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MAILING ADDRESS:
Chief Editor
Islamic International Medical College
274-Peshawar Road, Rawalpindi
Telephone: 111 510 510 Ext. 207
E-mail: chief.editor@riphah.edu.pk

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Correspondence Address:
Prof. Dr. Muhammad Nadim Akbar Khan
Managing Editor
Journal of Islamic International Medical College (JIIMC)
Westridge-III, Pakistan Railways Hospital
Tel: +92-51-4259795-98 Ext: 220
E mail: prh.jiimc@riphah.edu.pk

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EDITORIAL

Peripheral Arterial Disease-More Than Just Numbers: Lack of Disease Awareness and Hurdles in Management

Jahangir Sarwar Khan

Global population is going through a serious epidemiological shift inside which the load of Peripheral Arterial disease (PAD) is converting towards third world countries. Therefore, we ought to shift our recognition toward prevention and control of this disease. Over the last decade, treatment plan has been advanced, such as early diagnosis, greater common utilization of diagnostic investigations and advanced revascularization techniques. In this writing I emphasize the need to expand the vision and know-how of peripheral arterial disease, enhance its diagnostic considerations and to analyze and control this disease.

Lower limbs PAD is atherosclerotic disorder involving the arterial system of lower limbs. It is a prevailing condition considered to take hold of around 250 million people internationally and is related to expanded danger of numerous detrimental scientific effects such as amputations and MI. Amputation is the accidental loss or removal of part of the body . It is a transformative incident which influence one's capacity to be mobile, to do his routine chores , engage with people around and keep their self-determination.

The word burden of disease is a -ive term as it focuses more on the adversities and losses related with disease, disability, and death.

Critical limb ischemia[4] is a drastic variety of arterial disease which is frequently described as peripheral arterial disease with associated limb pain at rest, non-healing ulcers, or gangrene.[2,5]A study showed the 1-12 months incidence proportion for mortality as well as amputation is around twenty percent in patients with Critical Limb Ischemia.[6] In three different studies done at three different setups, there is an established relationship between lower socioeconomic group and high amputation rate in patients with CLI.

Despite being widespread and having unfortunate clinical outcomes in phrases of impaired workout and decreased physical function, PAD is still underrepresented and not thoroughly studied as in comparison with other related diseases. This little to no know-how is the reason behind disastrous approach to patients with PAD round the globe. In a latest systematic review by Bridgwood et al about PAD expertise and understanding, 61% of GPs were doing patients screening for arterial diseases and only 6% were treating patients according to the set guidelines.[1] During the same setup, the data of knowledge testing of undergraduate students and post graduate trainees validated negative to little overall knowledge regarding disease presentation and management. Disease awareness rate is 21%-61% among general population, according to this study. This lack of know-how and understanding is one of the motives towards delayed or underused treatment.

There seems to be many possible grounds for this underestimation of peripheral arterial disease. Firstly, it's a diagnostic dilemma thanks to broad spectrum of disease presentation.[13] Only 10%-30% presented with classical symptoms of intermittent claudication which is pain in calves that improved on rest of at least ten minutes, 20-50% are asymptomatic, whereas 40-50% having atypical presentation.[3] Secondly, the first-line investigation is the ankle-brachial index (ABI) and ABI ≤0.90 is diagnostic.[2,7,8] Research proved that ladies tend to own lower ABIs than males, mainly attributed towards their shorter height.[9,10] The ABI are often falsely high because of stiffened ankle arteries in DM or chronic kidney disease.[11,12] So here it is best to record the toe-brachial index i.e., measurements of toe and brachial systolic blood pressures.[2,7,12] As luck would have it, in our setups due to increased patient load, non-availability of resources and lack of expertise this is often not routinely done.

Also, many of us assume that morbidity and mortality related to leg diseases is lowered as

Correspondence:
Prof. Jahangir Sarwar Khan
Dean Postgraduate Education
Rawalpindi Medical University, Rawalpindi
E-mail: jskdr@hotmail.com

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compared to other atherosclerotic diseases.

In conclusion, PAD is prevalent in our society and needs to be addressed properly considering in mind the cost and maintenance of prosthesis after amputation is not a piece of cake for our people. In my opinion we can take steps towards attention of our healthcare workers within the shape of seminars and workshops. Also, we can distribute pamphlets in out- patient department for patient awareness. There should be screening of all high-risk patients with or without symptoms of PAD. An early and prompt referral of those patients to specialized clinics are going to be of great help. We should always stress more on prevention of disease instead of prevention of amputation.

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ORIGINAL ARTICLE

Evaluation of Foam Sclerotherapy as Minimally Invasive and First Line Treatment of Varicose Veins in Military Setup

Rafia Zafar[1], Khalid Siddiqui[2], Arslan Sharif Malik[3], Muhammad Imran[4], Hatim Khalid[5], Khalid Ibrahim[6]

ABSTRACT

Objective: This case series was carried out to determine the efficacy of ultrasound guided foam sclerotherapy as first line and minimally invasive treatment of varicose veins.

Study Design: Prospective case series.

Place and Duration of Study: Department of Vascular Surgery, Combined Military Hospital, Malir from 1st January 2020 to 31st March 2021.

Materials and Methods: Total one hundred patients with varicosities mainly of great saphenous vein (GSV) were included after detailed history and examination. Ultrasound Doppler was done to rule out deep venous thrombosis (DVT) and any secondary reason for varicose vein. Patients were followed up after 3 days, 10 days, 1month and 3 months with a Doppler ultrasound.

Results: One hundred patients and 130 legs were studied. Age ranges from 30-60 years with mean of 39.75 years, 70 (70%) of the patients were males and 30 (30%) were females. 98 legs (75.38%) had varicosities of GSV, 10 legs (7.692%) with mixed great and small saphenous vein and 22 legs (16.92%) with isolated small saphenous vein. 25 patients (25%) developed pain at cannula site, 3 patients (3%) had bradycardia following procedure and 4 (4%) developed ulceration on skin at the site of cannulation. All patients were followed up for 3 months with a Doppler ultrasound and no recurrence was found post procedure. Average return period to normal function and work was 15 days. In terms of leg pain and physical functioning, patients who underwent intervention achieved health better in short term.

Conclusion: Ultrasound guided foam sclerotherapy is safe, least complicated, and efficacious management for varicose veins with minimal chance of technical failure. This being an outpatient procedure saves time and space for arterial casualties of a vascular surgeon.

