian Nephron and hence decrease water retention[10].

Krum *et al* (2003) also did not observe any alteration in the Lipid Profile. The main findings of his study related to the impact of differing diuretic regimes melabolic parameters, and his findings did not support the suggestion that Thiazide diuretics when used in treatment of Hypertension may adversely effect the profile[10]. Hydrochlorothiazide was not associated with significant changes total Cholesterol, HDL Cholesterol and Apolipoprotiens. Indeed he observed Triglycerides levels increased significantly more with Hydrochlorthiazide Thiazides in high dosage and loop-diuretics can increase serum Low-Density-Lipoprotein cholesterol (LDL-C) and/or very-LDL-C and the total C/high-density Lipoprotein Cholesterol (HDL-C) ratio, while HDL-C is largely unchanged; triglycerides (TG) are also often elevated. Theories to explain these metabolic disturbances including increased Visceral Adiposity, Hyperurecemia, Decreased glucose Metabolism and Pancreatic Beta Cell Hyperpolarisation, may play a role.

The body Anthropometry, especially Waist Hip Ratio and Body Mass Index also did not show any significant difference in the two groups (either used alone or in combination). Although both these classes of drugs increase the basal insulin concentration and delay the insulin sensitivity response to glucose.

There are no head on trials found in literature which compared the Anthropometryin the two groups, however in this study the subjects in both the groups where on Lipid Modifying Drugs, especially statins It may be observed that anti-hypertensives do also have Lipid Modifying properties .But it can certainly inferred that despite being the modifier in both the arms, there was no significant difference on the Anthropometry and the lipid profile on subjects Hydrochlorothiazide and Chlorthalidone. Secondly it may be considered that the alteration in the Lipid Parameters is not robust in subjects with Hydrochlorothiazide (P Leren *et al*[9]. Eriksson *et al* studied the effect of the drug Hydrochlorothiazide on insulin resistance and visceral andhepatic fat accumulation and found out that Hydrochlorothiazide was associated with visceral fat redistribution and increased Liver fat accumulation. A blood Lipid-lipoprotein elevating effect of the diuretics Hydrochlorothiazide and Chlorthalidone in mildly hypertensive men has been established by a cross-over, randomized controlled trial, confirming previous clinical observations. Compared to baseline, plasma Total Cholesterol increased 6% and 8% and triglycerides 17% and 15% under treatment with Hydrochlorothiazide and Chlorthalidone, respectively[11].

Conclusion :

To conclude, Chlorthalidone was found to be a relatively more potent anti-hypertensive on both Systolic and Diastolic Blood Pressure when compared with Hydrochlorothiazide. It is more importantly so, as Hydrochlorothiazide is conventialy more popular in this Part of the World as compared to Chlorthalidone. Both these drugs failed to show any significant difference in the Lipid Profile and anthropometry in a period of six months.

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Original Article

A Study to Estimate the Magnitude of Dry Eye Disease among Adolescent Population using Visual Display Terminals in Lockdown Period — A Cross-sectional Observational Hospital Based Study

Kaushik Mitra[1], Sanjib Bandyopadhyay[2], Suman Mukhopadhyay[3], Sagar Karmakar[4]

Background : Dry Eye a grave problem in recent days has become a matter of concern for its diversity of symptoms including blurred vision and foreign body sensation and difficulty in diagnosis. There has been a sharp rise of Dry Eye symptoms during lockdown period in individuals who are using Visual Display Terminals (VDT). This study was conducted to find out the magnitude of Dry Eye among adolescents using VDTs during COVID Lockdown.

Material and method : A cross-sectional study was conducted in a medical college for a duration of one year. Individuals in the adolescent age group with digital eye strain and history of VDT use were included; those with any ocular abnormality and ocular surgery were excluded. After taking a detailed history and proper examination they were evaluated for Dry Eye using OSDI score, TBUT test and Schirmer's test. Subjects with an OSDI score of greater than 13, Tear Film Break Up Time (TBUT) less than 10 seconds and Schirmer's test ≤5mm were considered Dry Eye patient in our study.

Result : In 303 patients between age group 10-19 years with complaints of Digital Eye Strain such as eye discomfort, burning & foreign body sensation etc were selected for this study. The mean age of study population was 15.22±1.91 years with a range between 10 years to 19 years median being 15 years. Among them 162 patients (53.46%) were female and 141 (46.54%) were male (male: female ratio - 1.15:1). The overall proportion of Dry Eye in our study population was found to be 67.98%. In 85.44% of Dry Eye patients belonged to severe Dry Eye group while 11.16% belonged to moderate group and only 3.4% had a mild variety. Burning (32.95%) and foreign body sensation (47.72%) were most common significant symptoms found in severe Dry Eye. Mean total screen time in Non-Dry Eye patients (159.17±56.71) mins was significantly lower that of dry eye patients (417.57±76.83) mins.

[*J Indian Med Assoc* 2022; **120(2):** 32-6]

Key words **: Dry Eye, Adolescents, Lockdown.**

Dry Eye disease is one of the most commonly encountered problem in Ophthalmology[1]. It manifest as a Plethora of Symptoms such as Burning, photophobia, tearing, grittiness etc. Patients with Dry Eye disease may suffer from difficulties in daily routine activities, blurred vision etc, and thus quality of life gets compromised. Rising trend in different visual display terminal (eg, smart phone, computer, tablets, laptop etc) use with advent of technology has resulted in an increased incidence of Dry Eye in general population. Use of Visual Display Terminals (VDT) for long hours causes a decrease in maximum blink interval and ocular fatigue which lead to development of Dry Eye[2,3].

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Received on : 12/06/2021

Accepted on : 24/12/2021

Editor's Comment :

- Screen time should be reduced in Children and adolescents so as to decrease the incidence of different eye diseases including Dry Eye syndrome.
- Parents must bring their children to an Ophthalmologist as soon as symptoms of Eye strain appear for early diagnosis and treatment.

Even in the Pre-COVID time it was seen that high proportion of adolescents used screen based media much more than the recommended screen time[4]. Increased screen time among them resulted in Dry Eye in many situations. This existing problem of Dry Eye among VDT users had a sharp upshot with implementation of Lockdown for COVID epidemic. People lost all their outdoor activities and got confined in their rooms. So television, laptop, smartphones etc became the only source of news as well as entertainment for them resulting in a sharp increase of screen time. This was again added up by compulsory online classes of students. As a whole a large section of people was getting affected with Dry Eye related symptoms.

There are several studies which estimated the

Worldwide prevalence of Dry Eye varying between 5% to 30% in various age group and also revealed that 25 to 30 million people was affected by Dry Eye Worldwide[5]. There are very few published report on the prevalence of dry eye in lock down period among different age groups and no study was available on its prevalence in adolescent (10-19 years) age group in West Bengal.

This study was conducted in West Bengal to find out the magnitude of Dry Eye among adolescent population in lock down period and its relationship with increased screen time, so that the gravity of the problem can be understood and necessary recommendation could be made for its prevention.

Materials and Methods

This observational, cross-sectional study was conducted in a Medical College of West Bengal for one year from April, 2020 to March, 2021. In 303 patients in adolescent age group (10 to 19 years), attending the Outdoor patient Department of Ophthalmology, Department were included in the study based on the criteria mentioned below:

Inclusion criteria :

(1) Age between 10 to 19 years

(2) With complaint of digital Eye strain (eg, foreign body sensation, burning sensation, dryness, watering, stickiness, blurred vision, discomfort etc.)

(3) History of using some sort of visual display terminals eg, smart phone, computer, electronic tablet, television etc.,

Exclusion criteria:

(1) Patients with history of any life threatening disease, lid abnormalities of allergic Conjunctivitis.

(2) Contact lens users

(3) Taking any medication known to cause Dry Eye

(4) Patients who had any ocular surgery in last 6 months

Sample size was calculated taking prevalence of dry eye as 23.33%[6]. At 95% confidence level and absolute precision of 5%, the minimum required sample size for this study was calculated as follows

$n= \{Z^2 \times p(1-p)\} / d^2$.

(Z = 1.96, p = 23.33%, d= 5%) ~ 275

Further adding for an anticipated non-response rate of 10%, the final minimum sample size come out to be 303.

Due consent was taken from all study participant and their parents (in case of a minor). A detailed history regarding their complaints and usage of VDT was taken. We enquired for a specific symptom which was present always or most of the time of a day and was termed as significant symptom. They were than subjected to a thorough Ophthalmological Examination and evaluated for Dry Eye using OSDI questionnaires, Tear Film Break up Time (TBUT) and Schirmer's test. Subjects with an OSDI score of greater than 13, TBUT less than 10 seconds and Schirmer's test ≤5mm were considered Dry Eye patient in this study.

Ocular Surface Disease Index Questionnaire (OSDI) :

This was created by Outcomes Research Group at Allergan Inc. It is a self-administered 12 item questionnaire. It has 3 subscales: Ocular symptoms, vision related functions and environmental triggers. Patients have to rate their response on a 0 to 4 scale where '0' indicates 'none of the time' and '4' indicates 'all of the time'. The final score is calculated by the formula: OSDI = (sum of scores for all questions answered X 100) / (total no of questions answered) X 4 and it ranges from 0 to 100. Score 0 to 12 is considered as normal, 13 to 22 as mild Dry Eye, 23 to 32 representing moderate Dry Eye and 33 to 100 as severe[7].

Tear Film Break-up Time (TBUT) :

This test is done by Slit Lamp Examination. Patient is asked not to blink after instillation of fluorescein dye in his eye, the time interval from last complete blink to the first appearance of dry spot is considered as the tear break-up time. A TBUT less than 10 seconds is considered consistent with Dry Eye[8].

Schirmer's Test :

This test was conducted after giving a gap of 30 mins from TBUT test. Patient was asked to close his eyes after placing a fiter paper (Whatman filter paper no 41) in each lower fornix at the junction of outer and middle third without touching the fornices and left for 5 mins. After 5 mins the amount of wetting was noted in each strip. The result was considered positive if the amount of wetting was ≤5 mm[8].

Statistical Analysis :

In this study all data were depicted as actual number and percentages. Data was entered in Microsoft excel and mean, standard deviation and median was calculated. For comparison of mean we used WINPEPI software. 95% confidence level was considered acceptable, p-value less than 0.05 was considered significant. Pearson's correlation coefficient test was used to find out relationship between variables.

Result

In 303 patients between age group 10-19 years with complaint of digital Eye strain such as Eye discomfort,

burning & foreign body sensation etc were selected for this study. The mean age of study population was 15.22±1.91years with a range between 10yrs to 19yrs median being 15yrs. Among them 162 patients (53.46%) were female and 141 (46.54%) were male (male:female ratio - 1.15:1).

The overall proportion of Dry Eye in study population was found to be 67.98% while among females it was 76.54% and 58.15% was among males. Dry eye patients were graded according to their OSDI score into mild (13-22), moderate (23-32) and severe (33-100). 85.44% of Dry Eye patients belonged to severe Dry Eye group while 11.16% belonged to moderate group and only 3.4% had a mild variety. Burning (32.95%) and foreign body sensation (47.72%) were most common significant symptoms found in severe dry eye (Table 1).

The mean total screen time in Non Dry Eye patients (159.17±56.71)min was compared with that of Dry Eye patients (417.57±76.83)mins and it was seen that total screen time was significantly higher inDry Eye patients (Table 2).

Total screen time of severe Dry Eye group (442.33±36.12)mins was compared with that of mild to moderate group (272.33±91.18)mins and a higher screen time was noticed in severe variety which was statistically significant.

In this study we tried to find out whether there was any relationship between total screen time of study population with their OSDI score, Schirmer test and TBUT by a pearson correlation coefficient test (Fig 1).

Pearson correlation coefficient test revealed that a significant large positive relationship exist between screen time and OSDI score [r(301) =0.671, p <0.001] (Fig 2).

Result of pearson's correlation between screen time and Schirmer's Test indicated that there is a significant negative relationship between them [r(301) = -0.71, p <0.001.] (Fig 3).

Result of the Pearson's correlation indicated that there is a significant negative relationship between Total Screen time and Tear Break up Time [r(301) = -0.712, p <0.001].

Table 1 — *Distribution of study population according to their screen time*

Study population (n=303)	Mean±SD (mins)	Range (mins)	median (mins)
Non-dry eye patients (n= 97)	159.17±56.71	60- 380	140
Dry eye patients (n= 206)	417.57±76.83	130-500	445
95% CI = 241.1865 to 275.6135, t-statistics = 29.541 DF = 301, p<0.0001 (Highly significant)			

Table 2 — *Distribution of* Dry Eye *patients according to their screen time*

Group	Mean ± SD (mins)	Range (mins)	median (mins)
Mild - moderate (n=30)	272.33±91.18	130-400	305
Severe (n=176)	442.33±36.12	300-500	450
95% CI = 151.3185 to 188.6815, t-statistics = 17.942 DF = 204, p< 0.0001 (Highly significant			

Discussion

This study was done when our country as well as the world was facing 'Total Lock Down' due to COVID attack. Addiction to their smartphone for news, social media and online classes, all played a major role in increasing the Total Screen Time which resulted in

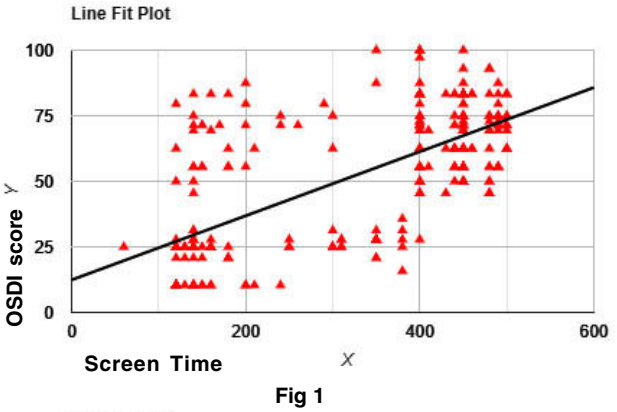

Fig 1

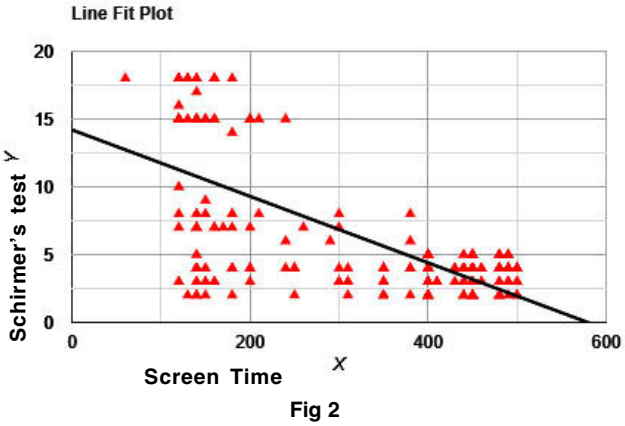

Fig 2

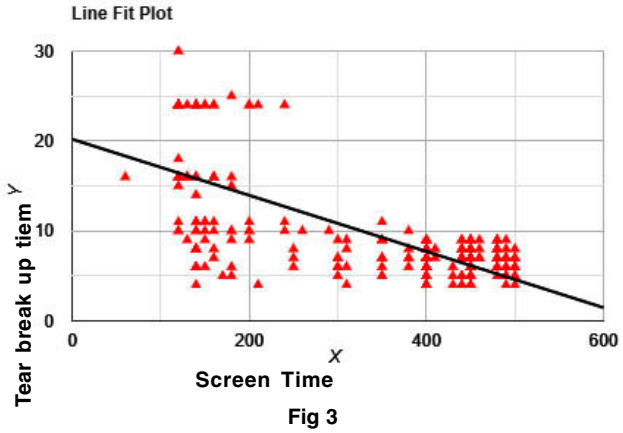

Fig 3

reduced blinking, evaporation of tears and subsequently to Dry Eye.

Study population had a mean age of 15.22±1.91 years with a female: male ratio of 1.15:1. This is similar to a study by Donthineni PR *et al* where the mean age was 15.2 ± 5.6yrs, while in another study by Ayaki M *et al* it was found to be 16.0±2.5 years.[9,10] In their studies female: male ratio was found to be 1.41:1 which is very close to this study.

Proportion of dry eye in present study was found to be 67.98%, among female it was 76.54% and among male 58.15%. A higher proportion of Dry Eye was found in female than male which is in accordance with several studies[11,12,13]. There are other studies where a much lower prevalence of Dry Eye was noted eg in study by Ayaki M *et al* it was 21.7% and study by Bhatt R *et al* revealed a prevalence of 23.33% in 13-18yrs age group[6,10]. These studies were conducted in pre-COVID time when there was no lock down and no online classes. A much higher proportion was encountered in this study probably because it was done during lock down period when people were using visual display terminals for much longer time.

A study by Mohan A *et al* (done during COVID-19 pandemic) found a higher prevalence (50.23%) of Dry Eye disease[14]. Napoli *et al* in his study proposed a term "Quarantine Dry Eye" and highlighted that there is a potential connection between Dry Eye disease and lock down related lifestyle and also expected that Lockdown will result in an increase in Dry Eye all over the World[15]. In a separate study by Prescott CR *et al* it was concluded that a complication of COVID-19 is Dry Eye caused due to increased screen time during lock down which may even contribute to depression and suicide[16]. Reddy SC *et al* noticed a prevalence of 89.9% of symptoms of Computer Vision Syndrome in their study[17].

So from the above discussion it is clear that there had been a sharp increase in use of digital devices during lock down period which resulted in a higher proportion of Dry Eye during that period.

