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Contents

EDITORIAL

LIVING IN THE CONTEMPORARY DIAGNOSTIC ERA; PATHOLOGIST'S PERSPECTIVE

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The medical sciences involved with diagnostics, including Pathology and Radiology constitute a critical link in healthcare system. In today's world of digitalization where informatics, slide imaging systems and high-end radiologic techniques are increasingly being employed for diagnosis, the roles of the pathologist and radiologist are evolving into active members of multidisciplinary teams for optimum care delivery to the patient.[1]

Talking about Pathology, the discipline has evolved over centuries from a humble beginning in naked eye examination of autopsies.[1] As the era of microscopy dawned, it began to be realized that the basis of diseases lies at cellular level. During all these phases of evolution, pathology remained a clinical discipline.[2] Although today's pathologists have largely lost direct contact with the patients, but, nevertheless they are the guardians of patients' samples on their behalf, and as such a part of quality-of-care practices.[3] Pathologists' responsibility to the patient is unequivocal, as has been estimated that over 70% of the clinical diagnoses and patient management decisions depend on laboratory tests.[4]

New technologies have emerged since the successful completion of human genome project and now one hears of genomics, proteomics, bio-informatics etc to count a few. These are being employed for diagnostic purposes as well currently. On the other hand, the surgical manipulation techniques are becoming more refined; the emphasis being as little trauma to the patient as is possible. In current scenario, the volume of work for the pathologist is on a rise, as new diagnostic , prognostic and predictive tests keep pouring in regularly.[5] This generally applies to all the subspecialties of the discipline. It is not only the volume of work with which one has to cope but the expectations of the clinicians have to be dealt with amicably.[6]

To keep pace with these advancements, it is the need of the hour that the working of healthcare providers is integrated for meaningful outcomes for the patients.

Instead of isolated functioning, teamwork is the order of the day.[7] Teamwork in the diagnostic process is neither static nor are there fixed diagnostic teams; instead, participation in diagnostic process is often dynamic, depending on what areas of expertise are needed for a specific patient. Treatment planning conferences are a form of such a coordination of health care professionals, getting together to review and discuss the medical condition and treatment options of a patient.[8] The participants include surgeons, medical oncologists, radiologists, radiation oncologists, pathologists, and other collaborating health care professionals. An advantage of this approach is that it provides a collaborative environment where an intra- and inter-professional team of clinicians can share information and opinions.[9]

Creating a culture that encourages such professional collaboration is critical. Health care organizations should support teamwork among pathologists, radiologists, other diagnosticians, and treating health care professionals by forming diagnostic management teams (DMTs).[10]

These evolutionary changes demand that the diagnosticians, including pathologists, should adapt to newer technologies, with modifications of practices in vogue. The challenge is that not only the pathologist has to be better equipped and fast, but accurate as well. Getting faster is not a real challenge now if one has resources at his/her disposal for these high-end technologies. The turn-around-times (TATs) in the laboratories are on a decrease generally. This requires a paradigm shift in the basic format of working. The concept of sub-specialty practice is now well established in West. Nobody can boast of knowing everything . Such a shift offers huge benefits for all the stakeholders; it sheds the load off the pathologist so that he finds more time for academic and research activities; as the sub-specialist has deeper experience into his/her area of expertise, he is more beneficial for the patient and clinician together.[11]

A basic prerequisite of such an improvement is appropriateness and completeness of the information the pathologist is receiving from clinicians because this determines the former's response in turn. The clinicians need increasingly elaborate yet relevant information. The pathologist is now required to define individual risks and prognosis to enable the clinician to monitor disease and institute targeted therapies. In turn, he needs pertinent details of patient's disease to generate a meaningful diagnosis or to formulate the differentials.

As is well known , pathology is an interpretive as well as integrative discipline.[10] It integrates clinical information, imaging findings, and other relevant data into microscopy and consolidates it with specialized studies like immunofluorescence, immunohistochemistry, flow cytometry etc to render an all- inclusive report which is useful to the treating physician and patient. For the improvement of the quality of reports, and also to avoid missing essential data, synoptic reports are in vogue world-wide. There are guidelines in place which document the essential features to be incorporated into the reports for every type of specimen. This includes the prognostic and predictive data as well, where required.[11] All the members of the multidisciplinary team are responsible to adequately perform their role to make this model a success. The ultimate beneficiary is the patient and with him, the healthcare delivery system.

A renowned American social philosopher, Eric Hoffer, once said "In a time of drastic change, it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists".

Let us not be so learned that our ability to live in the new world is compromised.

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GETTING VACCINATED – A DIRE NEED OF TIME

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"No madam, I didn't get vaccinated because four people died due to corona vaccination in my village" a reply from my driver upon my query to COVID-19 vaccination, that made me think about these myths and disbeliefs which are major obstacles in vaccination uptake. Some of the other myths prevailing in our community related to COVID-19 vaccination are[1,2]; it causes infertility, a western propaganda, implanting microchip through vaccination, it will cause death after 2 years, money making agenda, vaccines are not tested properly, vaccine will cause COVID-19 and fear of unknown. Debunking these myths and encouraging community for vaccination are big challenges[2]. COVID-19 vaccination is a key public health approach to combat pandemic[3]. We are still struggling with polio vaccination; Polio is endemic in three countries, i.e., Pakistan, Nigeria and Afghanistan and is eradicated from the rest of the world[4], very alarming situation for us as a Nation.

Listening to people's doubts about vaccinations carefully and respectfully and referring them to someone they trust is one of the most effective ways to address them. These concerns could be emotional or their personal experiences and their previous views of poor or unequal treatment. Don't overburden individuals with data and facts; rather, appreciate their viewpoints or experiences and inquire about their reasoning, not what we think they need to hear[3]. A range of organizations within and beyond the health sector can play a vital role in sharing accurate information about vaccination and its benefits. Almost everyone can help by understanding the principles of vaccination and knowing where to go for more authentic information, as well as freely expressing their desire to be vaccinated. Various organizations and employers can boost confidence by openly sharing their support for vaccination, or personal experience of getting vaccinated. This contributes to the acceptability of vaccination as a social norm in the workplace.

Vaccines are amongst one of the most effective public health interventions and an important tool in the fight against COVID-19. Fortunately, all the COVID-19 vaccines which have been approved for emergency use around the world are safe even for people with weakened immune system because none of them contain live virus in it. COVID-19 vaccinations[5] that are both safe and effective are making a substantial contribution to averting severe disease and death. As vaccinations become available and immunity develops, it's critical to continue to follow all of the COVID-19 prevention recommendations that include[6]: physical distancing from others; wearing a mask, especially in crowded and poorly ventilated environments; washing hands frequently with soaps or hand sanitizers; covering any cough or sneeze with a bent elbow or tissue; and opening windows and keeping rooms well ventilated when indoors.

To help make vaccination as easy as possible, employers needs to give employees the time and flexibility they need to attend vaccination appointments, and even recover from vaccination side effects. Local civil society organizations and community groups can help people to make vaccination appointments, organize transport or offer any other assistance that might help make it easy for someone to get vaccinated [5, 6].

Vaccination will help keep us, our family and our community safe from COVID-19. This will bring us all closer to do what we love with the people we care about. People may learn about vaccines and vaccinations by having intelligent and polite interactions with them. In this way, we can make a significant contribution to public health. Last but not least; happy to share that we successfully convinced our diver and he got vaccinated. Federal Medical and Dental College has a vibrant and proactive community medicine department and it has organized various health awareness sessions in community to debunk the myths and promoted COVID-19 vaccination.

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ASSESSMENT OF NEUROPATHIC PAIN IN PATIENTS WITH KNEE OSTEOARTHRITIS

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ABSTRACT

Objective: *To determine the frequency of neuropathic pain in patients with knee joint osteoarthritis.*

Study design: *A cross sectional study.*

Place and duration: *Rheumatology clinic from 1st July 2021 till 31st December 2021.*

Patients and methods: *The study was conducted on 56 patients by using a consecutive non probability sampling technique. Fulfillment of American college of Rheumatology criteria for knee osteoarthritis was the inclusion criteria. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) was used to assess pain, stiffness, and physical functional ability in the knees while the Douleur Neuropathique 4 (DN4) questionnaire was used to assess neuropathic pain. Kellgren-Lawrence (KL) grading system was used for radiological classification of knee osteoarthritis.*

Results: *Out of the 56 patients, 44(78.6%) were female and 12 (21.4%) were male. The mean WOMAC total score in patients with neuropathy was 48.64±10.36. Neuropathic pain was found in 25(44.6%) of the study population. Their mean DN4 questionnaire neuropathy score was 4.64±0.81. p value of 0.02, 0.004, 0.027, 0.003 and 0.01 on the spearman rho correlation was found between the total WOMAC score, radiographic grade, neuropathic pain, WOMAC functional score and WOMAC pain score respectively, showing a significant positive correlation.*

Conclusion: *There was a high frequency of neuropathic pain in patients with knee osteoarthritis. The DN4 questionnaire score correlated with the WOMAC total score and the functional and pain components. It was also found that the patients with grade I, II and III osteoarthritis (KL grading system) had a significantly higher WOMAC score and DN4 questionnaire score.*

Keywords:

Douleur Neuropathique four questions (DN4), Kellgren and Lawrence grading (KL grading), Osteoarthritis (OA), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)

INTRODUCTION

Osteoarthritis (OA) is one of the most common diseases of the joints described to have bone remodeling i.e new bone formation, loss of cartilage and narrowing of the joint space. Roughly 25% of the world population over 18 years is some way or the other is affected by this joint disease.[1] Decline in the functional status of the patients is a feature of this disease and thus it leads to absenteeism from work in these individuals because of pain and disability particularly the middle to older-age adults.[2] Symptomatic osteoarthritis most commonly presents with knee joint pain.[3] In osteoarthritis, initially there is loss of articular cartilage, later there is a process of new bone formation in the form of osteophytes and furthermore there are changes in the surrounding structure of the joint like the joint capsule, muscles and their attachments and the ligaments and menisci.[4] It is

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the involvement of all of these structures that leads to pain in patients with osteoarthritis.

Generally the pain in knee osteoarthritis is classified as nociceptive, but because of the presence of both neural and avascular tissue components in the cartilage the mechanism of pain is very complex[5]. It is thought that every component of the joint contributes differently to the degree of pain. A lot of nerve fibers are present in the subchondral tissue so damage to it can lead to damage to the nerves thus the neuropathic component of pain[6]. It has been observed that the radiographic grade of osteoarthritis and severity of pain is often mismatched and out of proportion to the degree of damage which has prompted researchers to find out about the different mechanisms of pain including neuropathy as a contributor to pain.

Neuropathic pain is considerable with prevalence of 23% or even higher[7] in patients with knee or hip osteoarthritis as shown by a recent meta analysis . In fact a recent study done in India has shown that neuropathy in patients with knee osteoarthritis was as high as 49%[8]. Different screening tools and questionnaires have been in use for assessing neuropathic pain such as the DN4 (Douleur Neuropathique 4), pain DETECT questionnaire (PDQ) and SLANNS i.e. Self-administered Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) questionnaire. All these questionnaires include information about the intensity of pain, character, quality, site of pain and the frequency of pain. [9] In our study we used DN4 definition of neuropathic pain, which is a questionnaire developed by the French Neuropathic Pain Group. DN4 consists of two parts one related to history and other part is the physical examination[10,11]. The rationale of this study was to determine the frequency of neuropathic pain in knee Osteoarthritis patients and its relation to various clinical and sociodemographic factors in the first phase of the study[8, 9].