Key Words: *Deep Venous Thrombosis (DVT), Great Saphenous Vein (GSV), Small Saphenous Vein (SSV), Sodium Tetradecyl (STD), Ultrasound Guided Foam Sclerotherapy (UGFS).*

Introduction

Varicose veins are tortuous, twisted, elongated superficial veins.[1,2] The outnumbered group of varicose veins is primary; secondary varicose veins are mainly caused by conditions such as deep vein thrombosis, pregnancy and pelvic malignancies. Truncal varices are varicosities in the line of great or small saphenous vein or their major branches; however reticular veins are dilated tortuous subcutaneous veins not belonging to the main branches of the great or small saphenous vein. Telangiectasia are intradermal venules of <1 mm.[3] Underlying cause include weak or damaged valves of vein and are diagnosed by clinical examination in addition to ultrasound venous Doppler for level of incompetent valve. Risk factors include obesity, lack of exercise and leg trauma. They are significantly associated with increasing age, weight, female sex; prolonged standing, family history, number of pregnancies and child birth.[4]

In history of surgeries performed for varicose veins preliminary method was ligation of the sapheno-femoral junction, stripping up to knee level combined with phlebotomies and end up with the rapid rise of minimally invasive procedures, such as foam sclerotherapy, radiofrequency ablation, and endovenous laser therapy.[5] Till now, gold standard treatment of varicose vein still is surgical ligation with stripping of the insufficient vein, however it may seldom be associated with substantial post-

[1,2,3,4]*Department of Surgery*
Combined Military Hospital Malir, Karachi
[5]*Department of Surgery*
Combined Military Hospital, Rawalpindi
[6]*Department of Surgery*
Combined Military Hospital, Jhelum

Correspondence:
Dr. Rafia Zafar
Trainee Surgery
Department of Surgery
Combined Military Hospital Malir, Karachi
E-mail: rafia.zafarr@gmail.com

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operative complications as bleeding, groin infections, thrombophlebitis and saphenous nerve damage.[6] Sclerotherapy was introduced first time in 1920 and remained modality of treatment for next two decades, later due to high recanalization rates it was abandoned. Tessari rejuvenated this method in late 90's. Sodium tetradecyl sulphate (STD), polidocanol, 5% alcohol and hypertonic saline are generally used as sclerosant.[7] To the best of author's knowledge the role of foam sclerotherapy in military setup was not extensively studied previously and thus no relevant literature was available. Hence there was a need to address this research gap which provided the rationale for this study.

Materials and Methods

After hospital ethics committee approval, a prospective study design of case series with consecutive sampling for data collection was made. It was carried out over sample size of one hundred patients; data was collected primarily by vascular surgery team from 1st January 2020 to 31st March 2021 at Combined Military Hospital, Karachi.

Inclusion parameters were age between 30-60 years and symptomatic primary varicose veins.

Patients with secondary varicose vein, active or previous history of deep venous thrombosis, peripheral vascular disease, infection, active ulcer, thrombophlebitis, pulmonary embolism, pregnancy, patent foramen ovale and allergy to sclerosant were excluded from study.

A comprehensive history was recorded about job type, duration, any history of DVT, aggravating or relieving factors affecting symptoms and any prior treatment for varicose vein. Venous Doppler ultrasound was advised to exclude DVT and establish the level of incompetence prior to booking for procedure. All cases were evaluated according to Clinical, Etiological, Anatomical and Pathophysiological (CEAP) Classification with C3 and below selected for foam sclerotherapy. All cases were carried out in minor operation theater of vascular surgery OPD. Sodium tetradecyl sulphate (STD) was used as sclerosant in every patient with maximum dose of 4ml. Foam was mixed in 1:4 (STD: air) ratio using modified Tessari method by adding 1ml of liquid sclerosant and 4ml air in 5cc syringe.(8) Ultrasound guided marking of main trunk and varices along with cannulation were done using 20G Butterfly needles in slight reverse trendelenberg position with subsequent injection of foam in the cannulated sites. Multilayered compression bandage was applied while keeping leg elevated at 45 degree. Each of the patients was given intravenous 5000 I.U. of Heparin at the end of the procedure followed by walking for few minutes. Compression bandage was replaced by leg compression stockings on third day and continued for 2 weeks. Re-checkup was carried out after 10 days to evaluate complications like DVT, thrombophlebitis and pain. Patients were advised to resume duty with light work for 5-7 days post procedure. Follow-up was done at 1 month and 3 months for assessment of failure of treatment and extent of re-cannulation if present. Documentation was done following results of ultrasound Doppler for successful occlusion of varicose veins, any need of further session of UGFS, DVT or thrombophlebitis requiring medical intervention.

This is a non-parametric study in which SPSS was used for data analysis and P value was not required since it's a case series.

Results

Patients examined in this study were exclusively military personals and their families. 100 consecutive patient and 130 legs were randomized. 70 (70%) were males and 30 (30%) were females with age ranging from 30-60 years and mean age of 39.75 years. The percentage distribution of patients with respect to clinical stage of the disease at the time of presentation is shown in (Figure 1). Varicose veins in region of GSV (75.38%), SSV (16.92%) and mixed type (7.692%) were noted. Individuals with bilateral and recurrent disease were also included to be treated simultaneously in single session (Table I). The number of legs with satisfactory occlusion of varicose veins recorded after one month of first session of foam sclerotherapy was 107 (82.30%), whereas 23 legs (17.69%) required second session of foam sclerotherapy for complete occlusion (Figure 2). Reason for failure or partial occlusion was either noncompliance to preventive measures prescribed or prolonged standing. All patients were followed up for 3 months with a Doppler ultrasound and no recurrence was found post procedure. 25 patients (25%) complained of pain over the insertion site of cannula on first 10-day follow-up, which was

completely settled by consecutive follow-up visits. 3 patients (3%) had bradycardia during the procedure and 4 patients (4%) developed wound at cannulation site after procedure which was managed conservatively (Figure 3).

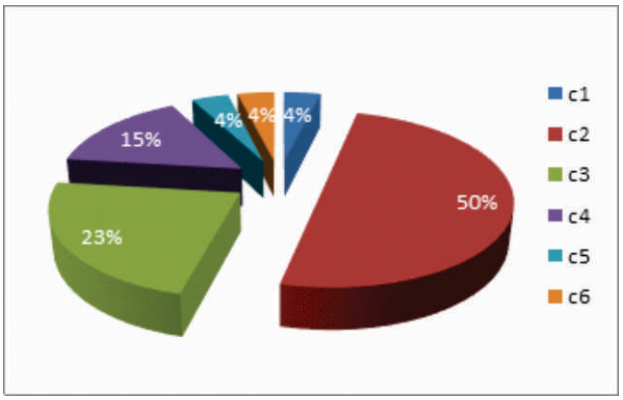

Fig. 1: Clinical Stages at the time of Presentation

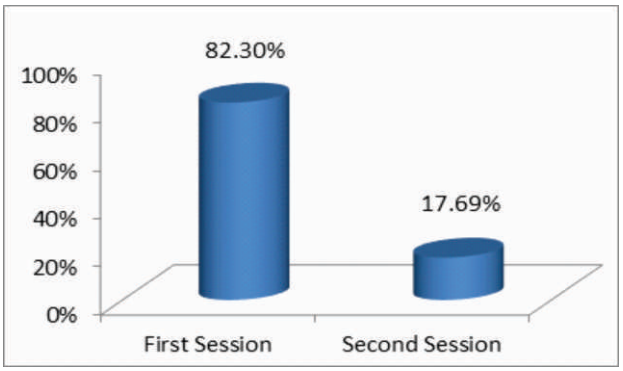

Fig. 2: Number of Sessions of UGFS

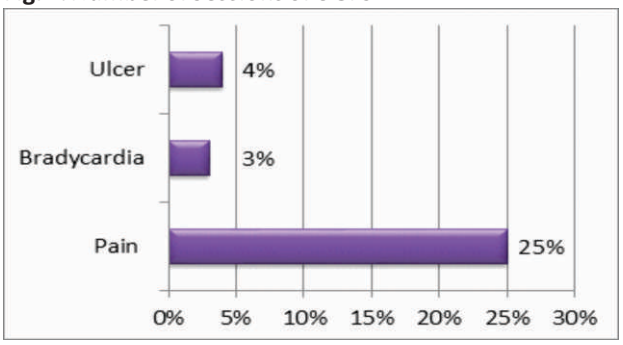

Fig. 3: Incidence of Complications

Table I: Demographic Characteristics of Patients

Number of patients	100
Number of legs	130
Mean age	39.75 years
Male	70 (70%)
Female	30 (30%)
Isolated varicose veins of GSV	88 (67.69%)
Bilateral varicose veins	19 (14.61%)
Isolated SSV varicose	13 (10%)
Mixed varicose veins	10 (7.69%)