Dry eye patients were graded into mild, moderate and severe group according to their OSDI score in this study. 176 patients (85.44%) of Dry Eye belonged to severe Dry Eye group while 11.16% and 3.4% were grouped in moderate and mild variety respectively. In study by Mohan A *et al* it was revealed that 26.3% were of mild grade while 11.1% were of severe grade Dry Eye disease[14]. Farrand KF *et al* reported only 8% severe Dry Eye in his study[18]. In contrast to the present study their studies had a low prevalence of severe degree Dry Eye, probably this was due to the fact for this study, patients were selected from a Tertiary Hospital OPD in lock down period. In COVID situation only those patients who were facing grave problem with their Eyes should have attended the OPD, most of the mild to moderate patients probably avoided hospital due to the fear of getting COVID infected till their problem got exacerbated and reached a severe grade.

In OPD during examination all patients were enquired for a symptom that the subject was experiencing always or most of the time in a day, which was termed as significant symptom. It was found that among Dry Eye patients foreign body sensation was the most common significant symptom (47.72%) followed very closely by burning sensation (32.95%) in severe variety. Foreign body sensation was also most commonly present in mild and moderate variety. It was also the most common symptom found in a study by Basak SK *et al* in their study[19].

This study revealed a mean total screen time of 417.57±76.83 mins in dry eye patients which was much higher than that of Non-dry Eye patients (159.17±56.71mins)and was found to be statistically highly significant ($p<0.0001$). A comparison was done between the mean screen time of mild to moderate with that of severe Dry Eye and it was found that a significantly higher screen time exists in severe variety. So we can infer from the present study that screen time is a significant risk factor of Dry Eye. This finding is in accordance with a study by Shirley Z *et al* where it was concluded that a significant risk factor of Dry Eye is screen time.[20]In another study by Akkaya S *et al* it was observed that screen time in computer using individuals was 7.70±0.86 hours which was much higher than their control group[21].

Pearson's Correlation Coefficient Test was done to find out the relationship between total screen time of study population with their OSDI score, Schirmer test and TBUT and it was seen that there is a significant positive relationship with OSDI score. [$r(301) =0.671$, $p <0.001$] while a significant negative relationship existed with Schirmer test [$r(301) = -0.71$, $p < 0.001$.] and TBUT [$r(301) = -0.712$, $p < 0.001$]. Almost similar findings was seen in a study by Pang Yi where it was revealed that OSDI scores were statistically significantly correlated with social media usage ($r_s = 0.13$, $p = 0.014$) and screen time ($r_s = 0.12$, $p = 0.006$). They also concluded that longer screen time is associated with worse Dry Eye symptoms[22]. Akib MN *et al* concluded in their study that a significant relationship was present between prolonged use of smart phone and Dry Eyee and found a positive

correlation with OSDI score and a negative correlation with TBUT and Schirmer values[23].

Limitations :

As this study was conducted in a Tertiary Hospital during COVID Lockdown, there may be selection bias. Probably in that period we mostly received the severe cases. Moreover, we had to rely on patients and their parents regarding the time of VDT usage and any mis-information from their side may result in information bias.

Conclusion

A higher proportion of Dry Eye disease was noted among adolescents who were subjected to over use of video display terminals during COVID Lockdown period. In addition to their general addiction to Smart phones they were forced to have prolonged online classes both from institutions and private tutors. As the proportion of Dry Eye in the present study was much higher along with a high daily screen time than most of the studies done before Lock down we suggest that the guidelines made by Human Resource Development for Health Research (HRD) ministry by the name 'Pragyata'(which introduced a cap on screen time for students) should be strictly followed by the respective institutions. We also like to suggest that Clinicians and Public Health Experts should make parents aware of the gravity of this problem so that they restrict their children from playing online games and getting addicted to their smartphones. Parents also should be made aware to bring their children to an Ophthalmologist as soon as Symptoms of Digital Eye Strain appear so that an early intervention could be done.

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Original Article

Comparison of Analgesic Effects of Levobupivacaine (0.25%) *versus* Bupivacaine (0.25%) using Ultrasound Guided Transversus Abdominis Plane Block in Total Abdominal Hysterectomy under General Anesthesia — An Interventional Study

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Background : Transversus Abdominis Plane (TAP) block is recently being used for effective pain relief following Total Abdominal Hysterectomy (TAH). Ultrasound guided block helps in correct localization of the plane and proper deposition of drugs. This study was done to compare the efficacy of Levobupivacaine and Bupivacaine in TAP block in TAH.

Materials and Method : Seventy patients (ASA 1 and 2) prepared for TAH under General Anesthesia were randomly allocated into two groups. Ultrasound guided TAP block was performed bilaterally with 20ml of Levobupivacaine (0.25%) in Group A (n=35) and Bupivacaine (0.25%) in Group B (n=35) on each side of abdomen after skin closure at the end of operation. Intensity of pain was evaluated by 10cm Visual Analogue Scale (VAS) score at 0, 2, 6, 12,24 hours. If VAS >3, 1gram paracetamol infusion was given as rescue analgesic. Duration of analgesia, total rescue analgesic requirement and hemodynamic changes by measuring MAP and PR were noted.

Results : VAS at 12 hours was significantly lower in Group A (mean 3.2±1) than Group B (mean 4.1±0.7, p<0.0001). Time of first rescue analgesic requirement was longer in Group A (mean 12.0±1.1h) compared to Group B (mean 11.2±1.1h, p=0.0059). Total analgesic requirement(paracetamol) in 24 hours was lower in Group A (mean 1.7±0.7g) compared to Group B (mean 2.2±0.7g, p=0.007). Hemodynamic changes were comparable in both groups.

Conclusion : Levobupivacaine provided better postoperative analgesia than Bupivacaine with stable hemodynamic condition in TAP block.

[*J Indian Med Assoc* 2022; **120(2):** 37-41]

***Key words* : TAP block, Levobupivacaine, Bupivacaine, Postoperative analgesia.**

Moderate to severe pain is experienced by the patients after lower abdominal surgery. Anterolateral abdominal wall is innervated by the Ventral Rami of the spinal nerve T_7 to L_1. Intercostal Nerves (T_7 toT_{11}) exit the intercostal space and run in the neurovascular plane between the internal oblique and transversus abdominis muscle[1]. Local anaesthetic injection in this plane will provide good postoperative analgesia in lower abdominal surgery. Presently TAP block is used for postoperative analgesia in various kind of surgical procedures namely open/ laparoscopic cholecystectomy and appendectomy[2], Cesarean section, Total Abdominal Hysterectomy (TAH), open Prostatectomy and Hernia repair. Hebbard *et al*[3]. described Ultrasound guided TAP block in 2007. Ultrasound imaging helps in accurate localization of the plane and proper deposition of drug, thereby leading to increased success and reduced complication rate. Anterolateral abdominal wall block depends on the spread of local anesthetic agents through the Musculo-facial Plane to Anaesthetize Multiple Small Nerve and plexuses[1]. Reliable blockade of dermatomes can be accomplished with good volume of local anesthetic agents (20-30ml). With use of large volume of Local anaesthetic, there is markedly higher chance of Systemic Toxicity[4]. An alternative newer local anesthetic (eg, levobupivacaine) with less systemic toxicity in the same dose will be more safe and effective. Sommer M, de Rijke JM, van kleef M, *et al*[5] found in their study that prevalence of moderate to severe pain in abdominal surgery was high in first 24 hours. So,

Editor's Comment :

- Transversus Abdominis Plane block is one of the important method of pain management in abdominal surgery. As the total drug requirement of Local Anaesthetic Agent is very high, so our aim was to find out one important local anesthetic agent with less side effects. We have used Laevobupivacaine, (a safe drug with less side effects) compared with commonly used drug Bupivacaine and observed better analgesic effects with high safety profile.

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Received on : 23/10/2021

Accepted on : 09/02/2022

our aim was to alleviate pain effectively in first 24 hours postoperative period. Primary outcome of this study was to compare the analgesic efficacy of levobupivacaine 0.25% *versus* bupivacaine 0.25% in terms of duration of analgesia, from time of injection upto requirement of rescue analgesia. Secondary outcomes were postoperative VAS score, total analgesic requirement in 24 hours following surgery, hemodynamic changes and other side effects.

Materials and Methods

After approval of Institutional Ethics Committee, 70 ASA (1 and 2) patients posted for TAH were included in the study and written informed consent taken. Patients with BMI >30 or<20, known allergy to drug used, Cardiac and Neurological Diseases, Chronic Opioid users were excluded. Patients were randomly divided into two equal Groups (Group A and Group B) with Sealed Envelope System. Inside the operating room, patients were attached with standard ASA monitors. All patients received standardized anaesthetic technique. Premedication (midazolam 0.05-0.15mg/kg, fentanyl 2mcg/kg) were administered before induction. All patients were induced with propofol (2-3mg/kg) and atracurium (0.5mg/kg) dose was used for intubation. Maintenance of anaesthesia achieved with O_2/N_2O (40:60) ratio, isoflurane (0.6-1%) and atracurium (0.1mg/kg) at interval. Infusion paracetamol 1gram was given for required analgesia.

At the end of operation, after skin closure, while maintaining the patient under General anaesthesia, antiseptic dressing and draping was done keeping the patient in supine position. Using sterile jelly and sterile cover, high frequency linear ultrasound transducer was placed in mid-axillary line at midpoint between lower costal margin and highest point of iliac crest and pointer directed medially. After proper visualization of Muscle layers of Antero-lateral Abdominal Wall, ultrasound compatible needle was introduced in plane (medial to lateral) at Anterior Axillary Line. The needle was introduced further and placed at transversus abdominis plane between internal oblique and transversus abdominis muscle. After confirming needle position with 2ml of 0.9% normal Saline and negative aspiration of blood, 20ml of Levobupivacaine 0.25% was injected bilaterally in group A. In group B 20ml of Bupivacaine 0.25% was injected bilaterally following the same procedure. After extubation, intensity of pain was assessed by VAS Score at 0, 2, 6, 12, 24 hours. Duration of analgesia was calculated from the time of injection upto the requirement of first rescue analgesic. When VAS score>3, infusion paracetamol 1gram was given IV. Total analgesic requirement was calculated at 24 hours. Baseline pulse rate and Mean Arterial Pressure (MAP) were noted and then followed up at 0, 2, 6, 12, 24 hours (Figs A & B).

Fig A — Sonoanatomy of anterior abdominal wall

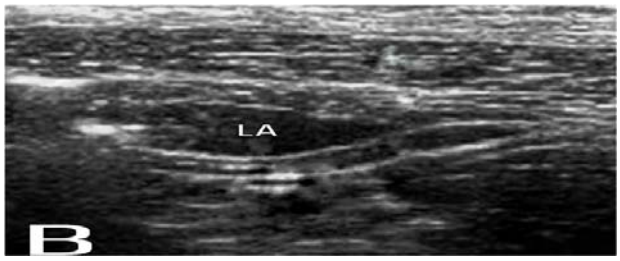

Fig B — Local anaesthetic agent splitting the transversus abdominis plane

Power analysis was done based on previous studies to measure the mean difference of duration of analgesia (1 hour) in between two groups. The sample size was calculated to be 33 in each group with 95% confidence level and power of the study 80%. Considering possible dropouts, we included 35 patients in each group.

For statistical analysis, data were entered into a Microsoft excel spreadsheet and then analyzed by SPSS (version 27.0; SPSSInc, Chicago, IL, USA) and graph pad prism version 5. Data has been summarized as mean and standard deviation for numerical variables and count and percentage for categorical variables. P value <0.05 was considered as statistically significant.

Results

Table 1 — *Demographic data and ASA distribution*

	Group A Levobupivacaine N=35	Group B Bupivacaine N=35	P-value
Age (years) Mean±SD	41.6±4.5	43.1±4.8	0.1850
Weight (kg) Mean±SD	57.7±2.8	57.9±2.8	0.7677
Height (cm) Mean±SD	151.1±0.1	149.1±0.0.1	0.1599
BMI (kg/m2) Mean±SD	25.3±1.5	26.1±1.8	0.0689
ASA I	19	22	0.4666
(no) II	16	13	

Both groups were similar for age, weight, height, BMI and ASA distributions.

Differences in VAS score at 0, 2, 6 hours were not statistically significant.

In group A, the mean VAS score at 12 hours (mean±SD) was 3.2±1.In Group B it was4.1±0.7.

Difference of mean VAS score at 12 hours with both group was statistically significant (p<0.0001) (Fig 1).

In Group A, the mean VAS score at 24 hours was 2.8±0.6.

In Group B it was 3.3±0.7.

Difference of mean VAS score at 24 hours with both Group was statistically significant (p=0.005).

In Group A, first dose of rescue analgesic was given at 12.0±1.1hour. In Group- B, it was at 11.2±1.1h. Difference of mean first dose of rescue analgesic in both groups was statistically significant (p=0.0059)(Fig 2).

In Group A, mean analgesic requirement at 12 hours was 0.6±0.5gram. In Group B, mean analgesic requirement at 12 hours was 0.9±0.3 gram. Difference of mean analgesic requirement at 12 hours in both group was statistically significant (p=0.012)(Fig 3).

In Group A, mean total analgesic requirement at 24 hours was 1.7±0.7gram.

In Group B, mean total analgesic requirement at 24 hours was 2.2±0.8gram.

Difference of mean analgesic requirement at 24 hours in both group was statistically significant (p=0.007)(Fig 4).

Pulse rate at 0,2,6,12,24 hours in both group were not statistically significant (Fig 5).

MAP at 0,2,6,12,24 hours in both group were not statistically significant

No patient experienced any complication related to TAP block in 24 hours (Fig 6).

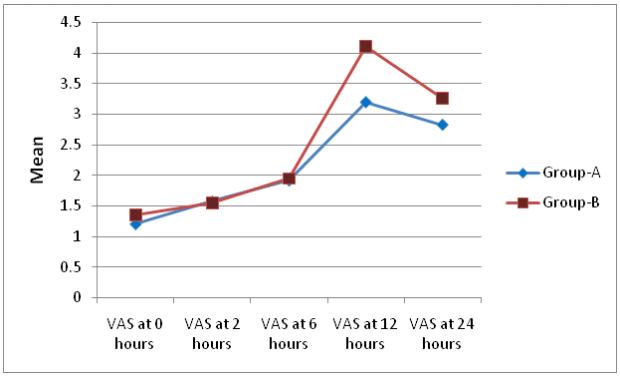

Fig 1 — Distribution of mean VAS score at 0, 2, 6, 12 and 24hours

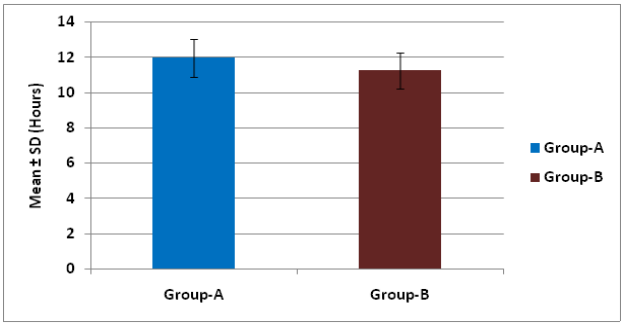

Fig 2 — Distribution of mean first dose of rescue analgesic

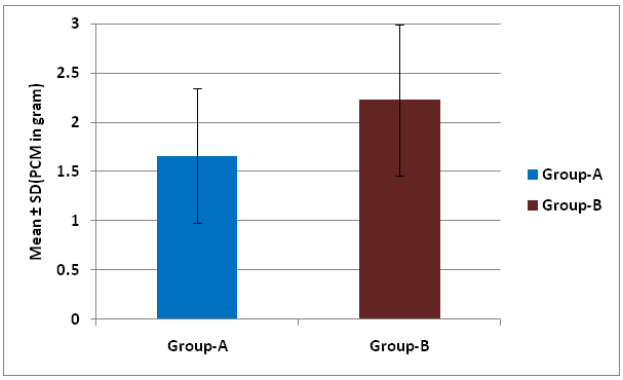

Fig 3 — Distribution of mean analgesic requirement at 12 hours(paracetamol in gram)

Discussion

In this study, we compared postoperative analgesic

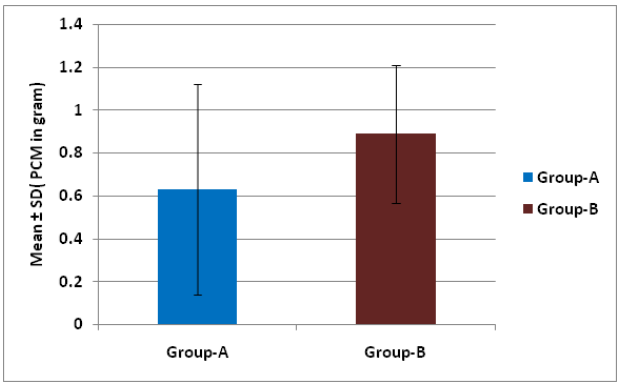

Fig 4 — Distribution of mean total analgesic requirement in 24 hours(paracetamol in gram)

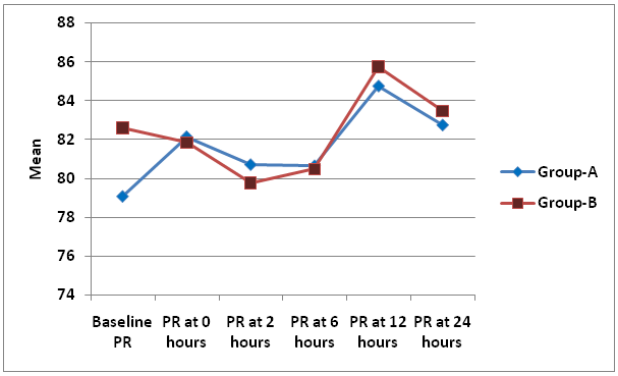

Fig 5 — Distribution of mean baseline PR , PR at 0, 2, 6, 12, 24hours

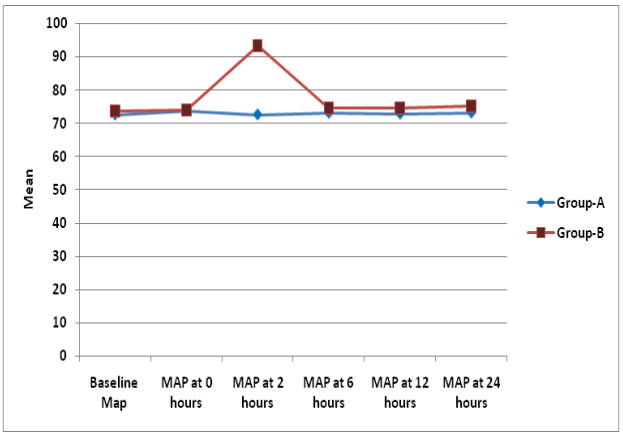

Fig 6 — Distribution of mean baseline MAP, MAP at 0, 2, 6, 12, 24hours

efficacy of Levobupivacaine and Bupivacaine in ultrasound guided bilateral TAP block following TAH under General Anesthesia. Group A and B received 20 ml of (0.25%) Levobupivacaine and Bupivacaine respectively on each side.