METHODOLOGY:

We conducted a cross sectional study in the rheumatology department of federal government polyclinic hospital, islamabad. This was a pilot study conducted on 56 patients to look for incidence of neuropathic pain in knee OA patients through non-probability consecutive sampling technique.

Inclusion criteria: all patients (age >40 years) who fulfilled the American College of Rheumatology (ACR) 1986 classification criteria for primary knee OA were included in the study[10].

Exclusion criteria: patients having other causes of peripheral neuropathy like diabetes mellitus, uraemia, amyloidosis and OA secondary to other causes like rheumatoid arthritis and gout were excluded from the study.

The study was started after getting approval from hospital ethical review board. Participants gave an informed written consent. The purpose, process and benefits of research were explained to all patients included in the study. The study participants' personal information was kept confidential.

Height, weight and Body Mass Index (BMI) was measured in the rheumatology clinic of all the study participants. Clinical examination of both knees was also done for the joint line tenderness, effusion, bony hypertrophy/enlargement and crepitus.

Western Ontario and Mcmaster Osteoarthritis Index (WOMAC):

Western Ontario and Mcmaster Universities Osteoarthritis Index (WOMAC) scoring was done. It has three components i.e pain, stiffness and physical functional ability[12,13]. It is scored from 0-96, a total WOMAC score, with maximum points for the physical functional ability component.

Radiological Assessment

Plain radiographs anterio-posterior and lateral views of the both knees were done. The Kellgren-Lawrence (KL) grading system[14] was used for radiological classification of knee osteoarthritis and help from a radiologist was taken. Relationship between radiographic grade and neuropathic pain was assessed in final data analysis.

Douleur Neuropathique 4 (DN4) Questionnaire

Neuropathic pain was defined by DN4, which is a questionnaire developed by the French Neuropathic Pain Group to differentiate somatic from neuropathic pain. DN4 has a total score of 10 and person is said to have neuropathic pain if she / he scores 4 or more. The study outcome was measured in terms of frequency of neuropathic pain in patients with knee osteoarthritis.[15]

Data were entered and analyzed through Statistical Package for the Social Sciences (SPSS) version 23.00. Descriptive analysis was explained using frequencies, percentages, mean and standard deviation. The association between the neuropathic pain score using the DN4 questionnaire, grade of osteoarthritis and WOMAC score was tested by using Chi square test.

RESULTS:

The study included 56 patients out of which 44(78.6%) were female. The mean age was 56.73±10.04 years, mean weight was 75.10±10.7 kilograms, mean height of 1.61±0.07 meters, the mean BMI was 28.75±4.15 kg/m². The mean duration of paracetamol use was 2.25 ±1.58 years. The mean WOMAC overall score was 44.89±11.91 while the mean WOMAC pain score was 9.80±3.40, the mean WOMAC stiffness score was 2.66±1.65 and the mean WOMAC functional score was 32.41±8.10. The mean DN4 questionnaire neuropathy score was 2.64±1.95 as shown in Table I.

Table I: Baseline Demographics of the study population

Baseline Demographics	Mean ± standard deviation
Age	56.73 ± 10.04
Weight in Kg	75.10 ± 10.72
Height in m²	1.61 ± 0.07
BMI Kg/m²	28.75 ± 4.15
Duration of disease	2.25 ± 1.58
Baseline WOMAC score overall	44.89 ± 11.91
WOMAC Pain score	9.80 ± 3.47
WOMACS tiffness score	32.41 ± 8.10
WOMAC Functional score	2.66 ± 1.65
DN4 Questionnaire score	2.64 ± 1.95

Based on the Kellgren Lawrence grading 5 patients (8.9%) had Grade 1, 29 (51.8%) had Grade 2, 17 (30.4%) patients had grade 3 while 5 patients (8.9%) had Grade 4 osteoarthritis.

Neuropathic pain calculated by DN4 questionnaire was found in 25(44.6%) of the study population while 31 (56.4%) were found to have a score of 0-3 meaning absence of neuropathic pain.

Two sample t test was done to compare the means and also difference between the two groups i.e. with DN4 score of 0-3 and DN4 score ≥ 4 and a significant difference was found among the groups as shown in Table II.

Table II. Two sample t test shows difference in WOMAC score in both categories of DN 4 questionnaire.

	T		Sig (2 tailed)	Mean difference	Std. error difference	95% conf. interval Of the difference	
						Lower	Upper
Baseline WOMAC score	-2.18	54	0.03*	-6.76	3.09	-12.97	-0.55

P = <0.05.

A *p*-value of 0.02, 0.004, 0.027, 0.003 and 0.01 on the spearman rho correlation was found between the baseline WOMAC overall score, radiographic grade, neuropathic pain, WOMAC functional score and WOMAC pain score respectively, showing a significant positive correlation between these entities as shown in the table III.

TABLE III. Spearman Rho Correlation analysis of the WOMAC score, Radiographic grade, Neuropathic pain

Factors		Spearman's Rho Correlation Co-efficient (r) and p-value
Baseline WOMAC score	Spearman's rho Correlation Co-efficient	0.311
	p-value	0.02
Radiographic grade	Spearman's rho Correlation Co-efficient	0.375
	p-value	0.004
Neuropathic pain	Spearman's rho correlation coefficient	0.296
	p-value	0.02
WOMAC functional score	Spearman's rho correlation coefficient	0.389
	p-value	0.003
WOMAC pain score	Spearman's rho correlation coefficient	0.341
	p-value	0.01

The comparative analysis of both the groups with the different variables studied are elaborated in table IV, showing clearly that the patients with knee osteoarthritis having neuropathy according to DN4 questionnaire had a significantly raised baseline WOMAC score (*p*-value 0.02). Those who had a greater radiographic damage based on the KL grading on the chi square analysis showed a significant correlation with the WOMAC pain score and the WOMAC functional score with *p*-value 0.008 and 0.04.

A Games-Howell post hoc analysis using the one way ANOVA between the different radiographic grades and the neuropathic pain assessed on the DN4 questionnaire showed a significant difference between the groups. The results show that the DN4 questionnaire score was significantly higher when the radiographic grade was I, II and III *p*-value 0.001 in comparison to grade IV. (*p*-value=0.79)

Our study did not show a correlation between the weight, height, BMI, age of patients and the duration of disease with the radiographic grade, however the baseline WOMAC score was worse in the female patients as compared to male (*p*-value=0.049) and the DN4 questionnaire score based on the independent sample t test which showed a *p*-value of 0.024 among both the genders.

Table IV. Comparative analysis of group 1 and 2 based on DN4 Questionnaire.

	Group 1 (without neuropathy)	Group 2 (with neuropathy)	*p*-value
Number	31(55.4%)	25(44.6%)	-
Age	56.9±9.45	56.52±4.28	-
Gender			-
Male	9(75%)	3(25%)	
Female	22/44(50%)	F=22/44(50%)	-
Weight	76.16±10.71	73.8±10.8	-
Height	1.61±0.07	1.60±0.06	-
BMI	28.97±4.07	28.46±4.28	-
Radiographic grade			
Grade 1	5(16.1%)	0(0%)	-
Grade2	16(51.6%)	13(52%)	-
Grade 3	6(19.4%)	11(44%)	-
Grade 4	4(12.9%)	1(4%)	-
Dn4 Neuropathy score	1.03±.706	4.64±0.81	0.045
WOMAC overall score	41.87±12.36	48.64±10.36	0.02
WOMAC pain score	9.16±3.76	10.60±2.94	0.008
WOMAC stiffness score	2.41±1.80	2.96±1.42	
WOMAC functional score	30.32±8.43	35.00±6.98	0.04

Table V. Two sample t test shows difference in WOMAC score and DN4 questionnaire in males and females.

	T	Df	Sig (2 tailed)	Mean difference	Std. error difference	95% conf. interval Of the difference	
						Lower	Upper
Baseline WOMAC score	-2.01	54	0.049*	-7.60	3.77	-15.17	-.036
DN4 Questionnaire	-2.43	20.65	0.024*	-1.34	0.55	-2.50	-0.19

P=<0.05.

The frequency of different symptoms of DN4 questionnaire in both the groups are shown below in table VI.

TABLE VI. Frequency of the components of DN4 Questionnaire in both the groups

	Group 1 (without neuropathy)	Group 2 with neuroapthy	*p*-value
Number	31(55.4%)	25(44.6%)	-
Interview of patient			
Burning	8/31(25.8%)	10/25(40%)	0.25
Painful cold	5/31(16.1%)	12/25(48%)	0.01*
Electric shock	8/31(25.8%)	21/25(84%)	0.000*
Tingling	2/31(6.4%)	10/25(40%)	0.002*
Pins and needles	2/31(6.4%)	16/25(64%)	0.000*
Numbness	4/31(12.9%)	17/25((68%)	0.000*
Itching	1/31(3.2%)	10/25(40%)	0.001*
Examination of patient			
Hypoesthesia to touch	0/31(0%)	9/25(36%)	0.000*
Hypoesthesia to pinprick	0/31(0%)	1/25(4%)	0.26
Brushing	2/31(6.4%)	11/25(44%)	0.001*

DISCUSSION:

Osteoarthritis is the commonest cause of functional decline and disability, particularly in the middle age to old age people leading to a poor quality of life. Osteoarthritis leads to limitation in the mobility of around 80% of the patients and out of them 25% cannot do their daily activities.[16] Good physical therapy and patient education has been the main stay of treatment in OA knee patients alongside paracetamol, topical and systemic NSAIDs and on need basis intra-articular steroid injections. Other entities like hyaluronic acid, chondroitin sulfate, kinesiotaping, radiofrequency ablation etc. have conditional recommendations in particular situations.[17]

Pain in knee osteoarthritis is proposed to have two components; nociceptive and neuropathic. These can be mediated by peripheral pathway i.e. mechanical or the central pathway leading to hyperalgesia.[18] We focused on the neuropathic component of pain in this study and would emphasize to treat neuropathic pain in patients with osteoarthritis.

Previously done studies show a wide range of prevalence of neuropathic pain in knee i.e. from 5.4– 52%.[19,20] In our study, we found that 44.6% patients had neuropathic component of pain which is comparable to the figures of a study performed in India where 49% patients had neuropathy[8]. A Spanish community based study showed a figure of 52%. However after removing confounders like other neuropathy causing conditions, the prevalence reduced to 33%.[21] In both these studies DN4 questionnaire was used as a tool to assess neuropathy.

Other scales for measuring the neuropathy, like the Pain DETECT questionnaires and the Self-administered Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) questionnaire (S-LANSS) have also been used in different studies to assess the neuropathic pain in knee OA. The results from these tools also show almost similar prevalence of neuropathic pain. Examples include a study done in the United kingdom showing that 27% of 179 respondents had neuropathic pain [22] and an Indonesian study in which 45.9% of patients were found to have neuropathic pain.[23]

As regards WOMAC scoring system, in our study it was seen that the total WOMAC score of the participants, the functional component and pain component of WOMAC score were analogous to the study done by Polat et al in Turkey in which WOMAC score in the neuropathy group was 58.5 vs 42.5.[20]

The relationship between radiographic grade, WOMAC score and neuropathic pain was not linear as found in our results and supported by study done by Finan et al that also showed an indeterminate relationship between radiographic damage and the degree of neuropathic pain.[24]

Our study also did not show any correlation between the weight, height, BMI, age of patients and the duration of disease with the DN4 questionnaire and the WOMAC score. This is also supported by previously done studies for example a study by Yildirim MA et al in Turkey did not show significant difference in the anthropometric measures of both the groups.[25] However, the literature review does show the results of some studies where patients with neuropathic pain component had slightly shorter height as compared to those without neuropathy.[19,26]

SHORT COMINGS:

There were several limitations in our study. First of all sample size was small. Secondly neuropathic pain was defined by using the DN4 questionnaire but not confirmed by the nerve conduction studies. Lastly, depression is an important component for somatization of pain and this component was not addressed in our study.