Discussion

Varicose veins are one of the most prevalent disorder of the vascular system among adults with 20–25% occurrence of visible varicosities in women and 10–15% in men.[9] Delay in treatment can subsequently result into a number of complications, including venous ulceration and thrombosis.[10] The prone areas for development of varicose veins in saphenous tributaries suggest that there are susceptible sites where changes in wall, hemodynamic pressure and orthostatic posture can initiate reflux. Reflux of GSV calf tributaries are more common where majority of the limbs belong to classes C1 and C2 of the CEAP classification.[11] In our military setup, soldiers face long orthostatic postures which results in early development and increased prevalence of varicose as compared to others. Combined Military hospital is a tertiary care referral center for vascular surgery which provides management for peripheral arterial diseases, vascular access surgery for hemodialysis, civilian and military vascular trauma, lymphatic, and venous diseases, in addition to it, heavy turnover of trauma cases requiring surgical and vascular attention and low availability of operation theaters; UGFS serves as safest, less time consuming, outpatient department based and definitive treatment option.

Many studies were conducted to compare the long term outcome of UGFS with great saphenous vein stripping, in one study N. Shadid[12] concluded from randomized control trial of 230 patients treated by UGFS and 200 by GSV stripping , 2-year probability of recurrence was similar in the UGFS and surgery groups: 11.3% (24 of 213) and 9% (16 of 177). They concluded at 2-year follow-up, UGFS was not inferior to surgery and is a potential cost-effective approach which supports our aim of using foam sclerotherapy as first line method. The use of sodium tetradecyl sulphate in this study was primarily because of its superiority over other sclerosant in terms of better elimination of venous reflux, improved cosmetic appearance, minimum post procedure pain and fewer failure rates. Efficacy rates of foam sclerotherapy over alternatives measures well with the values published in most studies. Studies that compared foam to conventional sclerotherapy found negligible difference in failure rate or recurrence in varicosities. Similarly recanalization rate was also not

different between the two treatments.[13,14]

A recent analysis by Darval et al[15] concluded advantages of minimally invasive UGFS over conventional surgery with respect to decrease in morbidity and faster recovery times. Assessment was done by analyzing the result of questionnaire sent to patients of both groups after 4 weeks of procedure. Individuals who had surgery were more likely to have substantial bruising and pain. Those who underwent UGFS, 43.2% returned to work within a day compared with none who had surgery. Patients who had UGFS were more likely to resume driving within 4 days with less association of pain, analgesia requirements and time off-work. Number of sessions required for 82.30% of the patients for optimum elimination of varicosities in present study was single, which did not cross the mean volume of 4ml of STD required for foam formation in 1:4 ratio. The protocol allowed an extra session if the GSV was found to be patent during the first month which resulted in a smaller number of failure rates in the long run, that can be due to larger volume of foam used than the mean of 4ml per leg. At a consensus meeting in Europe it was recommended not to use volumes of foam above 10ml per session.[16]

Stücker et al[17] in his study appreciated the effectiveness of foam sclerotherapy over liquid. It is important to select the correct concentration and the correct foam volume and offers possibility of using lower sclerosant concentrations than with liquids. Jia et al[18] did a systematic review to assess safety and effectiveness of foam sclerotherapy over sixty-nine studies which concluded that rate of critical adverse events, including pulmonary embolism, deep vein thrombosis and visual disturbance were less than 2 per cent. The median rate of headache, thrombophlebitis was less than 5% and pain at the site of injection measured 25.6%. individuals treated with UGFS experienced minimum post-operative pain, it also influences recovery, less time off work and early return to normal work confirming previous observations.[19,20]

Conclusion

Ultrasound guided foam sclerotherapy serves as a minimally invasive and less time-consuming method for treatment of varicose vein. Due to high prevalence in our military setup this modality of treatment shares workspace of vascular surgeon with promising results and minimal technical failure rate.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Frequency of Dental Midline Deviation in School Children of Lahore, Pakistan: A Cross- Sectional Study

Faiza Rana[1], Faiza Malik[2], Esha Rana[3], Rabia Tabassum[4]

ABSTRACT

Objective: To determine the frequency of dental midline deviation in different age groups of school children of Lahore, Pakistan.

Study Design: Observational cross-sectional study.

Place and Duration of Study: The study was performed in 7 different schools of Lahore, from 11th March to 30th May 2019.

Materials and Methods: A total sample of 300 children (190 girls, 110 boys) was taken whose ages were between 8 to 16 years. Midline deviations were observed with scale in millimeters, by taking the philtrum as a reference landmark. The statistical analysis was implemented with SPSS version 20. Qualitative data like gender, midline deviation and type of dentition was presented in the form of frequency and percentage. Data was stratified for gender and dentition. Post-stratification chi -square test was applied with *p*-value ≤ 0.05 considered as significant.

Results: Frequency of midline deviation was found to be 69.7% of which mandibular midline deviation was more frequent (45.7%) followed by maxillary midline deviation (12.7%), with the severity of 2mm being most common (42.3%). Deviation of both midlines was observed in 11.3% of students. The difference of frequency of midline shift in gender (*p*=0.924) and dentition (*p*=0.109) was insignificant.

Conclusion: The study concluded that the most frequently observed dental deviation was mandibular midline deviation towards right side relative to facial midline. No significant differences were displayed regarding gender and dentition.