We found that durations of analgesia was more in Levobupivacaine group. Mean VAS at 12 hours and 24 hours postoperatively were significantly lower in Group A than Group B (p value<0.0001 and p value=0.005 respectively). We also found that mean requirement of first dose of rescue analgesic was delayed in Group A than Group B (p=0.005). Analgesic requirement at 12 hours and total requirement at 24 hours were significantly lower in Group A than Group B (p value=0.012 and p=0.007 respectively). There was no significant changes in hemodynamic status in both groups.

Atim *et al*[6], Bhattacharjee *et al*[7], Carney *et al*[8], Hyun-Jung Shin *et al*[9], Heidi Chang *et al*[10]stated in their study that TAP block provided better postoperative analgesia at 6, 24 hours in patients undergoing TAH.

Hebbard *et al*[3] described ultrasound guided TAP block in 2007. Use of ultrasound imaging helps in correct localization of plane, proper deposition of drug and thus improved efficacy of the block which was similar to our observation.

Bilateral TAP block was used in various types of lower abdominal surgery apart from Hysterectomy and showed better postoperative pain control.

Yahia A. Hemimi *et al*[11], Belavy D *et al*[12] showed in their study that ultra sound guided continuous TAP block decreased systemic analgesic requirement and better pain control in first 24hours of Caesarean Section.

Essam Mahran *et al*[13] Ghisi D *et al*[14] in their study stated that ultra sound guided TAP block by subcostal approach was an effective method for postoperative analgesia and reduced morphine consumption in robot-assisted Laparoscopic Abdominal Cancer Surgery.

Hoda Shokri, Karim O Elsaeed[15] found in their study that ultrasound guided TAP block was more effective comparing VAS score and less pethidine requirement in Urological Surgery.

Ra *et al*[16] compared TAP block with two different concentration of Levobupivacaine (0.5% and 0.25%) and they found similar efficacy in two group. Lower local Anaesthetic concentration with similar efficacy is always desirable to prevent toxicity. So we have used 0.25% of both the drugs.

Preeti Goyal, Rahul Meda[17] compared the postoperative analgesic efficacy of Levobupivacaine (0.25%) and ropivacaine (0.25%) in TAP block, for Inguinal Hernia Surgery in adults and found levobupivacaine provided significantly better analgesia compared to Ropivacaine.

Sharma *et al*[18]compared levobupivacaine (0.25%) and Bupivacaine (0.25%) for caudal analgesia in children undergoing herniotomy and they found that both drugs were similarly effective.

Compagna *et al*[19] conducted Inguinal Hernioplasty under Local Anaesthesia comparing Bupivacaine and levobupivacaine in elderly patients. They found that both drugs were similarly effective in intra and postoperative analgesia.

ArzuYildirim Ar *et al*[20] compared the potency of Bupivacaine and Levobupivacaine in ultrasound guided TAP block for postoperative analgesia in patients undergoing Laparoscopic Cholecystectomy. TAP block under Ultrasound guidance was performed bilaterally with Levobupivacaine 0.25% 30ml2(n=25) and bupivacaine 0.25% 30ml (n=25). VAS score was significantly lower in Levobupivacaine group (p=0.049) postoperative 1, 2, 4, 6 hours similar to our study. There was no significant different in VAS score at 12 hours and 24 hours postoperatively. But in our study, we found significantly low VAS score in Levobupivacaine group (p<0.0001 and 0.0076 respectively) throughout 24 hours. ArzuYildirim Ar *et al* found no difference in rescue analgesic requirement between two groups. But in our study, we found that total rescue analgesic requirement in 24 hourswas less in group A than group B (p<0.05). Less VAS score at 12h, 24h and increased total rescue analgesic requirement in our study may be due to racial difference in height, weight, drug dose and other factors which provided superior analgesic property of Levobupivacaine in our study. Therefore we conclude that Levobupivacaine is a better alternative to Bupivacaine for ultrasound guided TAP block for

postoperative analgesia following Total Abdominal Hysterectomy.

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Review Article

Efficacy of Interventional Awareness Program on HIV/AIDS among High School Students of West Bengal, India

Ramdas Chatterjee[1], Shambo Samrat Samajdar[2], Shatavisa Mukherjee[3], Jyotirmoy Pal[4]

Introduction: Worldwide Human Immunodeficiency Virus (HIV) Infection is a Public Health Problem. Adolescents and young people are inclined to experiment with sex and prone to have HIV infection. Interventional Education Program on HIV/AIDS may prevent spread of the infection.

Materials and Methods : Knowledge and attitude of students (N=2373) of 10th to 12th grade from 38 schools of Kolkata about HIV/AIDS was assessed based on a questionnaire. Subsequently an interventional educational program was conducted for them. A follow-up study with the same questionnaire after 6-8 weeks of the interventional program was performed among the students (N=811) of 11th and 12th standard. Knowledge and attitude towards HIV/AIDS was evaluated by defining a 'Knowledge' and 'Attitude' score from responses of the students to relevant questions. Data was analyzed using SPSS, version 17 software.

Observations : Interventional Program improved student's (a) responses to more questions, (b) knowledge level and (c) positive attitude towards HIV/AIDS. Significant improvement occurred in the association of knowledge score with respect to the male students after the Intervention Program but not much with respect to girls. Association of the attitude score with respect to gender and three streams (Arts, Science, Commerce) of study were significantly enhanced after the program.

Discussion : Several studies around the world indicate that Interventional Educational Programs almost certainly improve knowledge and attitude of the school students about HIV/AIDS. Some differences in findings may be due to qualitative differences of the study participants. Our observations may not be extrapolated to other Indian Student Groups who may differ in awareness and cultural status.

[*J Indian Med Assoc* 2022; **120(2):** 42-6]

Key words **: HIV/AIDS, Awareness, School students, Knowledge, Kolkata.**

HIV infection is posing a challenge for Public Health for the World. Globally 38.0 million people were HIV infected in 2019 and 1.8 million were children (0-14 years). New infections of HIV were detected in 2019 alone among 460,000 young people of 10 to 24 years, of whom 170,000 were adolescents aged of 10 to 19 years[1].

One-fourth of India's population is comprised of adolescents (10-19 years) and one-third of young people aged 10-24[2]. This large proportion of young people contributing to India's economic growth and development must be healthy, educated and equipped with information. Adolescence is the period when individuals often experiment with sex and drugs. Consequently, they are prone to be HIV infected. In a conservative Indian Society, most parents hesitate to discuss sexual issues and teens tend to acquire inaccurate information from cheap media. So, educating them before they become sexually active can lay a foundation for safe sexual habits and healthy relationships. School life is an excellent opportunity to educate them[3].

In view of above and the importance of HIV/AIDS in Public Health Domain, the current study was conducted in context of adolescence population. Evaluating knowledge level and attitude of the adolescents about HIV/AIDS may facilitate in development of a strategy for HIV prevention. Assessment of knowledge on HIV/AIDS is a fundamental step in the Education Process

Editor's Comment :

- High school students are in special need of accurate HIV/AIDS education.
- This was an interventional follow-up study among school students (N=811).
- Students of class XI and XII of schools in Kolkata were included.
- Knowledge and attitude of the students regarding HIV/AIDS improved through an interventional educational talk.

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Received on : 11/05/2021
Accepted on : 18/08/2021

and Preventive Measure for the disease[4].

We are not aware of any previous study dealing with knowledge and attitude towards HIV/AIDS targeting a vast number of students of Higher Secondary Schools in Kolkata, India.

Objective of our study was to reveal improvement in knowledge and attitude towards HIV/AIDS among the students after an Interventional Education Programme.

Materials and Methods

In the present School-based Cross-sectional Intervention Study knowledge and attitude of 10th to 12th grade students (N=2373) of 38 randomly selected schools of Kolkata and its suburbs about HIV/AIDS were studied earlier[5]. A pre-designed, pre-tested questionnaire containing 41 questions (in English as well as Bengali) was administered to them. Both open and close-ended questions were there. Participation of the students in this study was voluntary. To maintain confidentiality students were asked not to write their name in the questionnaire. Steps were taken to restrict consultations among themselves. All questions and purpose of the study were explained to them. Afterwards, an Interventional Educational Talk was conducted as a Class Lecture on HIV/AIDS by an expert in the field.

Next, in the present study participating students of only 11th and 12th standard attended a follow-up study with the same questionnaire after 6-8 weeks but with fewer number of questions (N=29). Questions on demographic status (age, marital status, religion, address, home status eg, rented / own, family size, parents profession, caste, habit of visiting religious places, staying status eg, with parents / others) were excluded in the follow-up questionnaire. In total 811 (37%; 811 of 2181 of Pre-interventional study) students (256 boys, 555 girls) answered the questionnaire for the follow-up study. The study was completed during July, 2011 to December, 2013.

Ethical Committee of K K Chatterjee Memorial Association Approved the Protocol of this Study. Further, authorities of the schools extended their consents to perform this study.

Data analysis :

To analyze the data SPSS, version 17 (Chicago, IL, USA) was used. Chi-square Test of Association was used to understand Significance of Association between categorical variables. Statistical significance was assigned to P value of ≤ 0.05.

Knowledge and Attitude Scores :

To determine students' knowledge level about HIV/AIDS a score was defined after considering their responses to the following 8 questions in both the pre- and postinterventional studies.

(i) Knowing details of the abbreviations HIV and (ii) AIDS, (iii) Mode of HIV/AIDS Transmissions, (iv) which are the symptoms of AIDS/HIV Infection, (v) knowledge about those at greater risk for HIV/AIDS, (vi) whether HIV /AIDS preventable, (vii) whether treatment for AIDS available and (viii) whether in India HIV/ AIDS is spreading fast. A score of '1' was assigned to each correct answer to a question and '0' for a wrong answer. Thus, '0' and '8' were the minimum and maximum value respectively of the total knowledge score.

To know attitude of the students towards the disease and the persons living with HIV/AIDS another score was defined. This was done considering their answers to following 5 questions of this postinterventional (follow-up) study: (i) whether AIDS is considered as a disease of the poor, (ii) should AIDS patients or those who are HIV infected marry/ have children, (iii) is it embarrassing to discuss HIV/ AIDS, (iv) whether ever dissuaded talking on HIV/AIDS and (v) whether guardians and teachers should discuss HIV/AIDS.

A positive response to 'Attitude' question (v) whether guardians and teachers should discuss HIV/AIDS and negative to the remaining four was accepted as positive attitude about HIV/AIDS. The responses indicating positive attitude was given a score '1' and '0', otherwise. 'Attitude score' was the sum total of all responses of the above questions.

Observations

Mostly the students were Hindus, unmarried, aged 16-18 years and of general caste as stated in the pre-interventional study[5]. Table 1 shows that more of the girl students (68.4%) than boys (31.6%) attended the postintervention study. A much higher proportion (62.5%) of class XI students than class XII (37.5%) attended the follow-up program. Students of Arts (or Humanities) stream were found to attend the postintervention Programme in large number (49.62%) compared to Science and Commerce Stream (36.22% and 14.15% respectively).

Table 2 reveals that in general, compared to pre-intervention test more students responded to the 'Knowledge questions' (4 out of the 5 questions) as the 'No response' numbers reduced to a great extent. Similarly more students in the postintervention test responded to 'Attitude' questions compared to pre-intervention study (Table 3). Further, remarkable improvement in knowledge level of the students after the Interventional Education Programme was observed

Table 1 — *Characteristics of respondents*		
	Pre-Intervention Freq (%)	Postintervention Freq (%)
Gender :		
Boys	971 (40.9%)	256 (31.6%)
Girls	1402 (59.1%)	555 (68.4%)
Class :		
Class XI	1515 (63.8%)	507 (62.5%)
Class XII	666 (28.1%)	304 (37.5%)
Stream :		
Arts	955 (43.78%)	263 (49.62%)
Science	875 (40.12%)	192 (36.22%)
Commerce	351 (16.09%)	75 (14.15%)

(Table 2) in regard to most of the knowledge questions asked. In general, more of the students could offer 2 to 3 correct answers to the three knowledge questions after the Interventional Programme.

Table 3 describes attitude of the participants towards HIV/AIDS. The Interventional Programme improved positive attitude towards HIV/AIDS to a great extent as indicated by their responses to attitude questions. After attending the interventional program fewer (3.9%) students opined that AIDS affects mainly the poor people compared to the result (7.7%) of the Pre-interventional study. The intervention was not found to influence to any significant extent attitude of the students in respect to marriage of the HIV infected/ AIDS patients or having children (negative answer: 77.7% *versus* 81.3% from pre- and post- interventional participants respectively). Large number of the students either before or after the interventional program indicated that they were not embarrassed to talk about HIV/AIDS (73.7% *versus* 80.6%) or ever discouraged (84.6% *versus* 89%) to talk on the subject. More students of the follow-up study (90.3%) than from the Pre-intervention Study (81.8%) thought that HIV/AIDS should be discussed by the Guardians and Teachers.

High knowledge score almost doubled among both the boys and girls after attending the Interventional Education Talk (Table 4). The score also improved much among the students of all the streams.

Table 4 depicts that 'low' and 'medium' level attitude score was more pronounced among the students after their participation in the Interventional Programme and the 'high' score was among fewer proportion of the students. The improvement in low and medium level attitude score after the intervention was comparable among the male and female students. However, the improvement in medium level attitude score was significantly more among the 'Science' students when compared to those in 'Arts' or 'Commerce' Stream.