CONCLUSION

There was a high frequency of neuropathic pain in patients with knee osteoarthritis. The DN4 questionnaire score correlated with the WOMAC total score and the functional and pain components. It was also found that the patients with grade I, II and III osteoarthritis (KL grading system) had a significantly higher WOMAC score and DN4 questionnaire score.

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ASSESSMENT OF DETERMINANTS OF INFECTION PREVENTION AND CONTROL IN CLINICAL PRACTICES AMONG STAFF NURSES IN TERTIARY CARE HOSPITAL RAWALPINDI

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ABSTRACT

Objectives: *Infection Prevention and Control (IPC) is a worldwide and essential factor of all healthcare systems as Hospital Acquired Infections (HAIs) interrupt the health and safety of all those who use those facilities and who deliver them. The aim of the study was to assess the levels of knowledge, attitude and practices of the staff nurses towards prevention of infection and control in clinical practice.*

Study Design: *An institution based cross sectional study.*

Place and Duration of Study: *Fauji Foundation Hospital (FFH), Rawalpindi over a period of 06 months (from Jan 2021 to June 2021).*

Patients and Methods: *Using purposive sampling technique, a sample of 200 participants were chosen and through a structured self-administered questionnaire data were collected and analyzed using SPSS version 26.*

Results: *Among the study participants, 154 (77%), 165 (82.2%), and 106 (53%) were having adequate knowledge, positive attitude and satisfactory practice scores, respectively. About 1/3 (35%) of the respondents were untrained on risk assessment. Around sixty eight percent participants (68.5%) were recapping needles after use. There was a high (37%) prevalence of needle stick injury but limited (32.5%) use of post-exposure prophylaxis after potential exposure. The level of knowledge and practice scores among the study participants were also found to be low.*

Conclusion: *In spite of adequate knowledge and awareness of universal protocol for the prevention of HAIs, the adherence to the protocol was poor among the health care workers.*

Keywords:

Attitude, Healthcare professional, Knowledge, Nurses, Practice, Safety, Tertiary care hospital

INTRODUCTION

Infection Prevention and Control (IPC) is an unanimously important constituent of healthcare organizations. It affects health as well as safety of all users of healthcare services and all providers of these services.[1]

One of the major health problems is Hospital Acquired Infections (HAIs). It affects approximately 1.5 million people around the world annually. In developing countries, 10 out of 100 hospitalized patients are affected by HAIs, which leads to ethical and legal problems as well as social issues. This also results in longer stay at hospital, increased costs due to longer stay and even mortality.[2]

HAIs remain a common and costly problem in spite of the many advances. As per estimation of Centers for Disease Control and Prevention (CDC), in merely US, approximately 2 million hospitalized patients in acute care settings are affected by HAIs annually. This leads to approximately $3.5 billion direct costs per year. It is also suggested that at least 20% of all nosocomial infections are preventable, of which approximately 56% are vascular catheter-related infections.[3]

Pakistan is a country having large burden of disease. The burden of infectious diseases contributes more than 40% and the rest is for Non-Communicable Diseases (NCDs).[4] Hospitals are places where there is risk of

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interaction between the sick and the healthy. In the process of health care delivery system, both infectious and non-infectious waste is generated.[5] Around 25% of the waste produced is infectious and creates a threat to the staff and community, while rest of the waste is non-infectious and falls under the category of municipal waste. The knowledge, attitudes and practices regarding IPC, is significantly affected due to lack of facilities in teaching and other hospitals.[6]

Structure, daily patient movement and widespread disinfection practices, all play a key role in spread of infections. Simple measures to stop cross-infection can help to lessen HAIs. Failure to follow the scientific guidelines has caused several outbreaks of infections in various hospitals.[6]

Pakistan is facing huge burden of disease with > 40% prevalence of infectious diseases and preventable morbidity and mortality due to long duration of hospital stay, persistent disability, increased antimicrobial resistance and higher healthcare cost.[7] Strict observance of standard hospital infection control practices need to be implemented for cost effective healthcare delivery.

Hospital prevention and control of infection is one of the significant areas in healthcare settings where vigorous efforts are required as burden of HAIs is not exactly known. Implementing IPC practices results in decreased hospital stay, disability, antimicrobial resistance, health system cost and cost for patients.

The main objectives of the study was to evaluate the knowledge, attitude and practices of staff nurses regarding prevention & control of infection in Fauji Foundation Hospital (FFH), Rawalpindi and to find gaps in knowledge and practices viz a viz hospital SOP.

PATIENT AND METHODS

An institution based cross-sectional study was conducted from Mar to Aug 2021 at FFH. It is a multi-disciplinary specialized teaching hospital with 837 inpatient beds. Using purposive sampling, the computed sample size was 224 staff nurses with 50% expected prevalence, 95% confidence interval, 5% margin of error. The final sample size was 200. The non response rate was 10%. Staff nurses working at FFH as permanent employees as well as on contract basis who were potentially at high-risk, were available during the data collection period and consented to take part in the study were included.

A validated structured self-administered close ended questionnaire and observation form was used for data collection. This tool was adapted from an open access article distributed under the terms of Creative Commons (CC).[7]

Four main sections (socio-demographic characteristics, knowledge, attitude and practice) were included in the data collection tool. The tool was pretested on 10% of the study population and finalized. The questionnaire was distributed and data were collected after informed consent.

Data were coded and entered into SPSS version 26 for analysis. Knowledge and practice questions were scored as 1 or 0 for correct and incorrect responses, respectively. Attitude responses were provided 1, 2, or 3 for "Disagree", "Neutral" and "Agree", respectively. Summary statistics such as frequencies, proportions and means were computed. Scores below the mean were considered as inadequate knowledge, unfavorable attitude, or inadequate practice; whereas, scores equal to the mean score or above were considered as adequate knowledge, favorable attitude, or adequate practice. To identify the contributing factors affecting the knowledge, attitude and practice score, linear regression analysis was conducted using score as the dependent variable while using gender, age, experience, department and working hours as the independent variables. Furthermore, after assessing non normal distribution of data by Shaprio-Wilk test (p-value < 0.05), Mann–Whitney U test and Kruskul Wallis test with significance of p-value < 0.05 were used to see the differences in knowledge, attitude and practice among the participants.

Ethical approval was obtained from the ERC of Foundation University Islamabad (FUI). Ethical considerations were followed according to the recommendations of ethical review board.

RESULTS
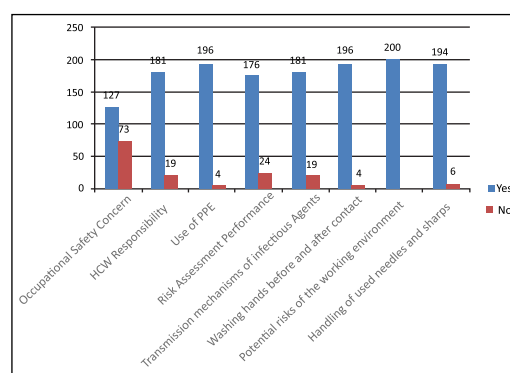
Fig 1:- Knowledge related factors for the evaluation of infection prevention and safety precaution in respondents

Table I: Socio-demographic and Health Facility related Characteristics

| Sr. No.	Socio-demographic and HC related factors	Variable category	Frequency n (%)
1.	Gender	Female	184 (92%)
		Male	16 (8%)
2.	Age group	≤ 25 years	67 (33.5%)
		26–30 years	74 (37%)
		≥ 31 years	59 (29.5%)
3.	Department	OPD	159 (79%)
		Ward	2 (1%)
		Emergency	11 (5.5%)
		Others	28 (14%)
4.	Working experience in years	≤ 5 years	76 (38%)
		6 – 10 years	69 (34.5%)
		> 10 years – 20 years	30 (15 %)
		> 20 – 35 years	25 (12.5%)
5.	Working hours per day	6 hours	90 (45%)
		More than 6 hours	110 (55%)
6.	Risk assessment training taken	Yes	130 (65%)
		No	70 (35%)
7.	HBV vaccine taken	Yes	126 (63%)
		No	74 (37%)
8.	No of respondents according to the dose of HBV vaccination	First dose	41 (20.5%)
		Second dose	16 (8%)
		Third dose	69 (34.5%)
		Not vaccinated	74 (37%)
9.	Availability of adequate amount of PPE in the department	Yes	150 (75%)
		No	24 (12%)
		Not sure	26 (13%)
10.	Availability of safety guidelines/manuals in the department	Yes	186 (93%)
		No	14 (7%)
11.	Source of information regarding safety precaution	Training	159 (79.5%)
		Guidance	39 (19.5%)
		Friends	2 (1%)
		Others	-
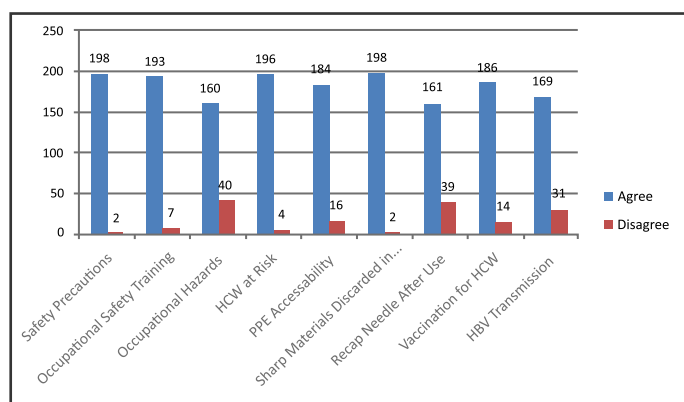
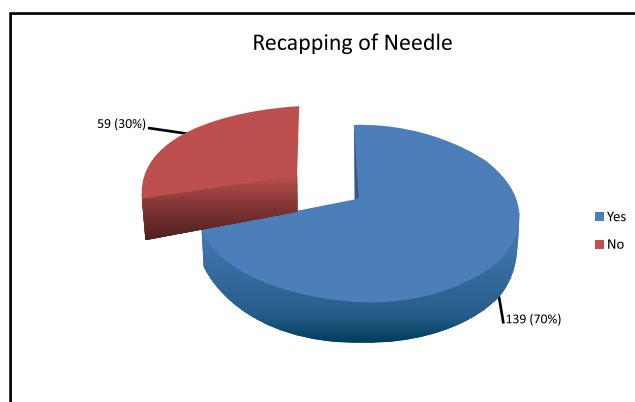**Fig 2 :- Attitude related factors for the evaluation of infection prevention and safety precaution**

Fig 3 :- Number of persons who practiced recapping of used needles.