Key Words: *Cupid's Bow, Dental Asymmetry, Incisive Papilla, Philtrum, Smile Esthetics.*

Introduction

Frontal symmetry and balanced smile are the appraisal standards of facial appearance.[1,2] Any discrepancy in facial and dental harmony of corresponding parts can cause asymmetry.[3] Midline deviations are most obvious of all the dental and occlusal asymmetries, as dental midline is a focal point in smile esthetics. The effect of harmonized facial and dental midlines on clinical outcome of orthodontic treatment is undebatable.[4]

Orthodontists are considerably less tolerant of midline deviations and can even appreciate 1 mm deviation of dental midline.[5] The magnitude to which the maxillary and mandibular dental midlines deviate from the facial midline is often recorded, with an aim that these midlines should be coincident after orthodontic treatment. It is an essential aspect of functional occlusion and serves as a clinical template to achieve maximum intercuspation.[6,7,8]

An individual's facial midline (constructed from glabella, base of the nose, nasal apex, upper lip Cupid's Bow and central point of the chin) is used as a reference line to evaluate dental midline.[4,9,10] The incisive papilla between the maxillary central incisors is normally found below the center of the philtrum.[10] One of the studies reported that the patients tend to relate their maxillary midline to the upper lip.[8,11] The philtrum is generally considered to be a valid facial landmark for assessment of midline.[6,11] However, this may be misleading due to the presence of a variable degree of asymmetry in facial structures, therefore, the incisive papilla could be an alternate intraoral landmark as it follows the

[1,2]*Department of Orthodontics/ Operative Dentistry*[3]
Sharif Medical and Dental College, Lahore
[4]*Department of Orthodontics*
University Medical and Dental College, Faisalabad

Correspondence:
Dr. Faiza Rana
Demonstrator
Department of Orthodontics
Sharif Medical and Dental College, Lahore
E-mail: dr.faizarana03@gmail.com

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direction of the deviation.[9]

Emphasis on dento-alveolar esthetics has heightened among orthodontists and patients. Although an ideal occlusion is still an important goal of treatment, the ideal esthetic outcome is crucial for patient's and orthodontist's gratification.[7,8] The treatment for existing discrepancies in midline may involve tooth movement, dental extractions, orthopedic treatment, or even orthognathic surgery.[7]

In Pakistan there has not been much previous research done to determine the frequency of maxillary and mandibular dental midline asymmetry. So, this cross-sectional survey was conducted to determine the frequency of dental midline deviation in different age groups of school children of Lahore, Pakistan. This provided some valuable local data base to create awareness among school children regarding their orthodontic treatment need.

Materials and Methods

This was an observational cross-sectional survey, performed in 7 different schools of Lahore, from 11th March to 30th May 2019. The study was done on a sample of 300 school children belonging to grade 3-10, selected via non-probability consecutive sampling technique to determine the frequency of dental midline deviation. Sharif Medical Research Center approved the study, followed by ethical approval with the letter number SMDC/SMRC/194-21. Prior permission was taken from the school principals. The inclusion criteria were children of both genders, aged 8 years and above, irrespective of the type of dentition and malocclusion. Children with unerupted or impacted incisors, missing or extracted teeth, history of orthodontic treatment, restoration of anterior teeth, craniofacial anomalies like cleft lip and/or palate, were excluded. Data was collected by clinical intraoral observation and examination of children after taking written informed consent from their parents. All data was collected by the primary researcher. To avoid visual fatigue, number of students examined per day was kept to a maximum of 30, which corresponded to the number of students in one class. Maxillary and mandibular dental midline deviations were measured with a clear plastic scale to the nearest millimeter by taking the philtrum (cupid's bow) as a reference landmark (figure 1).

Fig. 1: Measuring Maxillary Dental Midline Deviation from Philtrum of Upper Lip

Data was non-parametric and statistical analysis was performed with IBM SPSS version 25. Qualitative data like gender, midline deviation and type of dentition were presented in the form of frequency and percentage. The magnitude and side of midline deviation was also noted. Data was stratified for gender and dentition. Post-stratification chi -square test was applied with p-value ≤ 0.05 considered as significant.

Results

Overall, the sample consisted of 300 students (190 females, 110 males) out of which, 157 (52.3%) were in the mixed dentition group and 143 (47.7%) were in the permanent dentition group. The mean age of the sample was 11.5 ± 2.5 years, ranging from 8-16 years. Frequency of midline deviation was found to be 69.7% (Table I) of which mandibular midline deviation was more frequent (45.7%) followed by maxillary midline deviation (12.7%). Deviation of both midlines was observed in 11.3% of students. Table II represents the severity of dental midline deviation. In most of the patients, dental midlines were shifted from the facial midline by 2mm (42.3%), that was more likely towards right side of the face. Table III shows the difference of midline deviation among gender (p = 0.924) and dentition (p = 0.109), which was statistically insignificant.

Table I: Frequency of Midline Deviation

Midline Deviation	Frequency	Percentage
Overall midline deviation	209	69.7%
Mandibular midline deviation	137	45.7%
Maxillary midline deviation	38	12.7%
Maxillo-mandibular midline deviation	34	11.3%

Table II: Severity of Midline Deviation

Midline Deviation	Severity of Midline Deviation N (%)			
	1mm	2mm	3mm	>3mm
Maxillary Midline deviation towards right	19 (6.3%)	18 (6.0%)	2 (0.7%)	0 (0%)
Maxillary Midline deviation towards left	12 (4.0%)	21 (7.0%)	0 (0%)	0 (0%)
Mandibular Midline deviation towards right	20 (6.7%)	47 (15.7%)	16 (5.3%)	6 (2.0%)
Mandibular Midline deviation towards left	35 (11.7%)	41 (13.7%)	4 (1.3%)	2 (0.7%)
Total	86 (28.7%)	127 (42.3%)	22 (7.3%)	8 (2.6%)

Table III: Stratification of Midline Deviation with respect to Gender and Dentition

		Midline Deviation				*p*-value
		No		Yes		
Gender	Male	33	11.0%	77	25.7%	0.924
	Female	58	19.3%	132	44.0%	
Dentition	Mixed	54	18.0%	103	34.3%	0.109
	Permanent	37	12.3%	106	35.3%	

p-value > 0.05 shows insignificant statistical difference.

Discussion

This cross-sectional study was conducted to provide valuable local database of maxillary and mandibular dental midline deviation and to give awareness of orthodontic treatment among school children. We used philtrum as a reference for the evaluation of dental midline deviation as this is a valid facial landmark and patients generally relate their midline to the upper lip.[11]

Dental midline is a vital element in smile design. Midline should be perpendicular to incisal plane and incisive papilla.[12,13] The parallelism between the maxillary dental midline and facial midline is more fundamental than the coordination between these midlines. A minor midline deviation is acceptable if connector between the maxillary central incisors is vertical.[4]

Dentofacial attractiveness is reduced by discrepancies between dental and facial midlines. The maximum amount of deviation acceptable to orthodontists before it has negative impact on smile esthetics, has been documented to be 1mm to 2mm.[5,7,8,14,15] Ker et al and Springer et al observed that almost 3 mm of deviation is acceptable by layperson.[16,17] Beyer and Lindauer reported that 2mm midline shift was detectable by almost everyone.[18] According to Kokich and Shapiro, a 4mm maxillary midline deviation was not noticed by laypersons, whereas a 2mm deviation in incisor angulation was regarded as remarkably unattractive.[4,5] Therefore, dental and facial esthetics are of fundamental concern in orthodontics.[7,16]

In the present study, lack of midline coincidence was found to be 69.7%. Sheats et al conducted a study at Virginia Commonwealth University and found 46% lack of midline coincidence in orthodontic population.[7,19] They also concluded that the most frequently seen trait of asymmetry was mandibular midline deviation from the facial midline and maxillomandibular midline deviation. Thilander et al registered midline deviation in 13.2% subjects.[20] They found that it increased with age and was more frequent in lower arch. Borzabadi et al observed non-coinciding dental midlines in 23.7% of urban Iranian sample.[21]

This study also concluded that mandibular midline deviation was the most seen asymmetry (45.7%). Jain et al. noticed midline deviation in 77% of orthodontic patients.[22] Of overall dental midline deviation, 21% patients had maxillary midline deviation and 43% had mandibular midline deviation which is almost twice of maxillary midline deviation.[22] Bhateja and Fida observed that most frequent asymmetry seen was non-coinciding dental midlines in 78.2% of patients.[23] Mandibular midline deviation was observed in 67.5% of patients whereas, maxillary midline deviation was found in 14.3% of patients.[23] However, the side of deviation was not recorded.