Association of gender and stream of study of the students with knowledge and attitude score was

Table 2 — *Students' knowledge regarding HIV/AIDS*						
	Pre-Intervention			Postintervention		
	Yes	No	No response	Yes	No	No response
Know detail form of HIV	867(36.5%)	515 (21.7%)	991 (41.76%)	394 (48.6%)	223 (27.5%)	194 (23.90%)
Know detail form of AIDS	888 (37.4%)	207 (8.7%)	1278 (53.85%)	410 (50.6%)	114 (14.1%)	287 (35.3%)
Can HIV /AIDS be prevented?	1591 (67%)	575 (24.2%)	207 (8.72%)	567 (69.9%)	216 (26.63%)	28 (34.52%)
Is there any treatment for AIDS?	1090 (45.9%)	999 (42.1%)	284 (11.97%)	427 (52.7%)	340 (41.92%)	44 (5.42%)
Whether in India AIDS is spreading fast?	1808 (76.2%)	434 (18.3%)	131 (5.52%)	723 (89.1%)	84 (10.4%)	4 (0.5%)
	No. of Correct Answers			No. of Correct Answers		
	1	2	3	1	2	3
What are modes of HIV/AIDS transmissions?	1105 (46.6%)	426 (18%)	62 (2.6%)	364 (44.9%)	213 (26.3%)	44 (5.4%)
Which are symptoms of AIDS/HIV infection	545 (23%)	97 (4.1%)	14 (0.6%)	234 (28.9%)	56 (6.9%)	2 (0.2%)
Knowledge about people at greater risk for HIV/AIDS	405 (17%)	52 (2.2%)	-	207 (25.5%)	62 (7.6%)	30 (3.7%)

Table 3 — *Students' attitude about HIV/AIDS*						
	Pre-Intervention			Postintervention		
	Yes	No	No response	Yes	No	No response
Does AIDS affect only the poor?	182 (7.7%)	2146 (90.4%)	45 (1.89%)	32 (3.9%)	773 (95.3%)	6 (0.7%)
Should HIV infected/ AIDS patients marry/ have children?	373 (15.7%)	1843 (77.7%)	157 (6.61%)	139 (17.1%)	659 (81.3%)	13 (1.6%)
Is it discomfiting to discuss HIV/ AIDS?	574 (24.2%)	1750 (73.7%)	49 (2.06%)	145 (17.9%)	654 (80.6%)	12 (1.5%)
Have you been deterred discussing HIV/AIDS?	294 (12.4%)	2007 (84.6%)	72 (3.03%)	78 (9.6%)	722 (89%)	11 (1.3%)
Should HIV/AIDS be discussed by guardians and teachers ?	1942 (81.8%)	350 (14.7%)	81 (3.41%)	732 (90.3%)	70 (8.6%)	9 (1.1%)

Table 4 — *Knowledge and Attitude Score*

Knowledge Score							
	Pre-Intervention			Postintervention			Chi Square Value, Degrees
	Low	Medium	High	Low	Medium	High	of Freedom, P Value
Gender :							
Male	225 (23.17)	548 (56.43)	198 (20.39)	22 (8.59)	130 (50.78)	104 (40.62)	56.26 ; 2 ; <0.0001
Female	294 (20.97)	827 (58.98)	281 (20.04)	69 (12.43)	287 (51.71)	199 (35.85)	4.31 ; 1 ; 0.0379
Stream :							
Arts	220 (23.03)	590 (61.78)	145 (15.18)	37 (14.06)	163 (61.97)	63 (23.95)	4.51 ; 1 ; 0.0337
Science	116 (13.25)	495 (56.57)	264 (30.17)	9 (4.68)	75 (39.06)	108 (56.25)	1.23 ; 1 ; 0.2674
Commerce	92 (26.21)	217 (61.82)	42 (11.96)	15 (20)	48 (64)	12 (16)	0.51 ; 1 ; 0.4751
Considered Knowledge scores : Low = 0 to 2; Medium = 3 to 5; High = 6 to 8							
Attitude Score							
	Pre-Intervention			Postintervention			Chi Square Value, Degrees
	Low	Medium	High	Low	Medium	High	of Freedom, P Value
Gender :							
Male	1 (0.1)	209 (21.52)	761 (78.37)	148 (57.81)	101 (39.45)	7 (2.73)	97.58 ; 1 ; <0.0001
Female	1 (0.07)	234 (16.69)	1167 (83.23)	382 (68.82)	166 (29.91)	7 (1.26)	127.84; 1; <0.0001
Stream :							
Arts	0 (0)	195 (20.41)	760(79.58)	179 (68.06)	80 (30.42)	4 (1.52)	115.87; 1; <0.0001
Science	1 (0.1)	99 (11.31)	775 (88.57)	126 (65.62)	65 (33.85)	1 (0.52)	43; 1; <0.0001
Commerce	0 (0)	74 (21.08)	277 (78.92)	41 (54.67)	32 (42.67)	2 (2.66)	29.63; 1; <0.0001
Considered Attitude Scores (for pre-intervention) : Low = 0 to 1; Medium = 2 to 4; High = 5 to 7. Considered Attitude Scores (for postintervention): Low = 0 to 1; Medium = 2 to 3; High = 4 to 5.							

ascertained by a statistical test (chi-square) in the context of pre- and postintervention tests. Significant improvement in the Association of Knowledge Score with respect to the male students was observed after conducting the intervention talk (Chi-square, degrees of freedom and p-value as 56.26, 2 and <0.0001 respectively) but not so much with respect to girl students. However, significant improvement in the association between Knowledge Score and only art stream was observed (p=0.0337). In contrast, association of the Attitude Score with respect to gender and the Three Streams of study were significantly enhanced after the Interventional Programme as showed by the p-values in Table 4.

Discussion

Adolescent population having high risk for infection with HIV/AIDS are also in close social contact and these may put them in Focus of HIV Epidemic. Hence, it is of paramount importance to understand the existing lacunae in their status of knowledge and attitude about the infection as they are likely to start sexual life after few years.

After attending an Interventional Education Talk, knowledge level about HIV/AIDS among the students of our study was remarkably enhanced. Identical observation has been reported in a similar study among students of a Senior Secondary School in Pune, India[6]. An investigation[7] from Wuhan, China among students of a secondary school found that the students' knowledge about HIV/AIDS increased significantly and their attitudes changed positively after an educational intervention. Health education intervention dealing with HIV/AIDS among Senior Secondary School students of Jos, Nigeria has been shown[8] to have an effect in reducing the students' sexual risk behavior.

High knowledge score on HIV/AIDS was secured by 40% of the male and 35% of the female students of this study. The score improved significantly among the male students after the interventional education program. This observation is consistent to some extent with the findings of good knowledge scores on HIV/AIDS of around 45% of the high school students in Erbil City of Iraq[9], in Lao Peoples Democratic Republic[10] and adolescents in Bangladesh[4].

Unlike the previous Kuwait[11] and Iraq[9] studies showing better understanding of HIV/AIDS of male high school students than females, present investigation did not reveal much disagreement in knowledge scores with respect to two genders in both the pre- and postinterventional studies.

Studies from Cameroon[12] and Ghana[13] observed high degree of knowledge related to HIV/AIDS more (62.1 % and 61.6%) among the high school students. Our investigation showed remarkably more 'high' level of knowledge score among the students in Science stream (30% and 56% in pre- and postintervention) compared to those in Arts and Commerce Streams (15%, 12% in pre- and 24%, 16% postintervention). This observation was similar to that reported by the Kuwait study[11].

A study from Udaipur, Rajasthan, India[14] reported that 96% of the Students of Senior Secondary English Medium Co-ed Schools were aware of full form of HIV/AIDS. In contrast, only about 50% of the students of our study knew the full forms even after attending the Interventional Talk. Similar awareness of knowing full forms of AIDS (51.4%) and HIV (19.9%) has been also reported by another study from Delhi among the students of Senior Secondary School[15].

We observed 67% of the students of pre-interventional and 69% of postinterventional studies were aware that HIV/AIDS are preventable. This finding is comparable to that of an earlier investigation[11].

A study[16] from North Bengal, India, on knowledge about HIV/AIDS of Adolescent School Girls, found that only 14.2% of the students knew all the four correct transmission routes. In contrary, our investigation showed that much less number (5.4%) of the students knew only three correct routes even after the Interventional Programme. Such difference in findings may be due to qualitative differences of the participants (N = 811; class XI, XII) from our study and that (N=318; class IX, X, XI & XII) from the North Bengal study[16]. After intervention, the Wuhan Study[7] reported that the knowledge about mode of transmission increased more (85% to 90%) among their study participants. In the present study after the interventional education program the proportion of students who identified three correct ways of transmission of HIV increased by 100%.

Significant enhancement in students' attitude about HIV/AIDS was found in our study following the intervening educational talk. Similar change in attitude of Senior Secondary School Children in Pune following an educational talk has been reported by a previous study[6]. Educational intervention has also been found to change attitude of Secondary School Students positively by an investigation[7] from Wuhan, China.

It may be concluded that interventional educational programs are almost certainly very effective in improving knowledge and attitude of the school students with respect to HIV/AIDS.

Limitations

First, this study included adolescents in schools and not the similar school dropouts. So, generalization of the results for the latter group may not be reasonable. Second, as the data of this were self-reported by the students, veracity of some responses should be interpreted with care. Third, as the study was conducted in one state of the country, the observations may not be extrapolated to student groups from other parts of India who may differ in awareness and cultural status.

Acknowledgement

We are grateful to authorities of all the schools for their cooperation. We thank all the students for participating in this study.

Funding : None

Conflict of interest : None

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Review Article

An update on Oral Manifestations of COVID-19 : a Narrative Review

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Coronavirus disease, since its first case reported in China in 2019, has increased at an exponential rate globally, still growing strong and challenging the Healthcare System Globally. It primarily causes Pneumonia by infiltrating the respiratory tract. However, recent studies detecting SARS-COV RNA in saliva; and affinity of the virus to ACE2 receptors which are abundantly found in epithelial lining of oral mucosa suggest that the oral cavity might probably be the first contact area for the Coronavirus. The aim of this review is to compile and present evidence-based overview of oral manifestations of COVID-19, with a view to presenting a means of early disease detection. The literature shows that the most frequently affected sites in the oral cavity are tongue, lips and palate with varied manifestations like non-specific oral Ulcerations/blisters, Dysgeusia, Xerostomia due to reduced salivary flow, oral candidiasis and Gingivitis. The occurrence of oral lesions in COVID patients could be multifactorial; due to direct or indirect action of SARS-COV-2 on oral mucosa, secondary to the therapeutic drugs used in COVID-19 treatment; lowered general health status following prolonged hospitalisation and co-infections. COVID-19 associated oral manifestations may be underreported due to lack of knowledge among Physicians and Dentists. They should be sensitized to perform a thorough oral examination in COVID affected patients to provide an early diagnosis of the disease and take up measures to limit the progression and spread of disease.

[*J Indian Med Assoc* 2022; **120(2):** 47-51]

Key words **: Oral lesions, Saliva, SARSCOV-2, Oral mucosa, ACE 2 receptors.**

The outbreak of Novel Coronavirus (COVID-19) has challenged the Healthcare Management Systems worldwide. The fast spread of misinformation about the ongoing Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-COV-2) pandemic places the Virus alongside an annoying infodemic and causes unnecessary worldwide panic[1]. World Health Organisation (WHO) report on COVID-19 published on May 28, 2021 states that a total of 168,040,871 cases and 3,494,758 deaths have been recorded Globally with 27,369,09 cases and 315,235 deaths reported in India[2]. Epidemiological data suggest the spread of virus through droplet, direct contact, fomite and airborne transmission[3,4]. Initially, symptomatic patients were assumed to be a major source of disease transmission, however, recent studies suggest that patients in their incubation period and asymptomatic patients could also be a carrier of SARS-COV-2[5,6]. The Epithelial Cells of oral Mucosa are considered to be the best receptor for SARS-COV-2[7]; however, our knowledge on oral manifestations associated with the novel COVID-19 is still limited. The disease is devastating if allowed to progress, hence, this review aims to compile evidence-based overview of oral manifestations of COVID-19, for early detection and diagnosis of the disease.

Editor's Comment :

- Detecting oral lesions of COVID-19 by oral physicians can be useful to perform better preliminary triage in a dental setting. This can provide opportunity for early diagnosis of the disease thereby limiting the severity and spread of the disease.
- The occurrence of oral lesions could be multifactorial such as due to poor oral hygiene, increased susceptibility of COVID patients to viral, fungal, other bacterial co-infections; impaired immunity and pharmacological therapy used.

(1) Saliva as SARS-COV-2 Reservoir :

The Epithelial cells of Salivary glands act as viral receptors, due to significant expression of Angiotensin Converting Enzyme 2 (ACE2), which has been identified as a functional receptor for SARS-COV-2[8]. S-spike protein of SARS-COV-2 attaches to the ACE2 receptors and subsequently undergoes replication and lyses the cells,followed by release of salivary amylase into peripheral blood that facilitates an inflammatory reaction causing destruction of tissues of salivary gland which causes apparent signs and symptoms of discomfort, inflammation and pain in salivary glands[9]. SARS-COV RNA can be found in saliva even before

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Received on : 03/01/2022

Accepted on : 06/02/2022

lung lesion emerges with a positive rate of 92% or more, which accounts for the spread through contaminated saliva of asymptomatic patients[10]. Due to abundance of disease biomarkers in saliva with relative ease in its sampling procedure being non-invasive and cost-effective, research suggests the use of saliva as a viable diagnostic tool for early detection of COVID-19[11,12].

(2) Oral Manifestations of COVID-19 :

Oral lesions were reported to be symptomatic in 68% of cases with equal prevalence in both males (51%) and females (49%)[13]. Patients with older age and higher severity of disease reported to have more widespread and severe oral lesions. Oral lesions in mild cases, may appear before or at same time as initial respiratory symptoms; and in few critical cases requiring hospitalisation, they appeared 7 to 28 days after onset[14].

2.1 Xerostomia / Dry Mouth :

More than 50% COVID-19 patients reported to have Xerostomia and a significant correlation has been found between Xerostomia and Dysgeusia in these patients[15]. Factors such as aging, comorbidities, use of certain medications and psychological disturbances causing hyposalivation, increases the risk of an individual to COVID-19, as the presence of proteins and antiviral proteins in saliva are reduced[16-20]. A study revealed 38% of total COVID patients, who were severely ill, showed a strong relationship between salivary gland ectasia and high levels of CRP, a marker of systemic inflammation and LDH, a marker of overall Necrosis[21]. Due to significant expression of ACE2 receptors, SARS-COV-2 affects major and minor salivary glands resulting in Acute Sialadenitis with symptoms of discomfort, swelling and pain in salivary glands. Acute phase is followed by repair of salivary glands with fibroblast proliferation and fibrous connective tissue formation, which may lead to ductal stenosis and hyposecretion of saliva; ultimately leading to xerostomia due to Chronic Obstructive Sialadenitis[9].

2.2 Taste Alterations :

Interaction of SARS-COV-2 with ACE2 receptors, which is highly expressed in Epithelial Cells of tongue, may result in gustatory dysfunction. It is reported to be either the first symptom or the only symptom detected of this disease[22-25] with a wide range of prevalence between 5.6% and 92.64%[21,26]. The prevalence seems to be higher in female patients with mild to moderate COVID-19 severity[14]. Taste disorders are of three types: Hypogeusia- a decreased sense of taste; Ageusia- absence of sense of taste; Dysgeusia- a qualitative distortion of taste perception and it was found that 38% of COVID-19 patients showed Dysgeusia; 35% showed Hypogeusia; and 24% showed Ageusia, according to a recent systematic review[27]. Due to neuroinvasive action of SARS-COV-2, xerostomia may also be associated with gustatory dysfunction, eventually leading to Burning mouth syndrome[28]. Although not specific, Chemo Sensitive Disorders might be markers of early infection, Identification of which might help in early case identification and isolation thereby containing the spread of the disease[29-31].

2.3 Lesions Associated :

2.3.1 Oral Ulcerations —

Recurrent oral ulcers can be an inaugural symptom of COVID-19. A report of 3 cases showed occurrence of painful herpetic like oral blisters even before systemic symptoms could be seen in COVID positive patients[32]. Fidan *et al* performed a prospective Observational study on 74 COVID positive patients and reported that frequency of oral lesions in these patients is 78.4%. The most prevalent oral lesion were Aphthous like ulcers (36.5%); erythema (25.7%) and lichen planus (16.2%), commonly affecting sites such as tongue followed by buccal mucosa; gingiva and lastly the palate[33]. Brandao *et al* reported a case series of 8 COVID positive patients presenting two different patterns of Oral Ulcerations- Aphthous like and Superficial Necrosis spread throughout the oral cavity[34]. Reportedly, Aphthous like ulcers were seen in young patients with mild COVID infections and other Widespread Lesions resembling HSV1 Necrotic Ulcers were seen in older, severely infected and immunocompromised individuals.

Gianfranco Favia *et al* studied 123 COVID positive cases and reported that most frequently detected Oral Lesions were painful Ulcerative Lesions (52.8%-65%) presenting as single (40%) or multiple (60%) lesions[35]. Blisters were seen in 15.4% which collapsed into Superficial Erythematous Ulcerative Lesion associated with pain and minor bleeding. Asymptomatic petechiae was seen in 11.4% cases located on hard and soft palate and tongue. Angina bullosa was observed on soft palate, tongue and cheek that appeared as brown-black single multiple bullae. A study correlating the clinical and histopathological features of oral lesions describes that there is partial or complete Thrombotic Vascular Occlusion resulting in Superficial Necrotic areas along with wide inflammatory reaction in deeper tissues[36].

2.3.2 Tongue Lesions —

E Gherlone revealed that 28% patients showed tongue abnormalities limited to hairy white tongue

showing marked Hypertrophy of Filiform Papillae due to excess keratin production or poor oral hygiene[21]. Study describing changes in tongue show that in, early stages, tongue appeared pale/reddish with slimy white tongue fur. In middle stage, tongue appeared red with yellow dry fur. During early severe stage, it appeared crimson with yellow dry fur. In late severe stage, tongue seemed dark purple with thick dry fur. In recovery stage, tongue appears pale, tender, soft and enlarged that later becomes red with thin fur[37].

2.3.3 Necrotising Periodontal Disease —

Asymptomatic patient showed hyperpigmented labial Gingiva due to increased melanogenesis in response to immunoinflammatory processes, that increases the levels of prostaglandins, leukotrienes, cytokines (TNF alpha, IL-1) and inflammatory mediators[38]. Critically ill patients showed signs of Ulcero-necrotic Gingivitis associated with bleeding due to poor oral hygiene. Patel and Woolley hypothesised a rise in incidence of Acute Necrotising Periodontal Disease (ANPD) with increasing COVID cases, due to bacterial co-infections of Prevotella intermedia, alongside Streptococci, Fusobacterium, Veillonella and Treponema species, which have been detected in metagenomic analyses of patients affected by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2)[39].

2.3.4 Coinfections —

A few studies including: 5 case reports, one case-series, one cross-sectional study and one open-label trial[14,39-45], have reported cases of Oral Candidiasis in patients with COVID disease. Most cases developed Oral Pseudomembranous Candidiasis as a result of inflammatory processes to viral infection, use of antibiotics, Diabetes Mellitus or secondary to immunosuppression seen due to rapid and generalised Lymhopenia in patients with SARS-COV-2.

(3) Associated Syndromes :

3.1 Kawasaki-like Disease :

An Italian observational study showed 30 times higher monthly incidence of Kawasaki Disease during COVID outbreak; showing either the classic form or the incomplete form of Kawasaki Disease. In Kawasaki disease, mainly diagnosed in children below 5 years of age with peak incidence at 10 months; changes of lips and oral cavity may occur including Erythema, Fissuring, Dryness, Peeling, Crackling, Bleeding of Lips and Strawberry tongue, that may become worse if associated with COVID-19, hence are reported as Kawasaki-like disease[46].