Table II: Staff Nurses score for knowledge about IPC against gender, age, experience, department and working hours

Variable	Mean ± SD	*p*-value
Gender		
Female	11.49 ± 1.21	0.150*
Male	11.18 ± 1.04	
Age in years		
≤ 25 years	11.44 ± 1.13	0.649**
26–30 years	11.59 ± 1.14	
≥ 31 years	11.33 ± 1.35	
Department		
Ward	11.39 ± 1.09	0.017**
OPD	10 ± 4.24	
ER	11.90 ± 0.83	
Others	11.82 ± 1.54	
Experience in years		
1	11.50 ± 1.10	0.106**
2	11.63 ± 1.12	
3	10.96 ± 1.30	
4	11.52 ± 1.47	
Working Hours		
6 hours	11.58 ± 1.20	0.079*
> 6 hours	11.37 ± 1.20	

*Mann-Whitney U test

**Kruskal Wallis test

Among staff nurses the attitude about infection prevention and control did not change considerably with female staff achieving a slightly greater score (12.21 ± 1.70) as compared to the male staff (12.12 ± 0.95)). Staff nurses with age between 26 – 30 years have comparatively better attitude score (12.36 ± 1.16) than those ≤ 25 years (12.07 ± 2.35) and those ≥ 31 years (12.16 ± 1.13). There was significant difference between knowledge scores of staff nurses working in different departments of the hospital with ward (12.28 ± 1.21), OPD (1.00 ± 0.00), ER (12 ± 1.54) and other departments.

Table III: Staff Nurses score for Attitude about IPC against gender, age, experience, department and working hours

Variable	Mean ± SD	*p*-value
Gender		
Female	12.21 ± 1.70	0.286*
Male	12.12 ± 0.95	
Age in years		
≤ 25 years	12.07 ± 2.35	0.264**
26 – 30 years	12.36 ± 1.16	
≥ 31 years	12.16 ± 1.13	
Department		
Ward	12.28 ± 1.21	0.019**
OPD	1.00 ± 0.00	
ER	12 ± 1.54	
Others	12.6 ± 1.02	
Experience in years		
1	12.12 ± 2.22	0.117**
2	12.28 ± 1.28	
3	11.90 ± 1.19	
4	12.64 ± 0.75	
Working Hours		
6 hours	11.95 ± 2.19	0.61*
> 6 hours	12.41 ± 0.98	

*Mann-Whitney U test

**Kruskal Wallis test

Among staff nurses practices about infection prevention and control change considerably with male staff achieving a upper score (13.43 ± 1.03) as compared to the female staff (11.23 ± 2.52). Staff nurses with age between ≥ 31 years have comparatively better practice score (11.93 ± 2.09) than those 25 - 30 years (11.60 ± 2.90) and those ≤ 25 years (10.76 ± 2.24). There was no significant difference between practice scores of staff nurses working in different departments of the hospital with ward (11.50 ± 2.49), OPD (9 ± 0.00), ER (11.18 ± 1.40) and other departments (11.17 ± 2.93).

Table IV: Staff Nurses score for Practice about IPC against gender, age, experience, department and working hours

Variable	Mean ± SD	p-value
Gender		
Female	11.23 ± 2.52	0.001*
Male	13.43 ± 1.03	
Age in years		
≤ 25 years	10.76 ± 2.24	0.007**
26 – 30 years	11.60 ± 2.90	
≥ 31 years	11.93 ± 2.09	
Department		
Ward	11.50 ± 2.49	0.388**
OPD	9 ± 0.00	
ER	11.18 ± 1.40	
Others	11.17 ± 2.93	
Experience in years		
1	11.14 ± 2.29	0.484**
2	11.44 ± 2.97	
3	11.87 ± 1.89	
4	11.56 ± 2.41	
Working Hours		
6 hours	10.50 ± 2.40	0.000*
> 6 hours	12.16 ± 2.34	

*Mann-Whitney U test

**Kruskal Wallis test

Table V: Factors affecting the Practice score of Staff Nurses

Variable	Regression Coefficient s (β) [95% CI]	t	Std. error	p-value
Gender	2.198 [.94 – 3.4]	3.45	2.44	0.001
Age	0.59 [.165 – 1.034]	2.72	2.46	0.007
Department	-1.24 [-.444 - .195]	-.767	2.51	0.444
Experience	0.202 [-.143 – 0.546]	1.15	2.50	0.250
Working Hours	1.66 [0.998 – 2.32]	4.931	2.37	0.000

Gender, age and working hours were found statistically significant effects on practice.

DISCUSSION

Infections acquired from the hospital are a major issue all over the world. Current and relevant information and nursing support can play an important role in control of infection. Nurses need to have the vision to practice infection control on a day-to-day basis as a vital part of patient care.[8]

Workplace safety is a vital part of all healthcare organizations which ensures quality health care in facilities and is important to protect health care workers, patients and public from health-related risks.[7]

Prevention of infection is one of the most important tasks in the health organizations. In our study, about 57.5% of healthcare workers were knowledgeable about infection prevention. This finding revealed that about 50% of the staff nurses in the hospitals had sufficient understanding on prevention of infections, whereas studies carried out in Zambia and Bahirdar city reported knowledge about infection prevention in 74.4% and 84.5% respondents respectively.[9,10] In Nepal 22%, Palestine 53.9%, Iran 57% and healthcare facilities of West Arsi District, Southeast Ethiopia, 53.7% of healthcare workers in similar setting displayed good knowledge of IPC.[11,12,13] The remaining 42.5% of the respondents had poor knowledge about infection prevention and control.

Knowledge of the participants regarding importance of occupational safety in healthcare setting was 63% which is much lower than reported by a similar study which was 73%.[7]

Providing dustbin/bags that are coded confirm appropriate disposal of biomedical wastes which includes used gloves, needles and syringes, and likewise contribute to low rate of spread of infections.[14]

In our study 63% participants were vaccinated against hepatitis B virus whereas a similar study held in Eithopia reported it to be 30.7%.[15] In four hospitals affiliated to ministry of health in Palestine the vaccination status of workers was 80.8%.[8]

The attitude towards Hepatitis B Virus (HBV) transmission was also considerably poor as only 169 (84%) of participants opined that HBV is spread through biomedical waste. A similar study at Gondar University Hospital, Ethiopia [7] reported that 97% of participants had knowledge regarding the spread of HBV.

In current study 186 (93%) participants believed that vaccination is necessary for healthcare workers whereas 163 (81.5%) showed willingness to receiving

vaccination, however, only 60% were found to be vaccinated against HBV.

In this study, the practice scores of the participants were 104 (52%), which is moderately less than similar study held in Ethiopia i.e. 57.4% [7] and another study held in Palestine i.e. 98.5%.[8]

Around 37% cases incidents of needle sharps' injuries occurred during the previous 12 months, which is greater than a similar studies conducted in Northwest Ethiopia and Southeast Ethiopia (32.4%).[13, 15]

Our study revealed that 84.5 % participants wash hands with soap after handling the patients whereas 91% stated that they also perform hand washing after removing gloves compared to 12.3% which was reported in a study conducted at Dr. Ruth K.M Pfau Civil Hospital Karachi.[16]

Almost 2/3 of study participants were not aware of the World Health Organization's recommendation of not re capping the sharps/needles which is greater than study conducted at Nigeria.[17]

Linear regression was applied using practice score as the dependent variable and gender, age, department, experience and working hours as the independent variable. In the present study gender, age and working hours were found to be significant predictors of the total practice score.

Infection prevention is a main issue of all healthcare employees and policy makers of health system. Nursing is critical to the attainment and success of any health related programs especially preventive programs intended to reduce the occurrence of infections in healthcare settings. Hence, staff nurses should have adequate knowledge to achieve this objective.[8]

This study has several limitations. Firstly, there is a likelihood that the staff nurses may have provided socially desirable responses rather than their actual practices.[18]

Secondly, the findings cannot be generalized to staff nurses in other hospitals of the country as the study was restricted to a tertiary care hospital in Rawalpindi. Thirdly, as this was a cross-sectional study design, temporal relationship between the explanatory and outcome variable could not formed.[19]

CONCLUSION

In spite of adequate knowledge and awareness of universal protocol for the prevention of HAIs, adherence to protocol is poor among the health workers. The educational interventions need to be executed to address breaches regarding knowledge and practice to ensure that nurses use evidence-based infection prevention measures.

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IMPACT OF COVID-19 PANDEMIC ON ENDOSCOPY AND COLONOSCOPY PROCEDURES, A STUDY FROM TERTIARY CARE CENTER LOCATED IN RAWALPINDI, PAKISTAN

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ABSTRACT

Objective: Our objective was to evaluate the impact of COVID-19 on the services of the endoscopy unit of a tertiary care health center in Rawalpindi, Pakistan.

Design: Retrospective cross-sectional study.

Place and duration of study: The Center for liver and digestive diseases, Holy Family Hospital Rawalpindi, Pakistan from February 2019 to February 2020.

Materials and Methods: We divided the data into two time periods; pre-COVID-19 (Feb 2019 to March 2020), and the COVID-19 impacted period (March 2020 to Feb 2021). This study compared the impact of pre-COVID-19 and COVID-19 tenure in terms of frequency of endoscopy and colonoscopy procedures.

Results: Approximately, 17.4% (from 3235 to 2280) decrease in endoscopic procedures was noted in COVID-19 impacted period. This change was more pronounced in colonoscopy procedures which were reduced by 23.5% (from 430 to 266).   The detection of malignancies and other diseases was also delayed due to the reduction of these procedures.

Conclusion: Our study showed a remarkable reduction in endoscopy and colonoscopy procedures due to COVID-19.

However, we suggest that such an impact can also increase morbidity and mortality rates in the future if not dealt with meticulously. Locoregional and international guidelines should be provided to the GI centers dealing with endoscopic procedures during such pandemics in line with real-life evidence.

 Keywords:

Colonoscopy, COVID-19, Endoscopy, Mortality, Morbidity

INTRODUCTION

The novel coronavirus disease outbreak started in December 2019 in Wuhan, China. As the COVID-19 virus caused severe infectious disease, on 11th March 2020, WHO (World Health Organization) declared the COVID-19 outbreak a pandemic due to the uncontrolled situation[1,2]. The pandemic caused a daunting challenge to all services including health care (endoscopic units) due to the malicious and virulent behavior of the disease[3]. In comparison to previous SARS or MERS viruses, GI symptoms like abdominal pain, diarrhea, and vomiting seem to be more prevalent in COVID -19[4]. Numerous studies showed that Gastrointestinal (GI) epithelial cells had an expression of viral receptor angiotensin-converting enzyme 2 and hence SARS-CoV-2 can rapidly invade and replicate within the GI tract and cause deleterious effects[4].

Due to aerosol transmission from COVID-19 affected patients, it was impossible to manage routine outdoor, indoor, and even emergency departments due to a 50 to 75% staff reduction including doctors, nurses, and paramedical staff [5]. Seeing these unprecedented effects of COVID-19, gastroenterology societies such as the

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Asian-Pacific, European and American societies of digestive endoscopy issued guidelines for endoscopic activity. Consensus guidelines from the British Society of Gastroenterology and Joint Advisory Group for Gastrointestinal Endoscopy were published in March 2020[5]. These societies recommended the case-to-case selection for upper and lower GI endoscopy as per the urgency and dire need of the procedure which will be done after using personal protective equipment (PPE). They also emphasized the use of negative pressure rooms and pre-procedure COVID-19 PCR testing[5,6].