The severity of midline deviation in majority of patients was found to be 2 mm in this study, which is similar to the findings of Bhateja et al who reported the severity of about ¼ of lower incisor width.[23] Moreover, this study found that midline deviation was mostly towards right side of the face which is in contrast to Khan et al and Eskelsen et al who revealed that dental midline is mostly shifted towards left side of the face.[24,25]

The current study, having a cross-sectional design, had some limitations. The method of evaluating midline deviation was relatively inadequate at times, mostly in the evaluation of centric occlusion and centric relation (Co-Cr) shifts. The Co-Cr shift was not investigated in this study, therefore, a possibility of mandibular midline deviation due to underlying

functional shifts was there. Exact assessment of Co-Cr is essential to evaluate the probable origin of such deviations.

Conclusion

This study concluded that mandibular midline deviation was the most frequently observed midline deviation followed by maxillary midline deviation. The common severity of deviation was 2mm most likely towards right side of the face. No statistically significant differences were displayed regarding gender and dentition.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Effects of Mulligan Traction Straight Leg Raise Versus Passive Straight Leg Raise in Lumbar Radiculopathy Patients

Asmar Fatima[1], Zoya Mehmood[2], Bintal Wajeeh Satti[3], Shakeel Ahmed[4]

ABSTRACT

Objective: To compare the effects of Mulligan traction straight leg raise and passive straight leg raise in patients with lumbar radiculopathy.

Study Design: Randomized Control Trial.

Place and Duration of Study: The study was conducted from 2nd February 2017 to 30th June2017 at National Institute of Rehabilitation Medicine, Islamabad

Materials and Methods: A total of 38 patients of either gender with age range of 40 to 60 years with low back pain and lumbar radiculopathy were recruited in the study and they were randomly allocated in to two groups through lottery method, Traction straight leg raise, and Passive straight leg raise group. Patients with spinal surgeries and fractures were excluded from the study. Conventional physiotherapy treatments including transcutaneous electrical nerve stimulation, hot pack, stretching and strengthening exercises were given to all patients. Traction Straight leg raise Technique was performed on patients of experimental group and Passive Straight leg raise was performed on control group. Patients were assessed on baseline and after 4 weeks through Numeric pain rating scale, Oswestry disability index, and goniometer. Treatment duration was of 4 weeks with 2 sessions per week.

Results: Mean age of all patients was 53.60 ± 3.82. Experimental group showed much reduction in pain with pre median =6(1) and post median=2(1) as compared to control group pain with pre median= 6(1) and post median=4(1) on pain scale. Traction Straight leg raise also showed significant improvement in Range of motion with pre median=50(10) and post median=70(10) of experimental group as compared to SLR of control group with pre median= 50(15) and post median= 60(10). Statistically both groups showed improvement, but experimental group improvement was more significant.

Conclusion: Traction straight leg raise is more effective than Passive straight leg raises in decreasing pain and improving range of motion in patients with lumbar radiculopathy

Key Words: *Goniometer, Oswestry Disability Index, Passive Straight Leg Raise, Traction Straight Leg Raise.*

Introduction

Low Back Pain is a common musculoskeletal discomfort, localized below the costal margin and above the inferior gluteal folds, with or without leg pain, affecting majority of adults and is the most common cause of disability in developed countries.[1]

[1]*Department of Rehabilitation Sciences*
Allied College of Health Sciences, Multan
[2]*Department of Rehabilitation Sciences*
Shifa Tameer-e-Millat University, Islamabad
[3]*Physiotherapist, Central Health Clinic, (Derby UK)*
[4]*Department of Rehabilitation Sciences*
Jouf University Sakkaka, Saudi Arabia

Correspondence:
Dr. Asmar Fatima
HOD Rehabilitation Sciences
Allied College of Health Sciences, Multan
E-mail: asmar.fatima@gmail.com

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LBP results in increasing levels of disability, activity restriction and lack of participation, such as an inability to work.[3] In general population, there is an estimation that yearly incidence of first ever episode of LBP is 6.3% to 15.4%.Its prevalence increases in 60 to 65 years of age.[4] In general population prevalence of Chronic LBP ranges from 15 to 45%.[5] In Lumbar radiculopathy, pain occurs in the lower back and radiates around hip region and down the posterior aspect of the thigh into the legs. Symptoms are shooting pain, numbness and tingling in buttock and leg.[6] Damage is caused by the nerve roots compression that exit the spine from level L1 to S1.[7] Prevalence of lumbar radiculopathy been reported up to 5%.[8] Prevalence of lumbar radiculopathy is reported to be 11% out of 12.9% in working population.[9] Lumbosacral radiculopathy is up to 9.9% to 25%.[10] Repetitive load on the spine is the common

risk factor for radiculopathy. It is most found in patients who are involved in heavy labour.[11] There are numerous treatment options in literature for managing it. Physical therapy treatment includes muscle stretching, Traction, McKenzie exercise, TENS, ultrasound, Interferential therapy, hot pack".[12] Passive SLR test is frequently used by clinicians to diagnose lumbar radiculopathy and check hamstring tightness.[13] Techniques developed by Brian Mulligan are effective in treating radiculopathy i-e Mobilization with Movement (MWM) of extremities and Spinal Mobilization with Limb Movement (SMWLM's). Edmonton and Singer emphasized for the use of sustained natural Apophyseal glides that was first presented by Mulligan to restore pain-free joint mobility. Sustained natural Apophyseal glides have been reported for their benefits in acute and sub-acute thoracic spine conditions.[14] TSLR is a MWM technique of Mulligan and is used in treating lumbar radiculopathy and hamstring tightness. It is reported in literature that MWMs for managing LBP are used by many therapists as a part of their treatment approach. Majority of therapists using these had several years of experience in the treating of LBP with MWMs. Many therapists reported improvement in active spinal ROM and pain relief immediately after the use of MWMs[8-9]

The purpose of the study was to compare the effects of Mulligan traction straight leg raise and passive straight leg raise in patients with lumbar radiculopathy. Many patients with recurring low back pain have tight hamstrings, Traction SLR increase range of movement in few treatments. This study investigated whether Mulligan's TSLR is better treatment for the patients suffering with Low back pain with radicular symptoms.