3.2 Multisystem Inflammatory Syndrome in Children (MIS-C) :

A postviral immunologic reaction due to SARS-COV-2 infection, might result in MIS-C. A confirmed case of COVID-19, aged 21 years or less with fever and laboratory evidence of inflammation involving 2 or more organ systems, necessitating hospitalization, is categorized under MIS-C[47], showing oral manifestations such as red or swollen lips, redness in inner cheek, and strawberry tongue.

3.3 Melkerson- Rosenthal Syndrome :

A case report of a 51-year-old female with past history of cured Melkerson-Rosenthal Syndrome, developed COVID-19 disease and complained of malaise, unilateral lip swelling, fissured tongue and right facial paralysis, which was cured after treatment of COVID-19[48].

(4) Newer Complications:

4.1 Mucormycosis/Black Fungus :

Mucormycosis is a rare fungal infection caused by fungi of the order Mucorales, of the class Zygomycetes, that progresses rapidly and may have a fatal outcome[49]. Mucormycosis mainly affects immunocompromised individuals with risk factors like Diabetes Mellitus or on broad spectrum antibiotics/ steroids/monoclonal antibodies or immunomodulatory drug (Tocilizumab) therapy[50]. CAM has affected 18 Countries;however, India was the hardest hit country with over 20,000 cases in first week on June, 2021[51]. Inhalation of sporangiospores seems to be a main route of infection causing pulmonary infection which can spread contagiously into other organs. Diabetics with ketoacidosis provides a favourable environment for rapid proliferation of fungus and its subsequent invasion into orbit, cerebrum, paranasal sinuses, palate and skin of face[52]. Prevention of COVID-associated Mucormycosis focuses on addressing underlying risk factors such as glycemic control in diabetics; appropriate use of Systemic Corticosteroids and avoiding unnecessary use of antibiotics, antifungals and other immunomodulators; proper sterilisation and disinfection of medical equipment; good ventilation in hospitals; and proper line management in hospitals.Oral manifestation of Mucormycosis starts as Palatal Ulceration or Necrosis followed by perforation of palate as the fungi invades into the nasal cavity or paranasal sinuses through vascular channels. Patient usually presents with Facial Cellulitis and Anesthesia, Nasal discharge, Necrotic turbinates, Blackish discoloration over bridge of nose/palate, toothache, loosening of teeth and local pain on cheekbone[49].

Conclusion :

The current knowledge on the occurrence of Oral lesions and its association with COVID-19 disease is still inconclusive. Whether oral ulcerations or blisters are manifestations of COVID-19, needs more clinical studies to be carried out with large number of samples. The occurrence of Oral Lesions could be multifactorial such as due to increased susceptibility of COVID patients to viral, fungal, other bacterial co-infections; due to impaired immunity and Pharmacological Therapy used. It is important to be cautious of spreading information related to oral manifestations of COVID-19, as these acute oral Lesions could be a shared presentation by many conditions. Dentists, as oral physicians, have the opportunity to provide an early diagnosis and make proper referral, thereby limiting the severity and spread of the disease.

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Case Report

Isolated Unilateral Third Cranial Nerve Palsy : A Rare Presentation of Dengue Fever

Biva Bhakat[1], Angan Karmakar[2]

We herein report a case of unilateral 3rd cranial nerve palsy in a 15 years old boy. It can be due to numerous aetiologies like infectious, inflammatory, malignant, metabolic or vascular. In our case the nerve palsy was preceded by history of high grade fever of 5 days. Involvement of 3rd cranial nerve started 9 days after fever onset, insidiously, presenting as Ptosis and Diplopia. No history of altered sensorium, limb weakness, diurnal variation. Routine investigation was normal. Integrated Counselling and Testing Centre (ICTC) was negative. Cerebrospinal Fluid (CSF) study revealed viral picture but was negative for neurotropic viral panel. MRI brain was essentially normal except for presence of small Lipoma over prepontine cistern. Antinuclear Antibody (ANA) and Antineutrophil Cytoplasmic Antibodies (ANCA) were negative. Serology for Dengue was sent considering the history of high grade fever associated with blanchable rash. Dengue IgM report came out to be reactive. CSF Dengue IgM also came out to be reactive. Patient was put on short course of oral steroid therapy and cranial nerve palsy improved gradually. Neurological complications of dengue is uncommon. Few cases of Cranial Nerve Involvement associated with Dengue have been reported in the literature, most of them are associated with encephalitis. But in our case Cranial Nerve involvement was not associated with Encephalitis, it was probably due to immune reactions secondary to Dengue, making this case atypical.

[*J Indian Med Assoc* 2022; **120(2):** 52-3]

Key words **: Extra axial occulomotor nerve involvement, Immune reaction, Dengue fever, Convalescent stage.**

Dengue virus is one of the most important Flavivirus. There are 4 serotypes 1-4, which can cause infections with severity ranging from prodrome of constitutional symptoms and signs to severe Hemorrhagic Fever with or without Shock Syndrome. Recently it has been known to involve CNS as well. Neurovirulence is mediated by direct viral invasion and subsequent metabolic changes or from indirect mechanisms. Neurological involvement mainly occur in the form of Encephalopathy. Rarely, it can manifest as Neuritis, secondary to humoral immune response. To establish the diagnosis, serum and CSF reactivity for IgM antibody to be tested. Differential diagnosis to be excluded by appropriate investigations- blood test (to rule out other infectious diseases, inflammatory diseases), CSF examination (cell type and cell count, protein, sugar, RT PCR for neurotropic viral panel), Brain imaging (MRI with contrast). In this article, we are reporting a case of Dengue Fever with Oculomotor Nerve Palsy, extra axial lesion.

Case Report

15 years old aged male patient presented to us with chief complain of

- High graded fever, continuous in nature with chills and rigor, associated with malaise and headache for 12 Days. A febrile for last 7 days.

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Received on : 09/01/2022
Accepted on : 24/01/2022

Editor's Comment :

- Understanding the pathogenesis of cranial nerve involvement in dengue is of utmost therapeutical importance.
- Short course of oral steroid therapy is needed for early recovery if the underlying mechanism is immune reaction, a rare possibility.

- Drooping of left upper eye lid for 3 days; insidious onset, gradually progressive, associated with Diplopia that disappears on closing either eye and was maximal on looking upwards and right lateral gaze. No diurnal variation present. No history of altered sensorium, convulsion, neck pain, no history suggestive of other Cranial Nerve Palsy or Limb weakness.

Differential diagnosis :

Infectious diseases - Bacterial infections; Viral infections: CMV, EBV, HIV; lyme disease.

Inflammatory - SLE, Vasculitis

Malignancy - Acute Leukaemia

On examination patient was alert and conscious.

Pulse - 88/min, BP - 108/72,

Lymph node - Non palpable

No skin rash, no evidence of Arthritis

CNS Examination - Absent meningeal sign, normal Ophthalmoscopy, left sided complete ptosis, Anisocoria, left pupil fully dilated, not reacting to light, on pursuit movement, other than abduction and intorsions, other movement were impaired in left eye, no limb weakness, plantar- B/L flexor

CVS examination- WNL

Respiratory system- WNL

Gastrointestinal system- No hepatosplenomegaly

Differential diagnosis -

Infectious diseases - Bacterial, viral infections : CMV, EBV, HIV; Lyme disease.

Inflammatory - SLE, Vasculitis (Fig 1).

Investigation :

CBC- Hb 13.7, TLC- 4300 (N24L62), PLT- 1.2 lacs/cumm, ESR-46

LFT- T.Bil 0.5, SGPT/SGOT/AlkPhos- 24/62/121 total protein/Alb- 5.8/3.6

Ur/Cr- 24/0.7, Na/K- 138/4.3

MP, MPDA- Negative

HBsAg/ anti HCV/ **ICTC**- negative

ANA/ anti MPO/anti PR3- non reactive

CSF study -

- cell count & count - 12 cells, all are lymphocytes
- Protein - 60mg/dl,
- Glucose - 46mg/dl
- CSF Neurotropic viral panel - Negative

MRI brain - small area of hyperintensity noted in T1, T2WI suggestive of small lipoma over prepontine cistern (Fig 2).

We re-evaluate the history that fever was associated with blanchable rashes over generalised body, extreme body ache and myalgia. Considering the possibility of dengue infection, we sent for Dengue IgM antibody-

Dengue IgM - 37.8 (reactive).

CSF dengue IgM antibody sent- reactive

Provisional diagnosis - A case of dengue fever (convalescent stage) with extra axial 3rd cranial nerve palsy with lipoma in prepontine cistern region.

Treatment and follow up - He was given supportive treatment with a short duration of intravenous fluids and short course oral steroids and was discharged 7 days after admission with almost full resolution of diplopia and partial improvement of ptosis. The ptosis recovered fully 2 weeks later on follow up.

Discussion

- Viral and host factor play important role in disease pathogenesis.
- Neuropathogenesis involves following mechanism-

metabolic disturbances- cerebral anoxia, edema, hepatic encephalopathy, hemorrhages (secondary to thrombocytopenia)

viral invasion - (a) Passive crossing of the blood brain barrier: dengue induced cytokine immune response

Fig 1 — Dropping of left upper eyelid-weakness of levator palpabrae superioris, supplied by 3rd cranial nerve

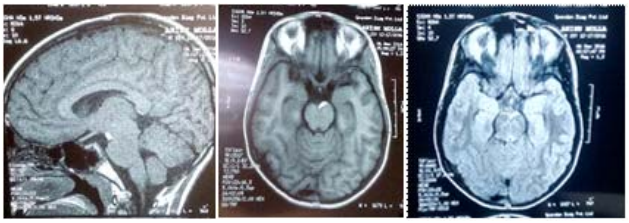

Fig 2 — MRI Angiography of cerebral blood vessel - normal

⟶ disruption of blood brain barrier⟶ invasion of CNS

(b) Actively invading CNS

autoimmune reactions- (a) immunoallergic mechanism in post infectious period

(b) Cell mediated immunologic reactions- activated T cells cross blood brain barrier ⟶ recognise an antigen in endoneural compartment ⟶ produce cytokines ⟶ disruption of blood brain barrier allowing cross reacting antibodies to enter and attack Schwan cells

- Host immune response, both inmate and adaptive, results in effective clearance of pathogenic organism. But dysfunction of immune system may lead to damage to host tissue as well. The immune response in brain secondary to Dengue infection may manifest as Cranial Neuritis.
- Diagnosis is usually made by demonstrating reactive Dengue IgM in CSF.
- Careful exclusion of other differential diagnosis to be done using detailed history, clinical examination, necessary investigations.
- Recovery is spontaneous or may need short course of Steroid Therapy in some cases.

Conclusions

- Neurological complications In Dengue fever can manifest as a form of isolated Cranial Nerve Palsy without other features of encephalopathy.
- Para infectious or post infectious Cranial Nerve Palsy may be due to immune reaction secondary to Dengue infection in CNS.
- Understanding the disease mechanism is important for appropriate treatment.
- A short course of steroid therapy prompt recovery, avoiding longer hospitalisation.

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Case Report

Stenotrophomonas Maltophila : A Rare Cause of Bacteremia in a Patient of Viral Encephalitis

Shreekant Tiwari[1], Monalisah Nanda[2]

Stenotrophomonas maltophila is an important Nosocomial Bacterial Pathogen. It is ubiquitous, non-fermentative gram negative bacillus previously known as *Pseudomonas maltophila* or *Xanthomonas maltophila*. It is usually of low virulence but now a day there is increased frequency of its isolation from hospitalized patients, especially patient with immunocompromised status. *S maltophila* infections include Bacteremia, Pneumonia, Urinary tract infection, Endocarditis, Meningitis, Peritonitis, Ocular infections, Septic arthritis & Cystic fibrosis. Treatment of *S. maltophila* infection is often difficult as it is resistant to commonly used antimicrobial agents and this antimicrobial resistance may emerge during therapy. Herewith we are reporting a case of bacteremia in a patient with viral encephalitis caused by Dengue Virus. Patient was treated successfully with Co-trimoxazole plus ticarcillin+clavulanic acid along with other supportive measures. [*J Indian Med Assoc* 2022; **120(2):** 54-6]

***Key words* : *Stenotrophomonas maltophila*, Multidrug resistance, Bacteremia, Viral encephalitis.**

Stenotrophomonas maltophila (S maltophila) is an important nosocomial and emerging pathogen. Earlier it was described mainly as opportunistic pathogen in immunocompromised patients but recently it is considered as true pathogen in immunocompetant individual also[1]. *Stenotrophomonas maltophila* was previously called as *Pseudomonas maltophila* or *Xanthomonas maltophila*. It is a Multi Drug Resistant, aerobic, glucose non-fermenting, non- sporing, non acid fast gram negative bacilli distributed widely in the natural and hospital environment. Earlier this pathogen was considered to have low pathogenic potential but now considered as an important nosocomial, multidrug resistant pathogen, because of decreased immunity in general population. It ranks third most common pathogenic non fermenting gram negative bacilli responsible for nosocomial infection after *Pseudomonas aeruginosa & Acinetobacter species.* Recently *Burkholderia Cepacia Complex (BCC)* also considered as an important nosocomial non fermenting gram negative pathogen[2].

Now-a-days it is found that *S maltophila* associated with nosocomial infections. Few of them are blood stream infections, others involve the urinary tract , bone joint, heart meninges, respiratory tract, skin and eye[3]. In cystic Fibrosis patients, *S maltophila* can account for colonization and chronic infection. There are various predisposing factors for *S maltophila* infection. Amongst these few important are malignancies, prolonged stay in Intensive Care Units, use of broad spectrum antibiotics, cytotoxic therapy, patients receiving transplants, damage of mucocutaneous barriers, indwelling urinary catheters and neutropenic patients. The correct identification of *S maltophila* has a great significance because it has to be differentiated from other non fermentative gram negative bacilli. *S maltophila* can be differentiated from other bacterial pathogen present in mixed infection by their ability to ferment certain selective sugars. *S maltophila* produces acid from Maltose but not from Glucose, whereas *Pseudomonas aeruginosa* utilizes Glucose but not Maltose. It is very difficult to identify *S maltophila* routinely in Microbiology Laboratory because of its inert bio-chemical reactions and difficulty in interpretation of phenotypic characteristics. That's why, *S maltophila* infections are less commonly reported from India though its incidence is increasing in Clinical Practice. Treatment of *S maltophila* is very difficult for multiresistance , ability to form biofilm and various extracellular enzymes[4]. Herewith we are reporting a rare case of bacteremia caused by *Stenotrophomonas maltophila* from a patient with viral Encephalitis.

Editor's Comment :

- Automated identification system (Vitek-2) can help in identification and antimicrobial susceptibility testing of such isolates.
- Isolation of *S maltophila* from any clinical samples should be looked with clinical suspicion.

Case Reports

A 35-year-old female from Rural area admitted to our hospital with chief complains of high grade fever (102°F), headache and fast breathing since last 4 days. On examination respiratory rate 46/min, pulse rate 104/min and blood pressure was 128/80 mm Hg. Abdominal examination and Cardiovascular System were within normal limits. Patient was slightly irritable, semi-conscious and there was neck rigidity. Other Central Nervous System findings were within normal range. Relevant laboratory findings include; Haemoglobin 12.2

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Received on : 19/11/2020
Accepted on : 01/01/2021

gm%, total White Blood Cell (WBC) count 29400/cmm, Neutrophil 88%, Eosinophil 2%, Lymphocyte 10%, Erythrocyte Sedimentation Rate (ESR) 56 mm after first hour, Na+ 140 m.mol/L, K+ 4.2 m.mol/L, Serum Urea 35 mg/dl, Serum Creatinine 1 mg/dl, Serum Protein 7.5 mg/dl, Serum Albumin 3.8 mg/dl. Routine microscopy of the urine showed pus cells 0-1/hpf, albumin trace and no parasite. Serological tests like Widal Test –negative, ICT for Malaria Parasite-negative, HIV, HBsAg & HCV – negative, Dengue NS1 Ag- reactive, Dengue IgM & IgG antibodies – non reactive, CSF sugar 10 mg/dl, protein - 250 mg/dl, chloride -97 mEq/L, ADA -3.8 U/L, Prothrombin Time (PT) – 12.2 sec, APTT – 33 sec, total platelet count – 1.2 lakhs/cmm, CSF total cell count -550/dl, N -90%, L -10%, RBC – occasional. Liver Function Test (LFT): direct serum bilirubin – 0.2 mg/dl, total serum bilirubin 1 mg/dl, serum alkaline phosphate 539 IU/L, SGOT - 294 IU/L, SGPT – 206 IU/L. Chest X-ray and USG abdomen were normal. With complete aseptic precaution blood and Cerebrospinal Fluid (CSF) were collected in aerobic & anaerobic blood culture bottle (BacT/ALERT/3D; bioMerieux, Marcy l' Etoile, France). Patient was started empirically with piperacillin +tazobactam & vancomycin. Aerobic culture bottle for blood showed positive sign of growth after 48 hours whereas aerobic culture bottle for CSF showed positive sign of growth after 72 hours. Broth was then sub cultured on 5% Sheep Blood Agar and Mac-conkey Agar from both the aerobic culture bottles. After overnight incubation Mac-conkey Agar of both the samples showed non-lactose fermenting, moist, non pigmented, smooth, tiny colonies with entire margin (Fig 1). Blood agar plate from both the samples also showed similar Colony Morphology and they were non-hemolytic. Gram stain was done from both the culture plates (blood & Mac-conkey Agar) of both the samples and it was gram negative bacilli. It was motile by hanging drop method. Routine Biochemical Tests were done and it was catalase positive, oxidase negative, reduced nitrate to nitrites, utilized glucose oxidatively, Lysine Decarboxylase Test was positive but Orinithine and Arginine test negative. On TSI both slant & butt was alkaline, produced H_2S on lead acetate paper strip. Further identification was done by VITEK-2 compact (fully automated identification system) using gram negative card (bioMerieux, Marcy l'Etoile France). It was identified as *Stenotrophomonas maltophila* with 99% probability from blood sample and with 98% probability from CSF sample. There was no growth on anaerobic culture bottle of both the samples even after 7 days of anaerobic incubation. Urine sample was also sent to the Microbiology department for culture & sensitivity. It was processed on Cysteine Lactose Electrolyte Deficient (CLED) media but there was no growth after 48 hours of aerobic incubation. Isolation of same bacteria from both the clinical samples (Blood &CSF) confirmed its pathogenic role. Antimicrobial susceptibility was performed with the disc diffusion method as described by the CLSI (Clinical and Laboratory Standard Institute) Guidelines and by VITEK -2 AST card. Sensitivity was detected to co-trimoxazole, levofloxacin, ticarcillin+ clavulanic acid, tigecycline, colistin & polymyxin B and resistant to gentamicin, amikacin, piperacillin+ tazobactam, imipenem, meropenem, cefotaxime and ceftazidime. Antibiotic susceptibility profile was same from both the clinical samples. Therapy was changed as per antibiotic susceptibility report to co-trimoxazole and ticarcillin+clavulanic acid for 14 days. There was good antibiotic response and fever was subsided on 4th day after starting the antibiotic therapy. Repeat blood culture was done after completion of therapy (14 days) and it was negative. Patient is doing well during follow up.