The consensus guidelines highlighted the importance and commencement of doing only emergency GI endoscopies to avoid the risk of cross-contamination and to provide maximum protection to the endoscopy unit personnel against COVID-19. Moreover, the guidelines recommended reducing the number of onsite endoscopy staff, setting up special chains for patients, monitoring the temperature of patients as well as staff members, and questionnaires about symptoms, recent or previous exposure to COVID-19 taken. This resulted in a dramatic decline in the number of GI endoscopic procedures worldwide[7-10]. Furthermore, this pandemic caused a reduction in the training opportunities which were related to GI endoscopy due to the high risk of transmission virus owing to the aerosol-generating property of the respective procedure. However, PPE and recommended protocol significantly reduce virus transmission[11-13]. This study is designed to study the pre-COVID-19 and COVID-19 tenure in terms of endoscopy and colonoscopy procedures.

METHODOLOGY

This was a retrospective cross-sectional study conducted at the "Center for liver and digestive diseases, Holy Family Hospital Rawalpindi, Pakistan". All the patients presenting to this center from February 2019 to February 2021 were included in this study. Ethical approval was taken before the study. Data of endoscopy and colonoscopy procedures carried out at this center were collected. For analysis purposes, data were divided into two time periods; pre-COVID-19 (from Feb 2019-March 2020) and the COVID-19 impacted period (March 2020 – Feb 2021).

The average number of procedures in every period was computed, and reduction activity percentage (%) and chi-square test were applied for the comparisons of pre-COVID-19 and COVID-19 impacted periods. Patients'

age, gender, the indication of the procedure, and endoscopic findings as well as, time and procedure type were also noted. A P-value less than 0.05 was considered to be significant.

RESULTS:

COVID-19 Impact on Endoscopy:

It was observed that during the study periods; a total of 2280 patients were hospitalized in the Center for liver and digestive diseases, Holy Family Hospital Rawalpindi, Pakistan for Endoscopic procedures during the pandemic time of COVID-19 (March 2020 – Feb 2021) which was significantly lower than the number of patients (3235 patients) who were admitted during the same period before the COVID-19 pandemic (Feb 2019-March 2020) (p=0.006). There was a non-significant change in gender distribution in both periods, with men (59.7% vs. 56.1%) and similar proportions of women (40.3% vs 43.9 %) (p>0.05). In regards to the age of admitted patients, in pre-COVID-19 (Feb 2019 - March 2020 remove dates) 26.2% of the admitted patients' age was between 41-50 years in comparison to 23.2 % in the COVID-19 period. It is in contrast to the COVID-19 impacted period in which the majority of hospitalized patients' age was 51-60 years i.e., 26.6% vs. 22% in the pre-Covid-19 period with significant shifting (p=0.006).

The majority of patients in Pre COVID-19 period were ranging from 51-60 years (26.2%0 compared to post COVID-19 period in which the age range was 61-to 70 years (26.6%). Overall, a 17.4% reduction in the number of patients was recorded. Age distribution of endoscopy procedure according to pre-COVID-19 and COVID-19 impacted period is shown in **Figure 1.**

It was observed that, there was a significant reduction in some indications of endoscopy including corrosive intake; 109 (3.4%) vs 64 (2.9%), UGIB; 1312 (40.6%) vs 33(1.4%), dysphagia; 108 (3.3%) vs 21 (0.9%), screening for varices; 126 (3.9%) vs 24 (1%), hematemesis; 410 (12.7%) vs 41 (1.8%) and melena; 626 (19.2%) vs 446 (19.6%) (p<0.001). Moreover, there was a significant increase in other indications for procedure such as persistent vomiting; 180 (5.6%) vs. 514 (22.5%), anemia; 143 (4.4%) vs 296 (13.0%), chronic diarrhea; 39 (1.2%) vs 426 (18.7%), corrosive stricture; 23 (0.7%) vs 170 (7.4%), dyspepsia; 159 (5.0%) vs 245 (10.8%).

The endoscopic findings were also noted. Findings that

were significantly reduced in pre COVID-19 and post COVID-19 periods included fundal varices; 97(3%) vs 47(2%), gastric ulcer; 210 (6.5%) vs 17 (0.7%), duodenal ulcer; 21 (0.7%) vs 1 (0.01%), portal hypertensive gastropathy without varices; 173 (5.4%) vs 41 (1.8%), duodenopathy; 41 (1.2%) vs 14 (0.6%), duodenal polyp; 8 (0.2%) vs 3 (0.1%), esophagitis; 68 (2.1%) vs. 26 (1.1%), gastric polyps; 33 (1.0%) vs 79 (0.3%), hiatal hernia; 164 (5%) vs 26 (1.1%), normal; 545 (16.9%) vs. 6 (0.2%), pyloric stenosis; 81 (2.5%) vs. 17 (0.7%) and obliterated esophageal varices; 102 (3.7%) vs. 19 (1.3%)(p=0.001).

It was observed that there was a significant increase in esophageal varices; 1209 (37.3% vs 74.6%), Mallory Weiss tear 0 vs 54 (2.3%), gastritis; 159 (5.0%) vs. 245 (10.8%), CA stomach; 33 (1.0%) vs 29 (1.2%), CA duodenum; 32 (0.9%) vs 26 (1.1%), candidiasis; 5 (0.1%) vs 33 (1.5%), esophageal stricture; 1.11% vs 5.6%, Barrett's esophagus; 10 (0.3%) vs. 36 (1.6%) and achalasia; 9 (0.2%) vs 28 (1.2%) (p=0.001).
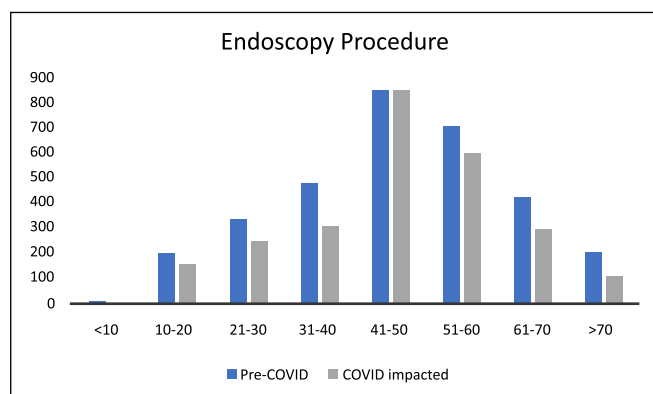

Figure 1: Age distribution of endoscopy procedure according to pre-COVID and COVID impacted period.

Table I: The distribution of age, sex, indications, and findings of endoscopy procedures of pre-COVID-19 and COVID-19 impacted period.

	Pre-COVID-19 period	Post-COVID-19 period	P-value
Age of the patient (Years)			
<10	11 (0.34%)	0	
10-20	207 (6.3%)	161 (7%)	
21-30	340 (10.6%)	254 (11.1%)	
31-40	477 (14.8%)	314 (13.8%)	
41-50	850 (26.2%)	530 (23.2%)	0.006
51-60	713 (22.0%)	605 (26.6%)	
61-70	429 (13.2%)	303 (13.2%)	
>70	208 (6.5%)	113 (5.1%)	
Total	3235 (58.7%)	2280 (41.3%)	
Sex			
Male	1930(59.7%)	1278(56.1%)	0.008
Female	1305 (40.3%)	1002(43.9%)	

Table II: The distribution of indications and findings of endoscopy procedures of pre-COVID-19 and COVID-19 impacted period.

	Pre-COVID-19 period	Post-COVID-19 period	*p*-value
Indication			
Persistent Vomiting	180 (5.6%)	514 (22.5%)	
Anemia	143 (4.4%)	296 (13.0%)	
Chronic Diarrhea	39 (1.2%)	426 (18.7%)	
Corrosive Intake	109 (3.4%)	64 (2.9%)	
Upper gastrointestinal bleeding (UGIB)	1312 (40.6%)	33 (1.4%)	
Dysphagia	108 (3.3%)	21 (0.9%)	<0.001
Screening Varices	126 (3.9%)	24 (1%)	
Corrosive Stricture	23 (0.7%)	170 (7.4%)	
Dyspepsia	159 (5.0%)	245 (10.8%)	
Hematemesis	410 (12.7%)	41 (1.8%)	
Malena	626 (19.2%)	446 (19.6%)	
Findings			
Esophageal Varices	1209 (37.3%)	1700 (74.6 %)	
Fundal Varices	97 (3%)	47 (2%)	
Mallory Weiss Tear	0	54 (2.3%)	
Gastric Ulcer	210 (6.5%)	17 (0.7%)	
Duodenal Ulcer	21 (0.7%)	1	
Gastropathy without Varices	173 (5.4%)	41 (1.8%)	
Duodenopathy	41 (1.2%)	14 (0.6%)	
Polyp Gastric	33 (1.0%)	79 (0.3%)	<0.001
CA Stomach	33 (1.0%)	29 (1.2%)	
CA Duodenum	32 (0.9%)	26 (1.1%)	
Duodenal Polyp	8 (0.2%)	3 (0.1%)	
Gastritis	329 (10.1%)	20 (0.9%)	
Esophagitis	68 (2.1%)	26 (1.1%)	
Candidiasis	5 (0.1%)	33 (1.5%)	
Esophageal Stricture	38 (1.11%)	127 (5.6%)	
Pyloric Stenosis	81 (2.5%)	17 (0.7%)	
Achalasia	9 (0.2%)	28 (1.2%)	
Barrett Esophagus	10 (0.3%)	36 (1.6%)	
Hiatal Hernia	164 (5%)	26 (1.1%)	
Not done	27 (0.8%)	3 (0.1%)	
Normal Findings	545 (16.9%)	6 (0.2%)	
Obliterated Varices	102 (3.7%)	19 (1.3%)	

COVID-19 Impact on Colonoscopy

It was observed that during the study periods; 266 patients were hospitalized in the Center for liver and digestive diseases, Holy Family Hospital Rawalpindi, Pakistan for colonoscopy during the pandemic time of COVID-19 (between Jan to the end of Dec 2019), which was significantly lower than the number of patients (430 patients) who were admitted during the same period before COVID-19 pandemic in the year (p=0.006).

There was a non-significant change in gender distribution in both periods, with men (61.8% vs. 61.6%) and similar proportions of women (38.2% versus 38.4 %) (p>0.05). In regards to the age of admitted patients during the study periods, in pre-COVID-19 (2019), the majority of admitted patients' age was between 51-60 years (22.8 %) in comparison to 16.1% in the Covid-19 impacted period. In COVID-19 impacted period, the majority of patients had ages ranging from 21-30 years

(27.8 % vs. 18.3%). Overall, a 23.4% reduction in the number of patients was recorded.

It was also noticed that there was significant reduction in certain indications and subsequent colonoscopy findings in total number of admitted patients for diagnostic colonoscopy in the COVID-19 period such as Per rectal bleed 226 (52.6%) vs 116 (43.6%), malignancy 17 (4%) vs 1 (0.4%), anemia 94 (21.9%) vs 4 (1.4%), constipation 17 (3.9%) vs 8 (3%), ulcerative colitis 42 (9.8%) vs 18 (6.7%), polyps 46 (10.7%) vs. 21 (7.9%), stricture 9 (2%) vs 3 (1.1%) with (p < 0.001).