Materials and Methods

Study design was randomized controlled trial and data was collected from Physical therapy OPD of National Institute of Rehabilitation Medicine Islamabad from 2nd January2017 to 30th June 2017.Patients of both gender with 40 -60 years of age having low back pain and lumbar radiculopathy were included in the study. The study was approved from ethical review board of Riphah International University with Ref No. RIPHAH/RCRS/REC/00201. Patients with inflammatory conditions, spinal surgeries and fractures were excluded. A sample size of 38 was calculated through open epitool.[15] Patients were randomly allocated in groups.18 patients were in experimental group (Mulligan Traction straight leg raise) and 20 patients were in control group (Passive straight leg raise). 3 patients from experimental and 5 patients from control group were dropout and 30 patients completed the follow-up. 15 were from experimental group and 15 were in control group. Passive straight leg raise (SLR) group patients were treated with Hot pack (10 min), high-rate TENS for 15 min at 70Hz frequency[16], stretching exercises (Hamstring stretch, Calf stretching), Bridging exercise for back 3times per day with 10 repetitions and Passive straight leg raise (3 sets of 10 repetitions). Mulligan Traction straight leg raise (TSLR) group patients were treated with TSLR technique (3 repetitions per session) and same conventional Physical therapy treatment as control group were followed for this group. Patients were educated regarding correct posture in standing, sitting, and weightlifting. Home plan was given to patients that included stretching and strengthening exercises for back and leg. Patients of both groups were asked to visit hospital twice a week. Traction SLR and Passive SLR techniques were performed on the patients of respective groups, and they were suggested to repeat the prescribed exercise home plan twice a day with 10 repetitions for 4 weeks. Patients were assessed through numeric pain rating scale (NPRS) for pain intensity, Oswestry disability index (ODI) for functional disability and Goniometer for Range of motion of hip joint. Statistical analysis was done through SPSS version 21. Parametric tests were applied for ODI because p value was > 0.05 and non-parametric tests were applied for NPRS, and straight leg raise because p value was < 0.05.

Results

Among 30 patients, 8 were male and 22 were female. Mean age of all patients was 53.60 ± 3.82. Majority of the patients affected with lumbar radiculopathy were housewives (83.3%).33.3% patients were having pain for more than 1 year,10% were having pain from less than 1 year. Overall, 53.3 % participants presented with back pain radiating to right leg and 46.7 % came with pain radiation to left leg. Frequency of nature and type of pain and other demographic variables are shown in Table I.

Table I: Demographic Data of Patients

Variables	Both groups	Group (Experimental)	Group (Control)
Age	53.60 ± 3.82	53.60 ± 3.62	53.60± 4.13
Pain Radiation Right leg Left leg	 53.3 % 46.7 %	 46.7 % 53.3 %	 60 % 40 %
Onset of pain Sudden Gradual	 13.3% 86.7%	 6.7% 93.3%	 20% 80%
Type of pain Sharp Dull Constant Intermittent	 3.3% 30% 46.7% 16.7%	 6.7% 33.3% 40% 13.3%	 0% 26.7% 53.3% 20%
Time Duration < 3 months <6 months < 1 year	 26.7% 30% 10%	 26.7% 20% 13.3%	 26.7% 40% 6.7%

For inferential analysis, test variables including NPRS, ODI and SLR were assessed by Shapiro Wilk test to identify the normality of data at baseline. Lumbar Oswestry Disability Index data was normally distributed with p-value> 0.05 therefore parametric tests (Independent sample T-test and Paired sample T-test) were applied. Whereas non-parametric tests i.e. Mann-Whitney and Wilcoxon signed rank tests for SLR and NPRS were applied as data was skewed for these variables with p-value < 0.05.

NPRS and SLR post treatment showed improvement in terms of pain and range of motion in both groups with p value < 0.05 whereas more significant improvement in pain was observed in experimental group with pre-treatment mean 5.80 ± 0.86 and post treatment mean 1.80 ± 0.77 and range of motion was also more significantly increased in experimental group with pretreatment mean 49.66 ± 4.41 and post treatment mean 71.00 ± 5.73 as shown in tale #II

Table II: Mann Whitney U Test between Control and Experimental Group Comparison

Test Variables	Group Allotted to Participants	Pre-Mean ± S. D	Post-Mean± S. D	Mean Rank	Z-value	P-Value
Numeric Pain Rating Scale	Control	6.20 ± 0.77	3.73 ± 0.45	22.60	-4.59	0.001
	Experimental	5.80 ± 0.86	1.80 ± 0.77	8.04		
Straight leg Raise	Control	50.66 ± 7.28	58.33 ± 7.23	9.27	-3.95	0.001
	Experimental	49.66 ± 4.41	71.00 ± 5.73	21.73		

Oswestry disability index post treatment showed improvement in control and experimental group with p value <0.05 (0.001). More significant improvement in Traction SLR group was observed, as shown in Figure 1.

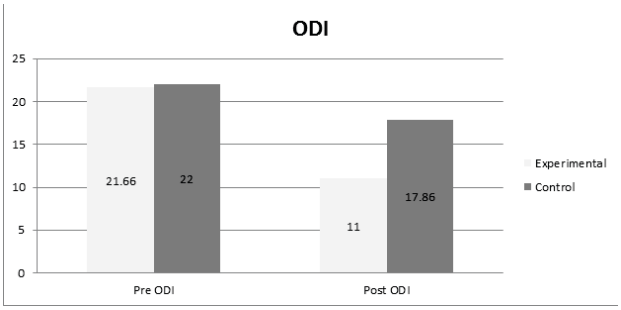

Fig. 1: Differences in ODI Between Control and Experimental Group

Discussion

The Purpose of this study was to compare the effects of Mulligan TSLR and passive SLR on patients with lumbar radiculopathy. The results of our study show that female experience low back pain with radiculopathy more than male. It is also observed in the study conducted by Aimin Wu et al.[17] Traction straight leg raise (TSLR) is effective in reducing low back pain caused by radiculopathy and improves SLR range. The reduction in pain on NPRS is more likely to the fact that TSLR technique is more directed to specific functional movements of lumbar spine. It targets the joint restrictions. Improved blood circulation also reduce pain.[18] The results of current study are similar to the results of study conducted by Pooja Kapadia et al on patients with hamstring tightness in which TSLR technique improved SLR range in patients with hamstring tightness and lumbar radiculopathy.[19] In this study it is also noted that TSLR technique improves stretch tolerance of hamstring muscles as well. This technique is more effective in reducing low back pain and increasing extensibility of neural structure, low back extensors and posterior thigh musculature as compared to passive SLR. This study correlates with the results of an RCT, conducted by Yıldırım, Meric Senduran, et al to compare the effectiveness of Static stretching and Mulligan TSLR on hip flexion ROM. The group in which TSLR was given showed significant improvement in hip flexion with p-value of 0.016 and 0.02 respectively after 4 weeks.[20]Riaz MU et al conducted another clinical trial in patients with

lumbar radiculopathy and results of the study showed improvement in ODI. This proves that Mulligan's technique is more effective in improving function.[21] The current study also shows that Mulligan's TSLR is effective in improving activities of daily living and increasing back muscle and hamstring extensibility in patients with lumbar radiculopathy. Mazumdar, J. et al conducted an RCT to compare the effectiveness of Mulligan TSLR and Muscle Energy Technique on Hamstring Tightness in male patients. Results showed that both techniques were effective reducing hamstring tightness.[22] The current study also have similar results. A systemic review conducted by Pourahmadi MR et al stated that Mulligan's straight leg and Bent leg raise techniques are effective in reducing pain and increasing hip flexion ROM in patients with unilateral lumbar radiculopathy.[23] This study also has similar results in improving SLR range with a p-value of 0.001.