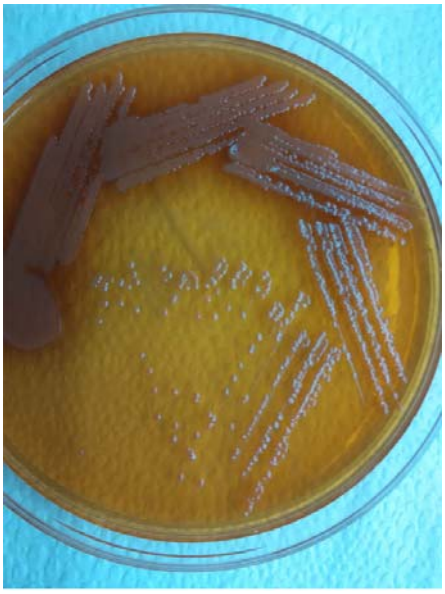

Fig 1 — Non-Lactose fermenting colonies of *S maltophila*

Discussion

Stenotrophomonas maltophila is a multi-drug resistant, nosocomial and an emerging pathogen. It is an aerobic, non-fermenting, non-sporing, gram negative bacillus. Primarily this organism is a plant pathogen which was also isolated from soil and water. Though initially it was considered as a pathogen of low virulence, but now it has been increasingly reported as nosocomial pathogen responsible for serious complications in immunocompromised as well as in immunocompetant hosts also. *S maltophila* was first isolated in 1943 by JL Edward and named *as 'Bacterium bookeri'*. It was named as pseudomonas maltophila in 1958 by Hugh and Ryschenkow. In 1981, *Pseudomonas maltophila* was re-classified as *Xanthomonas maltophila*. Finally Palleroni & Braudbury put it in genus *Stenotrophomonas* with only one species *S maltophila* in 1993[4]. Currently genus *Stenotrophomonas* consist of 12 recognized species. In 1997, Spirostachys Africana recognized as a new species, which was later found to be similar to *S maltophila*. It is ubiquitous in nature and due to this nature of *S maltophila*, many fomites and medical equipments in clinical settings may serve as reservoirs of infections. The most common risk factors for *S maltophila* infections are prolonged stay in ICU, indwelling urinary catheters, mechanical ventilation, prolonged use of broad spectrum antibiotics, corticosteroid therapy, cystic fibrosis, underlying malignancies, HIV infection and transplant recipients[5].

The most frequently reported infections caused by *S maltophila* include pneumonia, Blood Stream Infection (BSI), wound infection and Urinary Tract Infections, Ocular

infections, Endocarditis. Other less common infections are Meningitis, Sepsis, Skin and soft tissue infections, Epididymitis, Arthritis, Sinusitis, Cholangitis, Pyomyositis, Peritonitis and Osteoarthritis. There are few documented reports on community acquired *S maltophila* infections which most commonly occurs in patients with pre-existing co-morbidities[6]. Blood isolates of *S maltophila* should be properly analyzed to differentiate between true blood stream infection, contamination or colonisation. Commonest source of blood stream infection by *S maltophila* is central venous line. A previous surveillance study reported that *S maltophila* was the third most frequently isolated non-fermenting, gram negative bacillus after *pseudomonas aeruginosa and acinetobacter species*. Therefore clinicians must be aware that *S. maltophila* may spread anywhere in the hospital environment, especially from water related sources and medical equipments used for patient care[7].

Treatment for *S maltophila* infections is challenging due to multiresistance. These pathogens are intrinsically resistant to aminoglycosides and carbapenems. The possible mechanisms of antimicrobial resistance in *S maltophila* include; efflux pump, low outer membrane permeability, antibiotic inactivating enzymes and â lactamases. In literature, limited data are available on clinical trials, of various treatment regimes. In routine Microbiology Laboratory antimicrobial susceptibility among *S maltophila* isolates should be done by Kirby-Bauer disc diffusion method against co-trimoxazole, minocycline and levofloxacin as per Clinical Laboratory Standard Institute (CLSI) guidelines. As per CLSI guideline only Minimum Inhibitory concentration (MIC) is determined against ticarcillin-clavulanic acid, ceftazidime, minocycline, levofloxacine, co-trimoxazole and chloramphenicol[8]. Co-trimoxazole is the drug of choice for the treatment of S *maltophila* infections due to its good susceptibility and clinical outcomes in the treated patients. Co-trimoxazole was also sensitive in our case and patient recovered very well after treatment. The scenario is now changing and there are now few reports for emerging resistance to co-trimoxazole throughout the world. Ticarcillin-clavulanic acid has been prescribed as the second drug of choice due to its in-vitro activity against *S maltophila* infections in co-trimoxazole resistant cases.

In recent years, reports of high susceptibility rate of *S. maltophila* against colistin and polymyxin B are available. In our case both colistin and polymyxin B was sensitive by disc diffusion method however patient was treated successfully by co-trimoxazole and levofloxacin which were other sensitive antibiotics in panel. In case where co-trimoxazole is resistant, combination of two or more antimicrobial agents might prove benefits but there is the lack of clinical data about combination therapy and also more research have to be done. It has been suggested that combination therapy have better bactericidal kinetics than monotherapy. Early prosthetic-aortic valve Endocarditis and osteomyelitis were successfully treated by combination therapy[9]. Combined antibiotic therapy for bacteremia caused by *S. maltophila* is based on synergistic effect of co-trimoxazole plus ceftazidime, co-trimoxazole plus ticarcillin-clavulanic acid and ticarcillin-clavulanic acid plus ciprofloxacin[10]. Recent study indicated that fluroquinolones are feasible alternative to Trimethoprim-sulfamethoxazole (TMP-SMX) for the treatment of *S maltophila* bacteremia.

Stenotrophomonas maltophila has very dynamic characteristics. In the last two decades it has risen from environmental organism to grievous opportunistic pathogen. The organism is not only an opportunistic pathogen in immunocompromised hosts but also reported as true pathogen in immunocompetant individuals. *S maltophila* is not only resistant to commonly used antibiotics but also have ability to cause degradation of antibiotics. It uses antibiotics as food, which is of great concern in its role as nosocomial pathogen. Strict adherence to rules of hygiene, quality control in hospital units, avoiding the abuse of antibiotics etc. are suggested; as these things, predispose the organism to antibiotic resistance. To know more about this pathogen, there is need to collect epidemiological data of clinical isolates of *S maltophila*. Hospital should also perform surveillance on *S maltophila* associated infections. Clinical Microbiology Laboratories should do correct identification and reporting of *S maltophila.* Its isolation from clinical samples should be considered significant not be dismissed as commensals always.

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Special Correspondence

A More Hygienic Method for Measuring Blood Pressure

Aditya Raut[1], Rajeev Raut[2]

Background : Blood Pressure (BP) measurement is the commonest test performed in any healthcare facility. The same BP cuff is used for measurement of BP in many patients. The BP cuff can get contaminated with microorganisms[1]. It may become a vector in transmission of communicable and infectious diseases. The Corona Pandemic has highlighted the needs to prevent transmission of infections by taking precautions in health care facilities. Disposable BP cuffs are available in Western Countries. Though they solve the contamination problem effectively, they are very expensive. To overcome the problem of contamination of the BP cuff, we propose to use a very thin plastic paper to cover the arm of the patient, to tie the BP cuff on the plastic paper so that the cuff does not come in contact with the patient's body.

Aim : To validate the accuracy of the BP measured after tying the cuff in such non contact manner. Settings and Design: The study was carried out at Dr Rajeev Raut Eye Clinic with consent obtained from Ethics Committee. 50 patients underwent BP measurement in supine position with and without the plastic wrap around the arm. The results of BP measurements thus obtained were statistically analysed.

Results : The BP measurement obtained with the wrap and without the wrap were not found to be statistically significantly different.

Conclusions : The BP measurements obtained using a Polyvinyl Chloride (PVC) cling film wrap covering the arm are similar to those obtained without the use of the wrap. However, further studies are needed to prove the reduction in contamination rate.

[*J Indian Med Assoc* 2022; **120(2):** 57-8]

Key words **: BP measurement, BP cuff, PVC cling film wrap.**

Blood Pressure (BP) measurement is a commonly performed procedure in almost all Healthcare settings which provides essential information to aid diagnosis and monitoring. The Sphygmomanometer is an important tool for clinical assessment but it can become contaminated by micro-organisms. Also the same BP cuff is used for many patients, thereby increasing the chances of infection. Communicable diseases have come to the forefront of Medical Science once again, with the Corona Pandemic. BP cuff may act as an important vector for transmission of diseases.

In a study conducted by Dr Joseph Eldor in Jerusalem, it was found that 80% BP cuffs are contaminated on their inner as well as outer surfaces[2]. Bacterial Colonisation rate of up to 82% was found. Though disposable one time use BP cuffs is an ideal way to prevent the cuff from becoming vectors for organisms, it may not be economically feasible for all healthcare facilities in developing Countries like India to adopt such a procedure.

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Received on : 02/07/2021

Accepted on : 24/01/2022

Editor's Comment :

- Blood Pressure cuff can act as vector for many communicable diseases.
- Preventing contact between BP cuff and patients body and clothes is important. This can be achieved by wrapping a thin plastic clingwrap paper around the arm and applying the BP cuff on the plastic wrapper.
- Study shows that BP measurement performed using this method does not affect accuracy of the BP measurement. Further steps need to be explored to avoid the contamination of the tubing in the clinic environment.

We propose wrapping PVC cling wrap around the arm and then tying the BP cuff over the wrap to prevent direct contact of the BP cuff with the patient's body, to prevent contamination of the BP cuff. The accuracy of BP measured by this method was recorded, and it was compared with BP measured without the plastic wrapper by statistical analysis.

Material and Method

The study was conducted during October, 2020 – December, 2020. Approval for the study was taken from the Ethics Committee. 50 consecutive patients undergoing BP measurement were included in the study. All patients were included and there were no exclusion criteria. An informed consent was taken from all the patients.

A very thin plastic sheet is available as a role and is used by households to wrap food before putting it in the refrigerator. It is readily available, inexpensive and the plastic is biodegradable.The film is very thin (11 microns). It can be wrapped around the patient's arm with ease. When it is disposed, it being very less in volume, produces a very small plastic waste.

The paper was wrapped around the arm, and the BP cuff was tied over the wrap. The cuff was tied snugly and neatly onto the patient's arm, 2 cm above the Brachial Artery, aligning the artery index marker on the cuff with the Brachial Artery. The blood pressure was measured for all patients with and without the wrap, in supine position. In first 25 patients, the wrap was tied around the arm and BP was measured and recorded. Next, the wrapper was removed and BP was recorded over the same patient over the same arm.

In the next 25 patients, BP was measured without the plastic wrap first. Then the cling film wrap was wrapped around the arm, the cuff was tied over the wrap and BP was measured again and recorded. The 100 readings thus obtained were subjected to statistical analysis.

Observations

There was no statistically significant difference in the BP obtained with and without the use of the PCV cling wrap. Paired two tailed 't' test was performed P value (0.15).

Discussion

Blood Pressure Measurement is one of the most commonly performed medical tests in the World. It is a critical measure, providing information that is used for many purposes, including determining whether a patient is at increased risk for developing Vascular Disease because of Elevated Blood Pressure. Accurate BP Measurement is the foundation of optimal diagnosis and treatment of Hypertension. Ill persons visit healthcare facilities. Vomit, blood, sweat and spit of patients can come in contact with BP cuff at times. In Operation Theatres, BP cuff is continuously tied to the arm, and is exposed to possible contamination from body fluids. Studies have shown very high contamination rates in BP cuffs. Disposable BP cuffs are not economically feasible though ideal. A technique of measuring BP while minimising the contact of the cuff with the human body is therefore highly desirable.

Modifying the method of measuring BP by using PVC cling film around the arm of the patient, though not as ideal as use of disposable BP cuff, provides a more hygienic method without sacrificing accuracy. However, further studies regarding the rate of contamination using this non contact method are desirable.

Limitations and Drawbacks of Study :

BP Measurements used in the study does not include children under 12 years of age. The study does not include patients with extremely low or very high BP measurements that may be seen in Intensive Care Units and Operation Theaters.

While the cling film prevents contact of the bp cuff with the patients body, the tubing connect the cuff to the main machine still remain exposed. Additional exploration of technoques to prevent tubing contact and contamination are necessary.

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Special Correspondence

Pledging Service to Humanity.....

Ravi Wankhedar[1]

The decision on replacing Hippocratic Oath mentioned in minutes of NMC is totally Irrational, Retrograde & probably taken to please powers that be.

IMA always opposed replacing MCI by undemocratic NMC and now in last few years the fraternity is experiencing it's ill effects.

Instead of creating such unnecessary controversies or symbolism NMC should concentrate on improving quality of Medical Education, Protecting the dignity of modern Medicine and welfare of young Medicos.

The IMA leaders in NMC will surely oppose it and see to it that this minutes are not converted in notification.

Various Codes of Ethics for Physicians existed since time immemorial and was expressed in all ancient cultures where Medicine was well developed,may it be Indian, Chinese, Egyptian or Greek.

But they were relevant at that particular point of time.

In England, Thomas Percival, a Physician and author, crafted the first modern code of Medical Ethics in 1794 and wrote an expanded version in 1803, in which he coined the expressions "Medical Ethics" and "Medical Jurisprudence"

In 1815, the Apothecaries Act was passed by the Parliament of the United Kingdom.

In 1847, the American Medical Association adopted its first code of Ethics.

In modern era the Declaration of Geneva defines the Broad Outline of Ethics and is updated periodically.

Ethics is a Dynamic entity and even though the basic tenets remain the same, it has to be always updated considering the newer challenges of Medicine.

Hence to revert to a age old code is highly irrelevant in modern era.

All Medical Graduates in India are governed and bound by the Ethics decided by erstwhile MCI & now NMC. They were never administered the Hippocratic Oath. Hence the so called decision to abolish it is mere white wash and symbolic.

Does this quixotic decision of NMC mean that we are now NOT bound by the existing code of Ethics by NMC?

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Received on : 14/02/2022
Accepted on : 14/02/2022

Voice of Expert

Current Status of Postgraduate Medical Education in India : Some Thoughts

Pawanindra Lal*

Q.1 In India after doing Graduation in Medicine what are the options for PG ?

Ans : After graduation in medicine, aspiring doctors can appear in the NEET PG examination for roughly 45000 postgraduate seats in medical colleges. National Board of Examinations in Medical Sciences (NBEMS) has added nearly 2000 seats in 8 new subjects especially focussed towards district hospitals and this will not only improve services in the peripheral hospitals where more than 50% of the population is served, but also provide training opportunities in high volume hospitals under trained specialists. These new diploma holders can have career progression to a full DNB degree through the two year secondary DNB programme admission for which is conducted by a Post Diploma Common Entrance Test (PDCET) by the NBEMS. Additional opportunities are there for a direct 6 year DrNB (Doctorate) course in CTVS, Neurosurgery, Pediatric ASurgery and Plastic Surgery through the same NEET PG examination. Students also have the option for joining Central or State Government Health Services through the Union or state public service commission examinations to join as medical officers. Here again, NBEMS has an opportunity for 50% seats reservation for state doctors in Diploma courses and also in Degree courses. There is also provision for sponsored seats wherein candidates can be considered for such state sponsored candidates based upon their merit in NEET PG examination for PG training anywhere in the country in NBEMS accredited institutions where such seats are available.

Q.2. How a Medical Graduate can enroll for PG course?