Moreover, there was a remarkable increase in certain indications and colonoscopy findings in the number of patients admitted during the pandemic time such as chronic diarrhea 58 (13.5%) vs 110 (41.4%), intestinal TB 3 (0.7%) vs 7 (2.7%), IBS 1 (0.2%) vs 7 (2.7%), normal findings 205 (47.7%) vs. 130 (48.9%), hemorrhoids 82 (19%) vs. 66 (24.9%) and diverticulitis 3 (0.7%) vs. 4 (1.5%) with (p < 0.001).

Table II: Age, gender, indications, and findings of colonoscopy procedures of pre-COVID-19 and COVID-19 impacted period.

	Pre COVID-19 (2019)	COVID-19 impacted (2020)	*p*-value
	No (%)	No (%)	
Gender			
Male	266 (61.8%)	164 (61.6%)	
Female	164 (38.2%)	102 (38.4%)	
Total	430 (61.7%)	266 (38.3%)	
Indication			
PR Bleed	226 (52.6%)	116 (43.6%)	
Chronic Diarrhea	58 (13.5%)	110 (41.4%)	
Malignancy	31 (7.2%)	14 (5.2%)	
Intestinal TB	3 (0.7%)	7 (2.7%)	<0.001
Constipation	17 (3.9%)	8 (3%)	
IBS	1 (0.2%)	7 (2.7%)	
Anemia	94 (21.9%)	4 (1.4%)	
Findings			
Normal Findings	205(47.7%)	130(48.9%)	
Hemorrhoids	82(19%)	66(24.9%)	
Ulcerative Colitis	42(9.8%)	18(6.7%)	
Malignancy	17(4%)	1(0.4%)	
Polyps	46(10.7%)	21(7.9%)	<0.001
Stricture	9(2%)	3(1.1%)	
Diverticulitis	3(0.7%)	4(1.5%)	
Not Done	24(5.6%)	22(8.2%)	
Intestinal TB	2(0.5%)	1(0.4%)	

DISCUSSION

We conducted this study at the Center for Liver and Digestive Diseases, Holy Family Hospital Rawalpindi, Pakistan. Our data revealed a significantly decreased number of endoscopic and colonoscopic procedures during the pandemic. A similar reduction in the number of procedures was reported in other regions, such as the USA, UK, Netherlands, and China[14-17].

No data is reported about COVID-19 impact on the endoscopy unit located in Pakistan. We report a significant decline in endoscopy and colonoscopy procedures during the COVID-19 pandemic as compared with the pre-COVID-19 pandemic period. This reduction is also reported in other regions of the world[5,18-20].

COVID-19 played a major global impact on endoscopic services, reduced capacity with public disinclination to undergo endoscopy during the pandemic might lead to an increased mortality rate due to delayed cancer diagnosis. Endoscopic and colonoscopic procedures are mostly done in emergency settings; however, therapeutic procedures are linked with few complications and higher success rates. Only in time, we would be able to comprehend the real impact of COVID-19 on the well-being of our patients.

Upper and lower GI endoscopies are considered high-risk procedures for the endoscopist and the assisting staff as both are aerosol-generating procedures and there is also a concern for fecal shedding of the virus but still, they cannot be stopped completely being considered as lifesaving procedures. In this regard, patient selection can limit undue exposure to the concerned endoscopy unit staff.

Rutter MD et al. conducted a study in the UK in 2020, weekly average endoscopy procedures were 35,478 in the pre-COVID period, which reduced up to 12% as compared to our study 17.4% (from 3235 to 2280) decrease in COVID-19 impacted period. Due to the reduction in procedure cancer detection rate also decreased, and the weekly number of cancer detection was decreased by 58% in the UK. The most dramatic impact was noted in the number of colonoscopies up to 23.5% during the pandemic.

A study on COVID-19 Impact was conducted in a tertiary care center located in Romania, the total duration of the study was 6.5-month, and a 6.2-fold decrease was noted, Colonoscopies procedures were reduced from 916 to 42, p < 0.001; gastrointestinal (GI) endoscopies from 2269 to 401, p = 0.006; detection of cancers was reduced (57 compared to 249, p = 0.001). The COVID-19 pandemic has significantly altered the workflow of the endoscopy unit, lowering the number of procedures performed and potentially compromising the early detection of cancers.[21]

We compared the Pre-COVID-19 and COVID-19

periods retrospectively and concluded that endoscopy and colonoscopy during the pandemic time of COVID-19 reduced. There was a non-significant change observed in regards to gender distribution in both periods, men (59.7% vs. 56.1%) and similar proportions of women (40.3% versus 43.9 %). As far as the age is concerned, in pre- COVID-19 (2019), the majority of patients' age was between 41-50 years (26.2%) in comparison to (23.2 %). In COVID-19 the majority of patients' age was 51-60 years 26.6% vs. 22% in the pre-Covid period with significant shifting (P-value 0.006). Overall, 17.4% of services were decreased. A significant reduction in endoscopy indications including corrosive intake, UGIB, dysphagia, screening for varices, hematemesis, and melena was noted with P-value <0.001.

Moreover, there was a significant increase in other indications for the procedure such as persistent vomiting, anemia, chronic diarrhea, corrosive stricture, and APD/Gastritis. The endoscopic findings which were significantly reduced include fundal varices, gastric ulcer, duodenal ulcer, gastropathy without varices, duodenopathy, duodenal polyp, gastritis, esophagitis, polyp gastric, hiatal hernia, pyloric stenosis, and obliterated varices.

The colonoscopy services were reduced from 266 to 430 patients, including a reduction in the number of patients with PR bleed, malignancy, anemia, constipation, ulcerative colitis, and polyps. Moreover, there was a significant increase in patients presenting with chronic diarrhea, intestinal TB, hemorrhoids, and diverticulitis. These changes are implicated as a result of the direct impact of Covid-19 on endoscopic procedures and hence mark a new shift towards comparatively less commonly encountered diseases otherwise.

Although the global health crisis is over, endoscopy units started their work routinely. The COVID-19 pandemic is the 5th pandemic since the Spanish Flu in 1918, and will not be the last. The experiences that we gained during this period will provide light in future action against other potential pandemics. The use of PPE and the detailed guidance for patient and personnel hygiene will be helpful.

However, our study presents some limitations including single-center data being analyzed, and delayed complications.

CONCLUSION

Our study showed a remarkable reduction in endoscopy and colonoscopy procedures due to COVID-19.

However, we suggest that such an impact can also increase morbidity and mortality rates in the future if not dealt with meticulously. Locoregional and international guidelines should be provided to the GI centers dealing with endoscopic procedures during such pandemic in line with real-life evidence.

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THE PREVALENCE OF ADVERSE EFFECTS IN MEDICAL STUDENTS RECEIVING COVID-19 VACCINATION-ISLAMABAD

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ABSTRACT

Objectives: *To identify the reported adverse effects related to COVID-19 vaccination in medical students of Islamabad*

Design: *Descriptive Cross-Sectional study.*

Duration: *The study was carried out in the medical colleges of Islamabad. It was a study of 8 weeks conducted between August and September, 2021.*

Materials and Methods: *The study used an online questionnaire Google form having twenty-one questions each providing multiple choices in relation to demographic aspects of the participants, anamnesis related to COVID-19 vaccines as well as systemic side effects.*

Results: *About 10.9% of the participants reported no adverse events following immunization. Majority of the students got vaccinated with Sinopharm and SinoVac. The most common side effects were sore arm (23.3%), generalized weakness (16.7%), headache (10.1%), fever (6.2%), muscle pain (4.7%), localized swelling at injection site (6.2%). Majority (32.5%) experienced the symptoms after receiving the first dose, while 15 % experienced them after 2nd dose.*

Conclusion: *The findings of the study showed that majority of the medical students developed mild and negligible post vaccination adverse effects. No adverse consequences were reported.*

Keywords:

Adverse Effects, COVID-19 vaccines, Medical students, Sinopharm, Sinovac

INTRODUCTION

By June 2021, 181 million people have been reported to be infected with COVID-19 and more than 4 million died of the same. Seventy third World Health Assembly emphasized the role of immunization in the prevention and containment of SARS-CoV-2 transmission. There are presently over 125 vaccines manufactured worldwide, 365 vaccine trials in progress, and 18 COVID-19 vaccines given approval for mass immunization. Rapid development of vaccines against COVID-19 has led to speculations about vaccine safety in the high income countries. [1]

Despite the shocking number of deaths from COVID-19, there are many individuals and families in America who are suffering from vaccine hesitancy fearing side effects and most of these people are found to be from poor educational backgrounds and residing in the rural areas. The study calls attention to formulate legible and accessible health communications for wider and varied population dispelling the myths surrounding COVID-19 vaccinations especially regarding their side effects.[2] It is vital that governments develop communication strategies and inform the public regarding the concept of herd immunity and vaccine safety. Building trust in vaccines by broadcasting the positive image of COVID-19 vaccines, will help increase the coverage and end the ongoing pandemic.[3]

The vulnerability of Pakistan to conspiracy narratives in immunization context has been preventing the country from becoming Polio free and in the current state of affairs it has been quite a challenge for health authorities to build public confidence in COVID-19 vaccines and ensure the masses that COVID-19 vaccines carry either no side effects or they are mild and negligible in nature.[4] COVID-19 vaccines acceptance in Pakistan was found

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to be more in the young individuals, mostly female health workers providing first-hand health services to COVID-19 patients in the large city hospitals. The main reason cited for vaccine rejection was the fear of potential side effects related to COVID-19 vaccines.[5]

Fever, chills, soreness at the injection site and gastrointestinal disturbance among the young population were the foremost side effects reported by people in Pakistan after receiving COVID-19 vaccines.[6] This study aims to determine the frequency of reported adverse effects of COVID-19 vaccination amongst medical students of Islamabad.

Materials and methods:

A cross-sectional descriptive study was conducted in Federal Medical College from August to September, 2021, after the approval was secured from the ethical review board of the institution. A total of 257 students participated in the study; they were selected through convenient sampling technique. Data was collected through self-structured questionnaire. The questionnaire was made available online as a Google form with 21 questions. Following the established methodology, two vaccines namely Sinopharm and Sinovac were exclusively focused upon as initially these two vaccines were available and medical students were amongst the early one to receive vaccination.

Informed consent was taken and data confidentiality was assured. Students duly filled online questionnaires were included and incomplete forms were excluded from the study. Data was analyzed in SPSS version 22. Mainly descriptive statistics has been reported. For inferential statistics, chi-square test was applied between the categorical variables; p-value < 0.05 was considered statistically significant

RESULTS:

Out of total 257 participants, 146 (57%) had been administered Sinopharm while 111 (43%) had received Sinovac. The median age of those who participated in the study was 22 years, for details Figure 1. Majority of the participants were female 67.5%, remaining 32.5% male. Most of the participants 53% were from fourth year MBBS. About 44.4% of the participants were from Punjab studying in Islamabad and 37.6% were from Islamabad. Mostly parents of the participants were vaccinated; details in Table I.

Out of 257 participants, 11% reported no side effects while 89% students reported side effects. Most prevalent side effects in both male and female participants included sore arm (23.3%), generalized weakness

(16.7%), headache (10%), muscle pain (4.7%), fever (6.2%), muscle stiffness (3.5%), dizziness (2.3%), chills (2.7%). Table I shows detailed system-wise adverse effects.

After getting 1st dose of vaccination; 32.5% of the participants experienced adverse effects, 15.4% after 2nd dose, and 23.1% after both doses. About duration of reported adverse effects; 26.4% experienced symptoms immediately, 49.5% participants experienced within 12 hours of vaccination, 14.3% within 24 hours and 9.9% after a week. Symptoms of 45.1% participants lasted for about 1-3 days and 40.7% for less than a day. Around seventy seven percent participants sought emergency care and 21.5% resorted to self-medication.