Limitations

This study has limitation of small sample size. Limited sessions have been provided to patients and long term follow up could not be carried out.

Recommendation

Future studies should be conducted on larger sample size to determine the long-term effect of TSLR on strength and flexibility of thigh musculature. EMG studies can also be incorporated to assess the muscular activities during the application of different Mulligan's techniques.

Conclusion

This study concludes that Mulligan Traction Straight Leg Raise combined with conventional physiotherapy treatment show more significant improvement in Range of Motion, pain reduction and improving function when compared with passive Straight leg raise.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Prevalence and Severity of Dental Erosion among Preschool Children in Peshawar

Gulandama Alam Khan[1], Laila Mustafa[2], Madeeha Bangash[3], Ammara Sami[4], Fatimah Shiraz[5], Zarsanga Haider[6]

ABSTRACT

Objective: To analyze the impact of dental erosion among preschool children in Peshawar.

Place and Duration of Study: Study was conducted in Peshawar, KPK Pakistan over a period of 8 months from 1st December 2019 – 3rd July 2020.

Study Design: This was a descriptive cross-sectional study.

Materials and Methods: This study was conducted among preschool children in private schools of Hayatabad Peshawar on 1021 children with age range of 3-5 years. Parents of the invited children were asked to complete a questionnaire and consent form at home, distributed forehand. Examination was done according to Basic Erosive Wear Examination (BEWE) criteria. Clinical examination of the children was performed in their classrooms using disposable dental mirror and a ball-ended WHO CPITIN probe on all the surfaces of the deciduous teeth. Status of the dental erosion of the entire sextant was represented by the tooth surface with the highest noted BEWE score in that sextant. The association of erosive tooth wear with children's socioeconomic status, dental and oral hygiene habits was calculated using multiple logistic regression.

Results: Total of 1021 preschool children assessed in this study revealed prevalence of dental erosion (BEWE Score>0) to be 12.2%. Among these 92(9.01%) children had initial tooth wear,27(2.6%) had distinct tooth loss, and 6(0.58%) showed severe tooth loss. Prevalence of erosive tooth wear was recorded to be 1.9%, 4.8% and 27.1% among 3, 4 and 5-year-old children respectively.

Conclusion: Prevalence of dental erosion among preschool children in Peshawar is low. However, increasing age, parental education as well as poor dietary and oral hygiene habits were the factors deemed to contribute towards increasing prevalence.

Key Words: *Erosive Tooth Wear, Oral Hygiene, Preschool Children, Parental Education.*

Introduction

Dental erosion and the subsequent tooth wear are the irreversible loss of tooth enamel by acids from a non-bacterial source and are not directly related to mechanical or traumatic factors or dental caries. They are both documented as a major progressive problem in preschool children.[1]

On the basis of literature review, acidic beverages and food increase the potential for dental erosion,[2] which can lead to consequences like hypersensitivity, bad aesthetics, pulp exposure and malocclusion.[3] The enamel of deciduous teeth is thinner when compared to permanent tooth surface and morphological difference between the two dentitions exists.[4] This clarifies the fast and rapidly progressing erosive process in primary teeth. Even short-term exposure to acids may lead to advanced lesion extending to dentine in deciduous teeth. Tooth wear may entail tooth sensitivity, compromised esthetics, altered occlusion and even pulpal exposure in severe cases.[4] Moreover, child may face a compromise in the entire dentition for his lifetime due to early damage to the teeth from dental erosion.[5] Tooth wear in deciduous dentition is considered as the prognosticator of the augmented risk of the tooth wear in permanent dentition.[6,7]

Early diagnosis of tooth wear and prevention is the need of time as treatment in such cases might be complex, expensive and challenging[8]. The evidence available on the prevalence of dental erosive wear in preschool children in Peshawar is not sufficient. Therefore, the study aims to concentrate on the prevalence of dental erosion among preschool

[1,3,4]*Department of Paediatric Dentistry/Physiology[5]/ Operative Dentistry[6]*
Rehman College of Dentistry, Peshawar
[2]*Department of Paediatric Dentistry*
Shifa College of Dentistry, Islamabad

Correspondence:
Dr. Madeeha Bangash
HOD Paediatric Dentistry
Rehman College of Dentistry, Peshawar
E-mail: madeeha.bangash@rmi.edu.pk

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children in Hayatabad Peshawar, Pakistan.

Materials and Methods

This was a descriptive cross-sectional study and included 1021 kindergartens. Children from private schools of Hayatabad, Peshawar were included in the study using stratified random sampling technique over an interval of 8 months (December 2019 – July 2020). Sample size was calculated using G-Power with effect size 0.42, α-error 0.05 and power of 0.95. Consent was obtained from the Ethical Review Board of Rehman College of Dentistry (EC Ref. No. RCD-20-03-009). The dental examination was performed according to Basic Erosive Wear Examination (BEWE) criteria. Out of 121 children, 534 were girls and 487 were boys. Age range was 3 to 5years. According to BEWE criteria tooth erosion is divided into 4 levels. Score 0 = No tooth surface loss, score 1 = Initial enamel loss, score 2 = Distinct defect spanning less than 50% of the tooth and score 3 = Hard tissue loss of more than 50%.[9]

Healthy kindergarten 3 to 5 years old children in the selected schools were included in the study population upon their parental consent. Children having special needs and those suffering from severe chronic diseases were excluded from the study.

A questionnaire and consent form were distributed to parents of the invited children forehand, prior to conducting the survey and were asked to complete it at home within a week. The questionnaire contained two fragments including demographic characteristics (sex, age parental education, place of birth and family income) and oral hygiene behaviors (Tooth brushing and snacking frequency and history of previous dental visit). A research subordinate requested the parents to complete the questionnaire in case of missing data in the returned questionnaires via a phone call.

All three dentists were trained in BEWE assessment. Instrument used in classroom were disposable dental mirror, Head lamp (illumination in 100 mm Working Distance: = 40000 lux, Adjustable Rang Fluctuation Distance: 12.5 mm, Direction of illumination: Vertical 45 degree adjustable) for vision, cotton to dry the tooth surface, face mask, gloves and WHO CPITN ball end probe. After examining all the surfaces of the primary teeth, status of dental erosion of the entire sextant was represented by the tooth surface with the highest noted BEWE score in that sextant. In addition, following the diagnostic criteria of the WHO, the decayed, missing and filled tooth index (dmft) was adopted.[10,11] Caries experience was measured to be "yes" if dmft score was greater than 0, and "no" if dmft score was = 0.

Statistical analysis was performed using SPSS version 20. Significance level was set at P≤0.005. Descriptive statistics were used to calculate counts, means and standard deviations. Fisher Exact test was used to calculate significance among both genders, Chi square test was preformed to test relationship between categorical variables while significance level of dental erosion in various age groups was calculated using independent t test.