Ans : All PG courses are through the National Eligibility cum Entrance Test (NEET PG) conducted by the NBEMS. For AIIMS and certain other institutions of importance (AIIMS New Delhi, Bhopal, Bhubaneswar, Jodhpur, Nagpur, Patna, Raipur, Rishikesh, Bibinagar, Bathinda, JIPMER Puducherry, NIMHANS Bengaluru, PGIMER Chandigarh & SCTIMST, Trivandrum), a separate INI CET is conducted twice a year.

Dr. Pawanindra Lal

Q.3. Do you think the present method of selection by MCQ elimination test is perfect?

Ans : The present method of selection by MCQ is the most suitable method considering that nearly 1,75,000 MBBS students appear for the 45000 PG seats provising a uniform, fair and objective method of assessment where the final year MBBS scores of all candidates are different due to the hundreds of universities conducting these exit level examinations. What is required is to improve the quality of these MCQs by making them clinically oriented based on the actual bed side management rather than from rote based knowledge from text acquired only by memorising facts. The United States Medical Licensing Examination (USMLE) is an example of how intensive such MCQs can be which requires great deal of effort on the part of the faculty to make such high quality differentiating items with capacity to judge all levels of students.

Q.4. Recently, NBE has extended services of DNB, DrNB trainees as Resident Doctors for three months.

What's your reaction in this regard?

Ans : The extension of training by NBEMS was done as a conscious decision by the Board to compensate for the loss in clinical training due to COVID-19 lockdown and to make up for hands-on training in the concerned speciality of the students. any decision which improves the training and therefore aims in improving patient care can only be welcomed.

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Interview recorded on 15th November 2021 by JIMA

Q.5. Is there any requirement for an aptitude test for Medical Education?

Ans : Yes, the aptitude test is an important component of medical education and actually needs to be evaluated when the students are being admitted into the medical college after their schooling. Many international admission programmes assess the aptitude of students rather than evaluating their skills in science subjects like Physics, Chemistry and Biology which are allowed only if a certain level of proficiency has been achieved in these subjects. A great example is the United Kingdom Common Admission Test (UKCAT) where a great deal of emphasis is given on verbal reasoning, decision making, quantitative reasoning and abstract reasoning. Further these are timed strictly to enable the sharpest minds to crack the examination. These tests were designed to reduce the attrition rate i.e. decrease the number of medical students who leave medicine as a career at the end of their training since a lot of time, effort and money is spent on making one doctor. Unfortunately, in India we don't have such tests and therefore attrition rates are higher.

THE HAPLESS MEDICAL STUDENTS ARE ALREADY OVERBURDENED WITH EXAMS. ADDING SOME MORE EXAMS TO THE LIST WOULD ONLY LEAD TO MORE FATIGUE AND ATTRITION.

Q.6. After someone is admitted in any PG Course, is there any monitoring system to observe the progress of the candidate?

Ans : Under the NBEMS, there is a internal assessment carried out in the form of a Formative Assessment which is carried out for Post MBBS 3 year DNB Course and DrNB Super Speciality Course candidates in the 2nd year, for Direct 6 years Super Speciality courses in the 2nd and 4th year and for Fellowship Courses in the 1st year. Unfortunately, university programmes under the National Medical Commission (erstwhile Medical Council of India) does not have a formal formative assessment like NBEMS. Such internal evaluations allow the candidates to be examined in the mid term to ensure their competence in knowledge and skills and also their clinical acumen is evaluated at their own workplace by external assessors/examiners giving them scope to improve if they are found to be below par.

Q.7. In your opinion, what can be changed to ensure proper training?

Ans : A Good training programme has nothing to do with internal assessments or tests. It needs committed teaching faculty who are ready to spare time for bed side and on the job teaching and a hospital where there is plenty of clinical material in the concerned specialty so that enough hands-on work is available. We call these as case mix (case variety) and caseload (total number of cases) available. This is like a good hotel with good chefs and a good kitchen making tasty food. Now you want people who can relish this food. So trainees must be also equally committed to make the best use of the facilities and make the most of the opportunity available for their postgraduate training. Currently, hands-on branches like those having procedure skills have a lot of opportunity to improve training using Simulation models, mannikins, and virtual reality simulators and these can augment the skills even more. There is a need to set up National and Regional level Skills and Simulation Centres and the NBEMS has already planned for a National level centre to be created in the not so distant future. However, smaller institutional level simulations must also be encouraged for periodic training in the same hospital or the same city.

WITHOUT PROPER SALARY STRUCTURE AND OTHER INCENTIVES, IT IS VERY DIFFICULT TO GET COMMITTED TEACHING FACULTY FOR MEDICAL COURSES. ALSO, THE SALARY SCALES IN DIFFERENT PARTS OF INDIA VARY WIDELY. NATURALLY, IT WOULD BE DIFFICULT TO GET A UNIFORM LEVEL OF DEDICATION OF MEDICAL TEACHERS IN DIFFERENT PARTS OF THE COUNTRY.

Q8. What is the present Exit/ Final Assessment of PG Course?

Ans : For the NBEMS, there is a theory examination conducted on the hybrid mode, ie, a pen and paper examination where the question paper is displayed on the computer or tablet screens. Those who clear the theory are eligible to appear in the DNB Practical examination which is the case based examination. During Covid times, NBEMS introduced OSCE based assessment to supplement the lack of clinical cases due to nationwide lockdowns and lack of patients in concerned specialties. The OSCE component has been progressively reduced from 66% in 2020 to 50% in early part of 2021 and has been further reduced to

33% in the current diet of examinations due to the increasing number of normal cases. Since OSCE evaluation was found to be more discriminatory where such discrimination was not coming from conventional practical examination, it has been retained for the moment and more data will be analysed to decide if this 33% should continue even in non-covid times or be removed completely.

OSCE IS A GOOD WAY TO EVALUATE STUDENTS. IT SHOULD BE AN ESSENTIAL PART OF FUTURE EXAMINATIONS ALSO.

Q.9. Does the Exam system require any modification?

Ans : Examination system is always a standardised process after it has gone through a lot of rigours of evaluation. However, experience has shown that for clinical branches where patients are to be directly treated, case based examination has stood the test of time. NBEMS has a variety of examination components other than cases like ward round component which evaluates critical decision making in bedside patient management and OSCE has been the latest innovation to evaluate students uniformly on a clinical situation without any bias or prejudice and be marked on standard answer keys. The objectivity component of the examination process has thus been strengthened removing subjectivity. More skills based evaluation especially for surgical branches may be introduced and similarly where instruments and machines are used, their usage may be evaluated though these are difficult to execute nationally on a pan India basis. I am sure such reforms will come in slowly and improve the ultimate evaluation of the trainee at the end of his/her training.

Q.10. What's basic difference in PG education in India and other countries like US, UK?

Ans : There are two basic differences between postgraduate education in India and in countries like the US or UK. Firstly is the method of selection. In the US it is through USMLE scores which are uniform throughout the country and then references from departments where the candidate has worked. In the UK, it is through the MRCS/MRCP pathway and then references from units where one has worked. In India, it is through NEET PG examination which is uniform for all NMC/NBEMS institutions. The second main difference is in the duration of postgraduate training. Whereas, in India it is three years, in the US it varies from 3 to 5 years. Additionally there are sub-specialty fellowships mostly for one year duration. In the UK, similar training is for 5-8 years. The longer duration of postgraduate training is deigned to offer optimum clinical hands-on experience to the trainees.

Q.11. There is varied infrastructure and resource availability from Institutions, so how can this be standardized?

Ans : The purpose of good accreditation criteria is exactly to minimise this disparity between institutions in terms of infrastructure, resources and manpower. If the criteria are correctly applied in letter and spirit and the minimum requirements are fulfilled by institutions, disparities will be brought to negligible level. NBEMS has always strived towards ensuring that minimum requirements as mandated for a particular course in terms of infrastructure and manpower are always fulfilled.

WE THINK THAT SOME OF THE ACCREDITATION CRITERIA ARE A BIT UNFAIR. SOME RESOURCES, WHICH ARE EASILY OBTAINED IN INDUSTRIALIZED PARTS OF INDIA, LIKE THE WEST AND NORTH, ARE DIFFICULT TO PROCURE IN THE LESS INDUSTRIALIZED PARTS LIKE THE EAST AND NORTH-EAST. THUS, APPLYING ONE UNIFORM CRITERION TO THE WHOLE COUNTRY WILL BE DISCRIMINATORY TO THE LESS DEVELOPED PARTS OF THE COUNTRY. FOR EXAMPLE, IT IS VERY EASY TO DEMAND ECHOCARDIOGRAPHY AND ENDOSCOPY MACHINES IN JAIPUR OR AHMEDABAD. BUT THOSE MACHINES WILL BE A PRIZE IN ALIPURDUAR MEDICAL COLLEGE.

Q.12. Is there any role of Mentor in PG Training? If yes How can this be implemented?

Ans : Indeed mentorship is the best way to learn and hone the skills as required by postgraduates. Though the students are expected to learn from the whole team they are working with, a senior faculty who is usually a guide or a supervisor acts like a mentor to the trainees in not only helping them learn the nuances of the subject matter but also life skills including communication, keeping balance and ensuring that mental peace and harmony are never disrupted in challenging and stressful times. Mentorship model is also like the "Guru-Shishya" tradition well known in Indian culture. It is therefore

important for mentors - the teachers to be conscious of their actions themselves as they serve as role models for the future generation.

Q.13. How many faculties are yet to have DNB affiliations?

Ans : Currently NBEMS has more than 84 postgraduate, post doctoral and fellowship programmes and many more are in the process of being launched. In the year 2020-21, a postgraduate course in Palliative Medicine has been started and first year candidates should be joining this course from NEET PG 2021 conducted in September 2021. Eight new diploma courses have been started under the guidance and directions of Ministry of Health and Family Welfare, Government of India, in the subjects of Anaesthesia (DA-NBEMS), Obstetrics and Gynaecology (DGO-NBEMS), Pediatrics (DCh-NBEMS), Family Medicine (DFam.Med-NBEMS), Opthalmology (DOPtha-NBEMS), ENT (DLO-NBEMS), Tuberculosis and Chest Diseases (DTCD-NBEMS) and Medical Radiodiagnosis (DMRD-NBEMS) and nearly 2000 seats are for the taking again through the recently conducted NEET PG 2021. It is interesting to note that NMC(erswhile MCI) closed all the diplomas and upgraded them in medical colleges to Degree courses mainly because Diploma holders cannot be considered as teachers in medical colleges and there is need in the country to have more teachers for increasing numbers of medical colleges. Hence, the diploma space was lying unutilised and the government entrusted this responsibility to the NBEMS in 2020 which was accepted and taken to a very successful launch in the very first year.

Q.14. Do you think DNB has opened up job opportunities for young doctors?

Ans : Indeed, through the DNB courses in broad specialties and DrNB courses in super specialties, NBEMS has contributed in adding nearly 10,000 annual postgraduate and postdoctoral seats. The Government of India has already recognised and made DNB equivalent to MD/MS and DrNB equivalent to DM/MCh courses. Hence, all the students passing out are treated at par with university qualified doctors and are eligible for all jobs as senior residents or teachers in medical colleges subject to fulfilment of the requirement of equivalence as per the bed strength of the DNB/DrNB hospital in the NMC Act. For those from smaller hospitals, one year of extra senior residency is required to be done from a medical college for equivalence for teaching job only and not for practising in the country. Sponsored seats for MBBS doctors in-service and reservation for in-service doctors have been extra steps to encourage such interested and NEET PG/ NEET SS qualified doctors for career progression pathways. Diploma holders also have the unique opportunity to upgrade to full Degree through the Post Diploma Common Entrance Test (PDCET) conducted by NBEMS for admission to secondary DNB programme of two years duration.

Overall, NBEMS has contributed towards utilising non medical college institutions both in government and private sector to train medical manpower in specialty subjects from experts in the field and simultaneously improve the patient care by introducing residency scheme in such institutions.

JOB OPPORTUNITIES FOR YOUNG DOCTORS ARE NOT INCREASING SUFFICIENTLY.

WHILE CASUAL JOBS LIKE RMO-SHIP IN NURSING HOMES ARE THERE, PROPER BLUE COLLAR JOBS FOR DOCTORS WHERE THEY CAN GET A RESPECTABLE SALARY AND STANDARD LIFESTYLE ARE VERY FEW AND FAR BETWEEN. THUS, THE HERCULIAN EFFORTS DOCTORS UNDERTAKE TO COMPLETE A PG COURSE WITH BOND SERVICE IS NOT ALWAYS AMPLY REWARDED IN LATER LIFE IN INDIA.

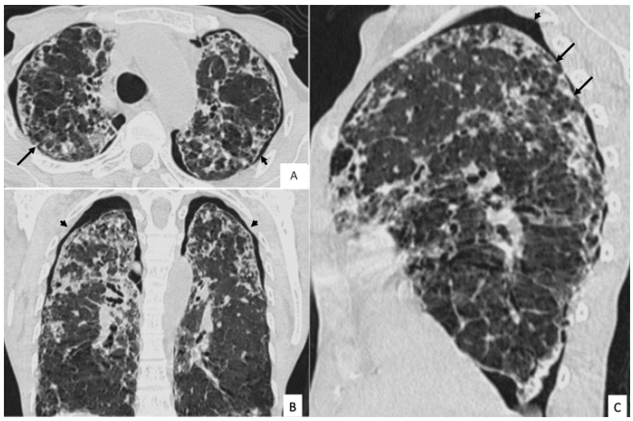
Dr. Pawanindra Lal, thank you for the valuable insight into 'Postgraduate Medical Education in India'.

Image in Medicine

Bhoomi Angirish[1], Bhavin Jankharia[2]

Quiz 1

CT scan images of a 54 year old woman who presented with sudden onset breathlessness. She had no past history of tuberculosis.



Questions :

(1) What is the diagnosis?
(2) What is the etiology of this condition?
(3) What are the differential diagnosis?

Answers :

(1) Subpleural reticular opacities associated with mild traction bronchiectasis are seen in both upper lobes. Bilateral pneumothorax is also seen. Biopsy showed fibrosis with elastin, confirming the diagnosis of pleuroparenchymal fibroelastosis (PPFE).

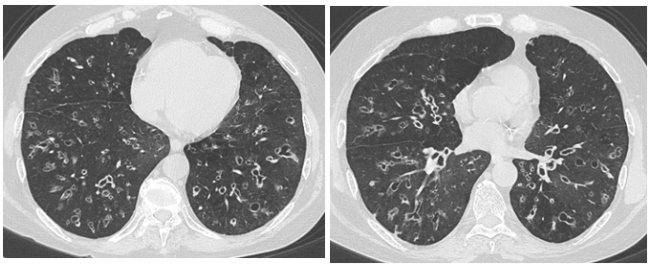
(2) Pleuroparenchymal fibroelastosis (PPFE) is rare pulmonary fibrosis that is clinically characterized by upper-lobe predominant fibrosis. As compared to idiopathic pulmonary fibrosis (IPF) where the fibrosis is subpleural basal, PFFE presents with upper-lobe-predominant subpleural fibrosis.

PPFE may be idiopathic or may be secondary to a variety of conditions such as connective tissue diseases, following chemotherapeutic drugs or autologous stem cell transplantation.

(3) In our country, tuberculosis is the most common differential diagnosis of upper lobe predominant fibrosis . The other common differentials are interstitial lung disease due to connective tissue disorders, sarcoidosis, drug induced lung injury.

Quiz 2

CT scan images of a 19 year old boy who presented with recurrent history of cough with expectoration.



Questions :

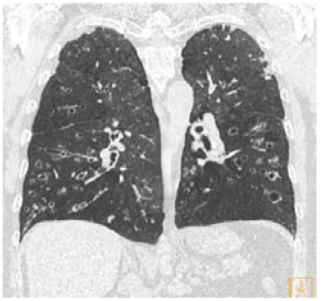
(1) What is the diagnosis?

(2) What are the other conditions associated with this disorder?

Answers :

(1) Thick walled tubular and cystic bronchiectasis is seen in both the lungs. Further work up was done, which confirmed the diagnosis of cystic fibrosis.

(2) Cystic fibrosis is an autosomal recessive genetic disorder due to homozygous defect of the CFTR gene that encodes for a transmembrane protein (CFTR) which is responsible for regulating chloride passage across cell membranes.



It affects the exocrine function of the lungs, liver, pancreas, small bowel, sweat glands and genital system.

Pulmonay manifestations are bronchiectasis, pneumothorax, pulmonary artery hypertension. Abdominal manifestations are fatty replacement of pancreas, pancreatitis, pancreatic cysts, hepatic steatosis, cholelithiasis, sclerosing cholangitis. Gastrointestinal tract manifestations are distal intestinal obstruction, meconium ileus. Urogenital track manifestations are seminal vesicle agenesis, testicular microlithiasis.

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Student's Corner

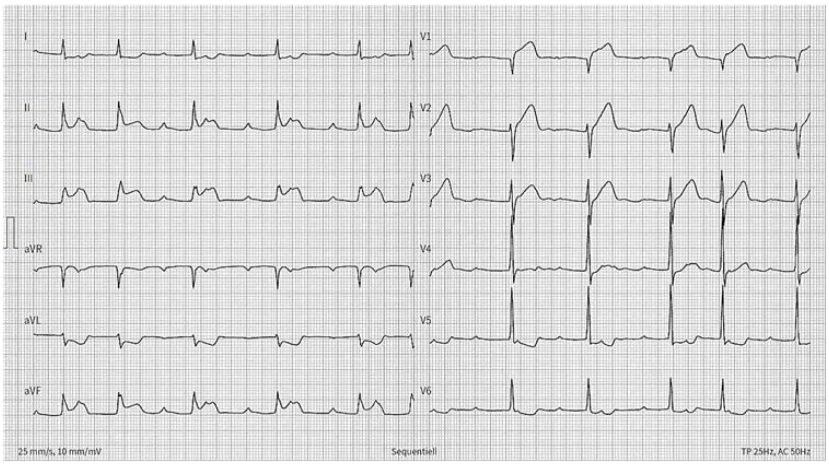
Become a Sherlock Holmes in ECG

M Chenniappan[1]

Series 2 :

"Block everywhere"

65 years male with cardiogenic shock.