More females reported sore-arm (58.2%) and generalized weakness (42%) as compared to male. By applying chi-square test statistically significant (p<0.05) difference found gender-wise only for these two reported adverse effects.

DISCUSSION:

Different international studies conducted both in the developed and developing countries reveal the reasons behind vaccine hesitancy; that are the lack of public confidence in vaccines, various myths and conspiracy theories questioning the safety, quality and more importantly efficacy of vaccines in preventing and mitigating the severity of infectious diseases.[7] The study results show that the commonest adverse effects that followed vaccination with Sinopharm and Sinovac were sore arm (23.3%), generalized weakness (16.7%) and headache (10.1%) etc. These findings are exactly in line with the international study-Prevalence of COVID-19 Vaccine side effects among Healthcare Workers in the Czech Republic-wherein participants displayed similar adverse effects of mild nature.[8] Current study also shows that 10.9% of the participants experienced no adverse effects and these results correspond with the results of another international study by Sprent J. et al, that explored vaccine safety in detail.[9]

In a cross sectional study conducted in 2021, it came to light that the side effects arising from vaccination with Sinopharm COVID-19 vaccines were mild and quite predictable, however the side effects were found to be more in the females and those who were aged less than 49 years of age.[10] These finding also strengthen our result mentioned that majority of females reported the adverse effects.

In another study which included Polish healthcare workers and medical students, it was observed that the side effects arising from COVID-19 vaccination were

self-resolving and did not disrupt the daily routine and functioning of the participants. The side effects which were negligible and self-limiting in nature were found concentrated in the younger age group.[11]

In a study conducted in Kingdom of Saudi Arabia regarding Oxford-AstraZeneca and Pfizer-BioNTech, 60% of the participants were reported to suffer mild side effects like pain at the site of injection and fatigue, and only 3% of the individuals needed to consult a doctor regarding their side effects.[12]

In a randomized, cross sectional study conducted in Jordan, participants received Sinopharm, AstraZeneca and Pfizer BioNTech and only 10% of them had serious side effects while all other had mild to moderate adverse effects which resolved on their own.[13]

The safety of Sinopharm in comparison to AstraZeneca and Pfizer was established in yet another study which shows that Sinopharm produced least adverse effects following first and second doses. Dry cough, anxiety and shortness of breath were associated with AstraZeneca.[14]

Economic reasons are also important for vaccination. In a study conducted in China, the participants showed their apprehensions and considered pandemic as a sort of biological warfare and the main motivational factor for vaccination among them was to protect their loved ones from the scourge of COVID-19 infection. The role of politicians and health authorities was highlighted in the study that how the influencers can play a crucial role in dispelling the misinformation regarding vaccinations.[15]

CONCLUSION:

This study established that participants of the study developed mild adverse effects to Sinopharm and Sinovac vaccines without any serious consequences and hence these vaccines are safe.
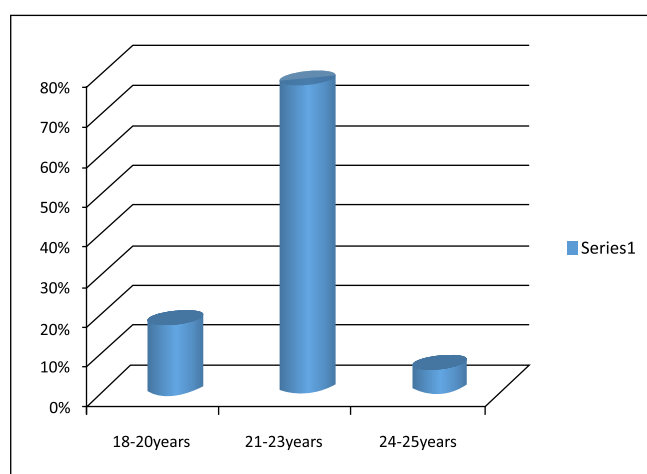
Figure 1: Age-wise distribution of study participants
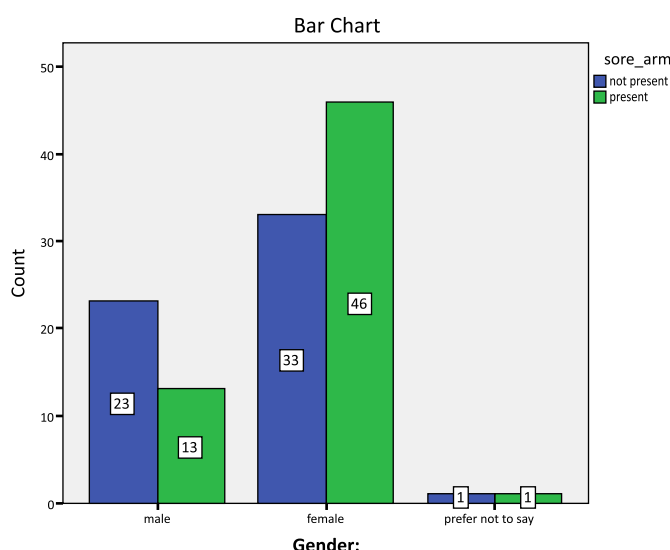
Figure 2: Gender wise distribution of reported side effect (sore-arm)

Table I: Socio-demographic and vaccination status of participant's family

Main variable	Options	N	%age
Fathers occupation	Govt employee	140	54.5
	Business	45	17.5
	Private job	55	21.4
	Others	17	6.6
Mothers occupation	House wife	174	67.7
	Working	83	32.2
Vaccination status			
Mother	Yes	225	87.6
	No	32	12.4
Father	Yes	230	89.4
	No	27	10.6
Sibling	Yes	191	74.4
	No	66	25.6

Table II: Reported adverse effects of Covid-19 vaccination

ADVERSE EFFECTS	N(%)
MUSCULOSKELTAL :	**76 (29.5%)**
Generalized weakness	43 (16.7%)
Muscle pain	12 (4.7%)
Muscle stiffness	9 (3.5%)
Chills	7 (2.7%)
Joint pain	5 (1.9%)
CARDIOVASCULAR:	**4 (1.6%)**
Palpitations	2 (0.8%)
Flushing	2 (0.8%)
NEUROLOGICAL:	**36 (13.9%)**
Headache	26 (10%)
Dizziness	6 (2.3%)
Decreased sleep	2 (0.8%)
Tingling	1 (0.4%)
Numbness	1 (0.4%)
RESPIRATORY:	**6 (2.4%)**
Shortness of breath	2 (0.8%)
Nasal stuffiness	1 (0.4%)
Runny nose	1 (0.4%)
Wheezing	1 (0.4%)
Cough	1 (0.4%)
LOCAL SITE REACTIONS:	**79 (30.7%)**
Sore arm	60 (23.3%)
Localized swelling	16 (6.2%)
Itching	3 (1.2%)
ABDOMINAL:	**6 (2.4%)**
Diarrhea	2 (0.8%)
Nausea	1 (0.4%)
Vomiting	1 (0.4%)
Abdominal pain	1 (0.4%)
Decreased appetite	1 (0.4%)
MISCELLENOUS:	**22 (8.6%)**
Fever	16 (6.2%)
Sweating	3 (1.2%)
Reinfection with COVID-19	1 (0.4%)
Others	2 (0.8%)
NO ADVERSE EFFECTS:	**28 (10.9%)**
Total:	**257 (100%)**

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APPLICATION OF MAASTRICHT UNIVERSITY PBL MODEL IN YEAR-5 MBBS STUDENTS

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ABSTRACT

Objective: To apply Maastricht University PBL model to Year-5 MBBS students.

Method: MU PBL model was applied to two groups of Year-5 MBBS students. The trigger of PBL was based on the theme of reading the CT-scan brain.

Results: A total of 38 students with 24 females participated in the study. The overwhelming majority of students supported the PBL and considered it to promote self-formulated learning objectives, self-directed learning, analytic skills, motivation, collaboration and lifelong learning.

Conclusion: PBL promotes cognitive as well as generic skills. It should be given its due place in a community-oriented medical education curriculum.

Keywords:

Analytic Skills, PBL, Self Directed Learning

INTRODUCTION

Problem-based Learning (PBL) was first introduced by McMaster University Canada in 1969[1]. Maastricht University (MU) Netherland developed their own model of PBL in 1974[2]. The latter became the world-recognized MU PBL model that promoted four aspects of learning: constructive, contextual, collaborative, and self-directed. The Edinburgh Declaration of WFME in 1988 changed the medical curriculum all over the world. It proposed Community-Oriented Medical Education (COME) curriculum and recommended PBL to make the students a lifelong self-learner[3]. Pakistan, with assistance from WHO launched a pilot "COME Project" in 1994 in its 4 public medical colleges. These colleges developed an MBBS COME curriculum distributed in three phases: Phase-I (Year-1 & 2), Phase-II (Year-3), and Phase-III (Year-4 & 5)[4]. Despite these initial efforts, the PBL system is not being followed in the majority of medical colleges. The reasons quoted include students lacking prior PBL exposure, deficiency of communication skills, and paucity of resources to conduct PBL[5].

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Comparing PBL with Case-based learning (CBL), both have small-group case-discussion. PBL does not need prior preparation; CBL does. The number of sessions in PBL is usually two; CBL has a single session. Limited guidance is needed in PBL; active guidance in CBL. Learning objectives are written by the students in PBL but provided by the facilitator in CBL. The learning method in PBL is independent self-directed learning (SDL) while it is a shared facilitator: self-learning in CBL. The learning style of PBL is an open inquiry; in CBL it is a guided inquiry. The end-of-session in PBL includes students' presentations while in CBL its a wrap-up by the facilitator. PBL boosts critical thinking and collaboration better than CBL. PBL fosters independent lifelong learning while CBL does not promote it.[6, 7]

Thus, for a practical application of PBL, we hypothesized that MU PBL would be well-taken by and beneficial to the students having no previous exposure to the PBL. To confirm it, the present study was designed to be conducted on Year-5 medical students and to complete the PBL in one session rather than the usual practice of two sessions.

Objective:

To apply the MU PBL model to the Year-5 MBBS students using a single session of PBL.

METHOD:

Design: Observational analytic study with a non-probability convenient sample.

Settings: Department of Neurology, HITEC Institute of Medical Sciences, Taxila Cantt, Taxila.

Subjects: Two groups of Year-5 MBBS students posted in the department of medicine. Other MBBS groups of the lower classes posted in the same department were excluded.

Learning Method of MU PBL: This is a short group (10-15 participants) learning activity. The main components are brainstorming, SDL, and discussion.

The Facilitator's Role in MU PBL: it includes preparing a Trigger (clinical scenario) for sharing with the group, outlining learning objectives for own reference (not for sharing), watching the students going on the right track of learning, and facilitating them if needed. For the present study, the facilitator provided an opportunity for self-evaluation for the students.

Seven Jumps (Steps) of MU PBL: it includes:

1. After reading the trigger (clinical scenario), understand the problem; define difficult words or terms.

2. Identify the questions to be answered.

3. Brainstorming on previous knowledge and identifying potential solutions.

4. Analyze and structure the results of the brainstorming session.

5. Formulate Learning Objectives.

6. Undertake SDL, individually or in smaller groups.

7. Discuss the findings.

Deviation from the convention: MU PBL usually includes a moderator, a time-keeper and a scribe among the students. The PBL is completed in two sessions separated by SDL. In the present study, the facilitator took the roles of moderator and time-keeper; there was no scribe. The PBL was completed in a single session that included SDL. For discussion and presentations, the participants were divided into subgroups of 3-4 students. In the end, a self-evaluation opportunity was provided.