Questions :

(1) Describe all ECG changes.
(2) Describe all the blocks in this ECG (clue).
(3) What are practical implications ?

Answers :

(1) ECG FINDINGS :

This ECG with Cardiogenic Shock shows acute total occlusion of Right Coronary Artery (RCA) due to red thrombus resulting in inferior sub epicardial injury (ST elevation) which is more in LIII than LII (RCA lesion). In addition, this ECG shows ST elevation in V1, V2 with more elevation in V1 suggestive of Right Ventricular Myocardial Infarction (RVMI). In anteroseptal MI ST elevation progressively increases from V1-V4 whereas in RVMI ST elevation from V1 – V4 decreases. There is no discordant ST segment depression between V1 and V2, ruling out Posterior Wall Myocardial Infarction (PWMI). There is reciprocal ST depression in L1 and avL. V5,V6 do not show ST segment elevation which indicates left coronary dominance.

The following 3 points are diagnostic of complete heart block in this ECG.

(a) Bradycardia
(b) Atrioventricular dissociation
(c) Atrial rate faster than the ventricular rate.

In this Complete Heart Block except in inferior leads the QRS is narrow because of supra His CHB due to AV nodal disease due to RCA occlusion. The reason for wide QRS in LII, LIII, avF is because of intra infarction block. In Intra Infarction Block the QRS may be widened at the site of infarct because of significant delay in depolarisation through injured / infracted myocardium. Intra infarction block is a type of peri infarction block which can be focal or divisional. This QRS widening will not be typical of any Bundle Branch Block. There are three premature beats (2nd , 6th and 10th beat). Whenever you find a premature beat in the presence of complete AV dissociation due to block, sinus capture beat has to be excluded. Here the premature beats are preceded by a P wave which is falling in the previous ST segment and so they are unlikely to be conducted to ventricle due to absolute refractory period. So, these 3 premature beats are likely to be junctional premature beats.

(2) CLUE :

This ECG shows following blocks

1. Acute total block of RCA (STE LIII>LII).
2. Acute total block of Right Ventricular Branch (STE V1>V2).
3. Acute total block of Proximal RCA (RVMI).
4. Complete Atrio Ventricular block
5. Block of AV nodal Artery – (supra His CHB)
6. Intra infarction block (Wide QRS-inferior leads)

Because of the presence of multiple blocks in the ECG ; the clue of **"Block everywhere"** is given.

(3) PRACTICAL IMPLICATIONS :

Because the patient has Cardiogenic shock, the IWMI and RWMI due to proximal right coronary lesion, the best choice is primary PCI irrespective of FMC to PCI time. Till then, Cardiogenic shock should be treated with IV fluids which have to be adjusted according to BP and lung signs. After correction of volume if the BP is still low, noradrenaline / dopamine has to be started. If PCI is not affordable, or not available then thrombolysis with Tenecteplase should be tried. The last choice is thrombolysis with streptokinase. If the patient has symptoms and severe bradycardia with hemodynamic compromise, temporary transvenous pacemaker may be attempted. Although this patient has multiple blocks, he may have better outcome if immediate revascularisation is done and is successful.

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Medical History

Jivaka : The Legendary Physician of Ancient India

Rudrajit Paul

In ancient Indian society, healers occupied a special position. Ancient Hindu texts are frequently interspersed with epithets about diseases and their treatment. For example, the Rigveda, while primarily being a description of Hindu deities, also contains descriptions of Skin Diseases and Jaundice. While ancient literature from most other civilizations deals exclusively with religion and the exploits of kings, India was perhaps unique in the fact that a large portion of ancient Sanskrit and Pali texts dealt with non-religious secular subjects like Medicine. It is from these texts that we come across the name of Jivaka, the physician to Goutam Buddha. Jivaka was a name that travelled beyond the borders of India (or the geographical region currently known as India) to China, Thailand and other Countries (Fig 1).

Like many other ancient Indian public figures, the origins and family background of Jivaka are not documented authentically. While some accounts state that he was the descendant of a royal family, others state that he was of humble origins who was raised by a prince. Whatever the family background, Jivaka studied Medicine at the famous University of Taksashila and became an astute clinician.

There is one famous anecdote regarding Jivaka during his student days. Their teacher, Atreya, sent all the pupils to a forest and asked them to fetch a plant with no medicinal values. Jivaka was the only one who came back empty handed and reported that he could not find such a herb. Atreya was very impressed and named Jivaka as his successor.

Jivaka then came to the city of Rajagriha (present Rajgir) and started his Medical practice. He quickly became famous for his clinical acumen and was appointed court physician to King Bimbisara (543—492 BCE). It was through this king that Jivaka met the great religious preacher, Goutam Buddha. In later part of the life of the Buddha, Jivaka became his essential companion and counsellor. Chinese and Tibetan texts describe vividly how Jivaka treated the Buddha on several occasions and saved His life.

Jivaka was not only the personal physician to Goutam Buddha but also his close disciple. Ancient Buddhist and Pali texts describe in great details about his devotion to Buddhism in its early days. He was highly revered by the people and his stature as a respected physician of the Kingdom helped a lot in propagating Buddhism among the masses.

While Jivaka is a respected figure in Indian texts, he was deified in ancient Chinese Medical texts. Also, in traditional Thai Medicine, he is still considered a father figure. In traditional Thai Medicine, a ceremony called "WaiKhru" is performed. During this ritual, the students pay homage to Jivaka as the source of ancient knowledge even today. Ancient texts of Chinese Medicine pay homage to Jivaka as the "Medicine King".

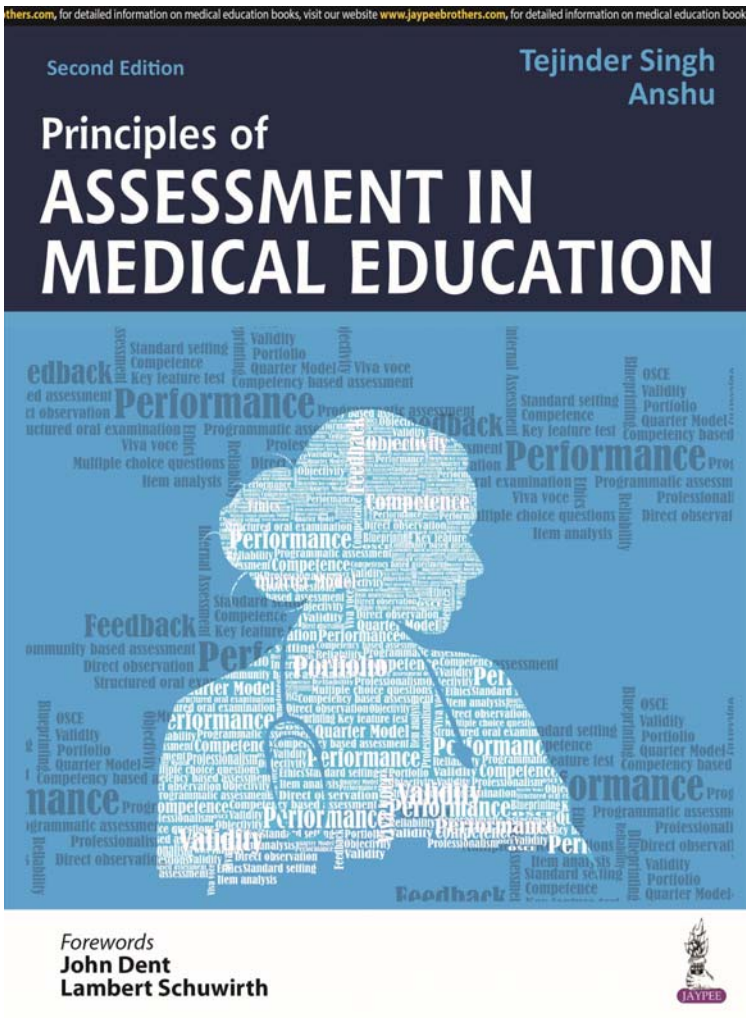
Some treatment methods used by Jivaka are well known to the scholars of ancient Pali texts. For example, he treated some "Disease of the Head" of a patient with Ghee through the nose. He also treated Rectal Fistula of King Bimbisara with some ointment. These texts also mention that Jivaka performed Surgeries on his patients, sometimes even in front of the relatives. But the veracity of these accounts is difficult to verify. One famous Surgery he performed was removing a piece of rock from the foot of the Buddha himself using a knife (Fig 2).

Thus, in conclusion, it can be said that Jivaka was a Physician whose fame transcended the borders of his country and influenced ancient Asian Medical Traditions to a great extent.

Fig 1 — Painting of Jivaka in 10th Century Chinese scroll (Wikimedia Commons)

Fig 2 — Ancient Tibetan painting on "patriarchs of Medicine" shows picture of Jivaka

Book Review



Princples of Assessment in Medical Education by Tejinder Singh & Anshu, 2nd Edition, Publisher : Jaypee Brothers Medical Publishers Pvt. Ltd., 4838/24, Ansari Road, Daryaganj, New Delhi 110 002, INDIA, ISBN : 9789354652479, Price Rs. 1295, Edition : 2/e, Publish Year : 2022, Pages : 412, Size : 6.75" x 9.5", Cover Type : Paper Back, With CD/DVD : No, Format : Two Color, Weight (Grams) : 630 Grams, Price Rs. 1295.

Competency Based Medical Education, a new venture in the field of medical education in India calls for different scientific aspects of medical education, of which "Assessment" marks an important imprint. The book, "Principles of Assessment in Medical Education, authored by eminent medical educationist, Professor Tejinder Singh & Anshu, is a treasure which needs to be possessed by all medical teachers as a guidebook towards right assessment in CBME for both UG & PG students.

Professor Tejinder Singh, a stalwart in the field of medical education & Professor Anshu have provided a picturesque description of assessment of both knowledge & skill acquisition of students. Workplace based assessment, community based assessment, assessment of professionalism & ethics as well as assessment in online settings need special mention. Important topics like question paper setting, OSCE/OSPE set up and designing, portfolio assessment, feedback have been nicely depicted.

As faculty development programs like RBCW, AETCOM Workshop,CISP are already in progression at present, throughout India, this book would be an invaluable guide to all medical faculties far and wide.However a practical demonstration guide in the form of a CD as an add-on would be a welcome gift to all medical faculties of various Institutes.

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Letter to the Editor

[The Editor is not responsible for the views expressed by the correspondents]

COVID SECOND WAVE — The Guiding Principles

Sir — COVID-19 pandemic is soon going to complete two years of human circulation and we are still not sure how long it is going to be there in the community. Therefore the burden of co-infections and their comorbidities with COVID-19 is expected to be higher in future. The World Health Organisation on 11th March 2020 declared that COVID has become pandemic and the Clinical Management Guidelines[1] made before COVID-19 may not be applicable now for the management of patients. It is also challenging to exclude other causes of Acute Febrile Illnesses (AFI)[2] such as Vector Born Diseases like Dengue[3], Chikungunya, Malaria, Scrub Typhus, Leptospirosis and Enteric Fever especially during the transmission season during COVID pandemic period. We have to control certain comorbid conditions like CKD, CAD, strokes, COPD, Brochial Asthma, Diabetes, etc. Guidelines are frequently changing but certain specific most suitable guidelines by WHO and ICMR[4] are very helpful to manage the Corona Pandemic. Our aim and objective is to share our views and sensitise ourselves[5], consultants and Healthcare Workers about our proper guidelines which we found suitable and of rational use at present time.

Guidelines We Recommend :

(1) RT-PCR may be negative-(read ORF/Rdrp and N/E gene as S gene may not be detectable).

(2) Diagnosis (If RT-PCR negative) Clinical symptoms, Serum Markers CT Chest.

(3) Loss of smell is equal to RT-PCR

(4) Virus stops replicating after 9 days.

(5) Around15 minutes of exposure is required to get the infection.

Features of Pneumonia :

Temp > 101

CRP > Rapid rise of CRP

Persistant Cough

5% fall in SPO2 after 6 mins walk.

Investigation at Home in mild cases on day 3 and repeat at day 7-8 :

(1) CBC with NLR (Neutrophil/Lymphocyte Ratio)

(2) CRP,

(3) D-DIMER (Very important- Repeat after 3 days)

(4) Blood Sugar

Add Investigations in Moderate/Severe cases:

(1) CT Chest

(2) IL-6

(3) Ferritin

(4) LDH (A sign of cell death)

(5) LFT

(6) KFT

Interpretation of Investigations:

(1) CRP a good marker to start Steroid

(2) NLR a good prognostic factor.

(3) Increasing Lymphopenia indicates severity

(4) D-Dimer-Monitor every 2-3 days

(5) LDH - Useful follow-up parameter only

(6) IL-6 is very unreliable.(Timely collection and rapid transportation required. Choose the same LAB)

(7) Thrombocytopenia can be seen in about 20%cases

Importnt Principles :

(1) Antivirals are most helpful, given in (replication phase 1 to 7days of symptoms)

(2) Anti inflammatory (steroids) should be started in early Pulmonary phase i.e. after 7 days (replication phase)to prevent Covid Cytokine Storm.This phase may set in early in Severe cases

(3) LMWH (Enoxaperin) 40mg or 1mg/Kg S/C OD dose should be given in all admitted patients/all patients of Pneumonia

Critical Signs :

(1) Temp> 103 without PCM or 101 after PCM

(2) Persistent cough

(3) Sudden onset of shortness of Breath(SOB)

(4) Rapid increase in CRP

(5) CT Chest score >13/25

General Home Treatment :

(1) REST is a big help (light walking, sitting allowed)

(2) SPO2 monitoring

(3) Plenty of fluids

(4) Paracetamol. Don't hesitate to add Nimuselide/Mefenamic acid in case of high fever and bodyache

(5) Good diet

(6) Vit-C, Vit-D, Zinc

(7) Ivermectin/ Favipiravir may/maynot help (doubtful weak antivirals). Don't be anxious as Fevipiravir is not available these days

(8) Azithromycin, Doxycycline are used to counter secondary infection or undiagnosed sore throat.

(9) Cetrizine/Fexofenadine cough syrups may help

(10) Steam kadha help as throat soothing agents

(11) Isolation to protect others in family

Specific Treatment :

(1) STEROIDS- Start Early to all patients with SPO2 <94 (persistent) on any day of Disease.

Which steroid to use :

Inj Dexamethasone (2ml= 8mg Dexamethasone Sodium Phosphate contains 6mg Dexamethasone) to be given IV

Or, Tab/inj Methyl Prednisolone 32 mg

Or, Tab Wysolone/Tab Omnacortil 40 may be especially useful for patients in Home isolation waiting to get a bed

Or, Dexona tablets are available in 0.5 mg tab ..So 16 tab may be required if taken orally.

All steroids Dexa/Solumedrol/Prednisone/ methylprednisolone likely to have same effect.

In Hospital Steroids doses are higher

When to avoid Steroids: Better to avoid steroids in early replication phase, in asymptomatic cases, in mild symptoms but less than 7 days, in viremia phase with normal CRP and CT Chest.

Controversial: in cases with CT score <8 with Disease <7 days,

(2) Enoxaperin 40mg (1mg/Kg)

a) To all moderate to severe symptomatic patients (If Spo2 <94,PR >110, RR is>24)

b) If Pneumonia is suspected clinically, by X-ray or CT Chest then start LMWH.

(Oral Anticoagulant like Rivoraxaban15mg per day or Apixaban may be options for patients on home isolation with no injection facility)

(3) Remdesivir- In hospitalized patients (should be started in less than 10 days of onset).

How to Suspect Cytokine Storm :

(1) Unremitting fever with extreme weakness and fatigue.

(2) Shortness of breath in second week.

(3) Sudden high fever onset in second week

(4) increased Cytopenia

(5) Hyperferritinemia

(6) Pulmonary involvement

(7) Rising CRP >50

(8) Worsening CT Chest

Conclusion : Above Guidelines have been found useful and further scope of improvement is always there as our experiences improve.

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National Presidents met many VVIPs and visited IMA branches










JOURNAL OF THE INDIAN MEDICAL ASSOCIATION :
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Registration No. KOL RMS / 476 / 2020 - 2022

RNI Regd. No. 2557/1957
Vol. 66, No. 2, February 2022, Kolkata

Date of Publication : 20th February, 2022

IMA Delegation headed by Hon'ble National President Dr Sahajanand Prasad Singh met VVIPs at Delhi

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If not delivered please return to
Journal of the IMA (JIMA)
53, Sir Nilratan Sarkar Sarani,
(Creek Row), Kolkata - 700014

Printed and Published by **Dr Sanjoy Banerjee** on behalf of Indian Medical Association and printed at Prabaha, 45, Raja Rammohan Sarani, Kolkata - 700009 and Published from Sir Nilratan Sircar IMA House, 53, Sir Nilratan Sarkar Sarani (Creek Row), Kolkata 700014, Editor : **Dr Jyotirmoy Pal**