The Trigger (Clinical Scenario) for sharing with the students:

You are appearing in the table-viva of Medicine, the examiner asks you the following three questions:

1. What is a CT scan Brain?

2. Read the CT scan brain displayed and give the findings.

3. What are contraindications of a CT scan?

Material prepared for facilitator's own reference (not for sharing with the students):

1. Learning objectives:

   a. To identify normal brain parts and vascular territory.

   b. To identify infarction, hemorrhage, tumor, and ring-enhancing lesion.

   c. Reading approach – CSF spaces, brain, skull, and soft tissues.

   d. Contraindications of CT scan.

2. Learning resources needed:

   a. Books

   b. Internet facility

   c. CT-scan brain images with normal findings

   d. CT-scan brain images with abnormal findings

Tasks completed after brainstorming and analysis: the students were able to present a definition of a CT-scan Brain, formulate learning objectives for this PBL and list learning resources needed for this PBL.

Task completed during SDL: To achieve the learning objectives through independent self-directed learning, students searched for the relevant information.

Task completed during the discussion and self-evaluation opportunity: The facilitator showed the images of normal and abnormal CT scans of the brain and students did the interpretation. Students' queries and misconceptions were cleared.

The resources available for the SDL: It included internet facility, multimedia, students' own smartphones, books and CT-scan images.

Students' Feedback on the PBL: After completing PBL, the students gave their feedback through a Likert scale questionnaire with 7 items.

RESULTS:

Out of a total of 38 students of 5th Year MBBS, 18 participated in the First PBL and 20 in the Second PBL. There were 14 Males and 24 Females. Their ages ranged from 22 to 25 years.

During brainstorming and analysis, the students answered the question "what is a CT-scan brain?" with the following definition:

CT scan is a set of X-ray images of the brain taken from different angles and planes combined together and then processed by a computer to create cross-sectional images.

After brainstorming and analysis the students formulated the following Learning Objectives:

a. To identify brain anatomy and normal parts on a CT-scan brain

b. To identify different densities on a CT-scan brain

c. To interpret abnormal CT-scan and make differential diagnoses

d. To have a systematic reading approach

e. To find Indications of CT-scan brain (this was out of the trigger)

f. To find contraindications of CT-scan

For the list of resources needed for this PBL, the students' response was:

a. Books, b. Internet facility, c. CT-scan films, d. The CT-scanning facility, e. Instructor.

During discussion and self-evaluation, the students were able to interpret the following findings on CT-scan Brain:

a. Normal anatomical structures including CSF ventricles, basal ganglia, thalamus, lobes of the cerebrum, and cerebellum.

b. Communicating Hydrocephalus.

c. Infarction in the territory of the middle cerebral artery.

d. Intra-cerebral hematoma.

e. Meningioma tumor.

f. Extradural hematoma.

Students had difficulty in recognizing:

a. Ring-enhancing lesions of tuberculous meningitis.

b. Subdural hematoma.

Regarding contraindications of CT-scan Brain, the students proposed the following list:

a. Pregnancy

b. Hypersensitivity to contrast agent

c. Claustrophobia

d. Young age

The students' feedback in terms of percentage of favor to each statement of the questionnaire is given below:

a. The self-directed Learning is an integral part of PBL: 94.7%.

b. This group study exhibited collaboration and interdependence: 89.5%.

c. Identifying Self-learning Needs and formulating Learning Objectives were possible by being methodical and disciplined: 73.7%.

d. After a self-directed Learning activity and using a logical & analytic approach, it was easy to read a CT-scan Brain and answer the questions asked by the facilitator: 81.6%.

e. Feedback from the peers and the facilitator cleared many learning concepts: 86.8%.

f. This PBL created curiosity and internal motivation and made us confident and competent in Self-Directed Learning: 81.6%.

g. Overall the PBL was a successful activity in terms of self-learning: 86.8%.

DISCUSSION:

The main finding in this study was that the Year-5 MBBS students strongly favored the PBL and declared it a successful activity despite having no previous exposure to the same. It also showed that the PBL can be completed in a single session rather than the usual practice of two sessions. And, this can be completed with the existing resources in a medical college. The limitation in the study included restricted time for SDL because the PBL was completed in a single session.

The students preferred PBL to lecture-based learning (LBL) in their verbal comments. One of the students commented that "Despite the hectic morning schedule in summer, the afternoon PBL activity enhanced our motivation because of discussion-based SDL." Faisal et al divided Year-3 MBBS students into PBL and LBL groups and evaluated them with MCQs. The PBL group showed better academic performance[8]. Haseeb et al included Year-4 & 5 MBBS students from a PBL-supported college and an LBL-supported college and evaluated them with the same assessment. The PBL group achieved significantly higher scores including better knowledge and healthier attitudes toward health sciences research[9].

In this study, because of COVID-19 epidemic-related time constraints, the PBL was completed in one session rather than recommended two sessions. Khan et al

applied a PBL-variant in a large-group discussion of 140 students and compared it with LBL in the subject of biochemistry. He found similar MCQ test scores in both modalities, but the former was more conducive to enthusiastic self-study[10].

The present activity was carried out after a brief explanation to the participants, who did not have prior PBL experience. Huda et al had a better approach to introducing student-centered PBL to the entrants in a medical university by offering a 10-hour course in 6 sessions. She acquainted them with the small group dynamics in order to make them lifelong learners[11].

Each PBL starts with a trigger, which is prepared by the facilitator. Bangash stated that the most fascinating aspect of PBL is the ability to make an association between an external stimulus or situation and the concepts stored in memory. It is also reflected by the fact that PBL activity leads to higher performance in USMLE scores and promotes research and innovation[12].

In the present study, the facilitator's main role during the PBL was the creation of an environment for problem-oriented self-directed learning and the provision of self-evaluation opportunities to the students. Wang et al highlighted the importance of PBL coaching in comparison to PBL tutoring. Through cognitive scaffolding, PBL tutoring facilitates a learning environment, encourages the active participation of members, and continuously monitors the quality of learning. In addition to this and through emotional scaffolding, PBL coaching promotes empathy and medical humanity as the learning goals and pays particular attention to the emotional and motivational aspects of the learners. It is accomplished through establishing rapport, trust, and a nurturing relationship with the learners[13].

The students' feedback supported the statement "The self-directed learning is an integral part of PBL" by 94.7%. Yadav et al assessed the Attitude and Perception of the 1st year MBBS students. PBL sessions were effective in improving students' professional knowledge, refining problem-solving, promoting self-directed learning, and enriching teamwork experience[14].

A total of 89.5% of the participants agreed that "This group study exhibited collaboration and interdependence." Mughal et al analyzed seven PBL groups and found that the development of social dimension skills was facilitated to a greater extent than the cognitive dimension skills[15].

The students had a consensus of 73.7% that "Identifying self-learning Needs and formulating Learning Objectives were possible by being methodical and disciplined." MU PBL is based on a disciplined and methodical approach to formulating learning objectives, seeking relevant information through independent research, and sharing information for problem-solving.[2]

The participants had 81.6% agreement that "After a self-directed learning activity and using a logical & analytic approach, it was easy to read a CT-scan Brain and answer the questions asked by the facilitator." The Harvard Business Review defines the set of 21st-century skills as the ability to "Compete on Analytics." These skills include communication, collaboration and critical thinking (including creativity). Talat et al found that PBL supports 21st-century skills along with personal and social development. The 21st-century skills influence students' creativity more than competitiveness. The study's key finding is that social development is the strongest influencing factor on creativity and competitiveness. Personal development, on the other hand, has a weak but positive impact.[16]

A total of 86.8% of the students favored the statement "Feedback from the peers and the facilitator cleared many learning concepts." In a qualitative study by Mubuuke et al, students suggested that the facilitators need to give comprehensive feedback on their knowledge construction process as well as on generic skills.[17] A systematic review by Lerchenfeldt et al indicates that peer feedback in a collaborative learning environment (PBL and Team-Based Learning) may be a reliable assessment of professionalism and may promote professional behavior[18].

A total of 81.6% of the participants agreed that "This PBL created curiosity and internal motivation and made us confident and competent in Self-Directed Learning." The assessment of a temporomandibular joint PBL showed that the knowledge increased immensely following PBL sessions. Students attributed this success to PBL being interactive, collaborative, goal-directed, and research-oriented. Their increased motivation to learn a new topic was attributed to the self-formulated learning objectives and self-directed learning skills. It will possibly make them lifelong learners[19].

A total of 86.8% of the students declared that "Overall PBL was a successful activity in terms of self-learning." In describing the history of the PBL explosion, Camp considered it a paradigm shift that fits with the tenets of adult learning theory. Student autonomy, building on previous knowledge and experiences, and the

opportunity for immediate application are all well-known to facilitate learning in adults. These, therefore, should foster the success of a PBL approach with medical students who are adult learners[20].

CONCLUSION:

PBL is a world-recognized instruction method, which promotes problem-solving cognitive skills as well as the 21st-century generic skills. It is considered a paradigm shift in medical education. In line with the vision of the Edinburgh Declaration; PBL promotes lifelong learning in students. It should be given its due place in community-oriented medical education curriculum.

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Tables and illustrations should be merged within the text of the paper, and legends to illustrations should be typed on the same sheet. Tables should be simple, and should supplement rather than duplicate information in the text; tables repeating information will be omitted. Each table should have a title and be typed in double space without horizontal and vertical lines on an 8 1/2" x 11' paper. Tables should be numbered consecutively with Roman numerals in the order they are mentioned in the text.

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System International Unit (SI Unit) measurements should be used. All drugs should be mentioned by their generic names. Trade names may however, be mentioned in brackets, if necessary.

ABSTRACT

Abstracts of original article, comprising of upto 250 words, should be in structured format with following sub-headings.

i. Objective, ii. Design, iii-Place and duration of study, iv. Patients/materials & Methods, v. Results, vi. Conclusion.

Review article, case reports and others require a short, unstructured abstract.

INTRODUCTION

This should include the purpose of the study. The rationale for the study should be summarized. Only pertinent references should be cited; the subject should not be extensively reviewed. Data or conclusions from the work being reported should not be presented.

METHODS

Study design and sampling methods should be mentioned. The selection of the observational or experimental subjects (patients or experimental animals, including controls) should be described clearly. The methods and the apparatus used should be identified (manufacturer's name and address in parentheses), and procedures described in sufficient detail to allow other workers to reproduce the results. References to established methods should be given, including statistical methods; references and brief description for methods that have been published but are not well known should be provided, new or substantially modified methods should be described, giving reason for using them, and evaluating their limitations all drugs and chemicals used should be identified precisely, including generic name(s), dose(s) and route(s) of administration.

RESULTS

Results should be presented in a logical sequence in the text, tables and illustrations. All the data in the tables or illustrations should not be repeated in the text; only important observations should be emphasized or summarized.

DISCUSSION

The author's comment on the results supported with contemporary references. Critical analysis of similar work done by other workers, its comparison with own work with possible reasons for any differences found should be included.

CONCLUSION

Conclusion should be provided under separate heading and highlight new aspects emerging from the study. It should be in accordance with the objectives.

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