Results

Among 1021 children examined, 6(0.58%) were scored 3, 27(2.6) were scored 2, 92(9.01%) were scored 1 and 896(87.7%) were scored 0 according to BEWE criteria. Out of 487 male children 0.41% and out of 534 females 0.74% had severe erosive loss as shown in Table I.

In sextant assessment, upper anterior teeth were the most damaged teeth and, lower right and left posterior teeth were least damaged teeth. Children of age 5 years were mostly prone to dental erosion according to our study.

The prevalence and severity of dental erosion are labelled in Table I in the context of gender and age, showing erosive tooth wear increased with increasing age among the study population. Male children were more effected with dental erosive wear (Fisher's Exact Test P=0.028).

Values for birthplace according to chi square= 1.146 and P= 0.766 were not significant, which showed that birthplace had no effect to cause or increase dental erosive wear (Table III).

Table II presents the severity and prevalence of dental erosion in all the sextants. The anterior maxillary primary teeth were ranked as teeth showing highest prevalence and more severe dental erosion as compared to other sextants, whereas the lower mandibular molars as the lowest in terms of prevalence of tooth erosive wear.

Sociodemographic characteristics linked to erosive tooth wear are described in Table III. Child's age, parental education level and frequency of daily snacking were the factors that showed associated

Table I: Prevalence and Severity of Erosive Tooth wear Among 3-5 years old Children in Peshawar

	N	BEWE SCORE				Total BEWE Score Mean (SD)	Prevalence BEWE>0
		0	1	2	3		
Gender							
Male	487	414(85%)	53(11%)	18(3.7%)	2(0.41%)	0.20(0.51)	73(14.9%)
Female	534	482(90.3%)	39(7.3%)	9((1.7%)	4(0.74%)	0.13(0.44)	52(9.7%)
Age							
3 years	151	148(98.01%)	3(1.9%)	0(0%)	0(0%)	0.029(0.14)	3(1.9%)
4 years	397	378(95.2%)	19(4.9%)	0(0%)	0(0%)	0.05(0.21)	19(4.8%)
5 years	473	370(78.2%)	70(14.8%)	27(5.7%)	6(1.3%)	0.30(0.63)	103(21.7%)
Total	1021	896(87.7%)	92(9.01%)	27(2.6%)	6(0.58%)	0.16(0.47)	125(12.2%)

Table II: Distribution of Severity of BEWE Scores in each Sextant

Sextant	BEWE Scores			
	0 (No erosion)	1 (Initial Loss)	2 (Hard tissue Loss <50%)	3 (Hard tissue loss> 50%)
Upper Anterior Teeth	937(92%)	70(6.8%)	11(1.07%)	3(0.29%)
Upper Right Posterior	1007(98.6%)	6(0.58%)	6(0.58%)	2(0.19%)
Upper left Posterior	1013(99.2%)	5(0.48%)	2(0.19%)	1(0.09%)
Lower Anterior Teeth	1007(98.6%)	10(0.97%)	4(0.39%)	0(0%)
Lower Right Posterior	1019(99.8%)	2(0.19%)	0(0%)	0(0%)
Lower left Posterior	1020(100%)	1(0.09%)	0(0%)	0(0%)

Table III: Sociodemographic Characteristics Linked to Tooth Erosive Wear

Variables	N	BEWE Score >0(%)	Comparison and Statistics
Children Examined	1021	125(12.2%)	
Gender			Fisher's Exact Test P=0.028
Male	487	73(14.9%)	
Female	534	52(9.7%)	
Age			Independent t test P=0.000 95% Cl= -0.632 to 0.329
3 years	151	3(1.9%)	
4 years	397	19(4.8%)	
5 years	473	103(21.7%)	
Birthplace			Chi square= 1.146 P value= 0.766
KPK	707	87(12.3%)	
Others	314	38(12.1%)	
Fathers Education			Chi square= 726.523 P value= 0.000
Primary	48	0(0%)	
Secondary	127	117(92.1%)	
Tertiary or above	826	8(0.96%)	
Mothers Education			Chi square= 220.697 P value= 0.000
Primary	130	2(1.53%)	
Secondary	364	119(32.6%)	
Tertiary or above	527	4(0.75%)	
Family Income			Chi square= 1.324 P value= 0.724
Low	0	0(0%)	
Middle	482	63(13.07%)	
High	539	62(11.5%)	

Snacking Frequency Two times or fewer More than two times	838 183	10(1.2%) 115(63%)	Chi square= 532.985 P value= 0.000
Tooth Brushing Frequency Once a day or less Twice or more	640 381	79(12.3%) 46(12.07%)	Chi square= 1.517 P value= 0.678
Dental Caries Experience Yes No	621 400	50(8.05%) 75(18.75%)	Chi square= 30.513 P value= 0.000

with the prevalence of dental erosion statistically (BEWE>0) (P<0.05). Male children who had BEWE score >0% were 14.9% and female children who had BEWE score >0% were 9.7%. This displayed that male children are more prone to dental erosive wear as compared to girls. BEWE Score >0% in 3, 4 and 5-year-old children were recorded as 1.9%, 4.8% 21.7% respectively indicating increase in erosive tooth wear with increase in age (shown in Figure-I).

Parental education levels (primary, secondary and tertiary), snacking frequency, tooth brushing

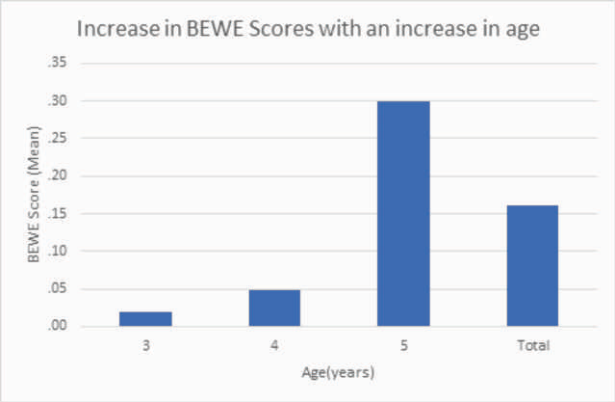

Fig. 1: Showing Association of Age with BEWE Scores

frequency, dental caries experience, place of birth and income, were some of the predominant features affecting the rate of dental erosive wear in children.

Discussion

Dental erosion is multifactorial. Our results illustrate that many factors are involved in tooth erosion like acidic food, acidic drinks, parental education, family income, gender, tooth brushing frequency and snaking frequency. Carbonated drinks and fruit juices have acidic PH. Therefore, been implicated in the growing incidence of erosion. Dental wear is a general term used to describe a non-carious surface loss of the dental hard tissues that can be caused by abrasion, de-mastication, attrition, abfraction, resorption and erosion or a combination of any of these.[12] There is currently a growing interest among dentists and researchers about dental erosion although the reports have appeared frequently in literature. Reformed lifestyle and eating patterns, with bigger consumption of acidic foods and beverages are considered probable risk factors for dental erosion.[13]

Moss SJ et al reported[14] that erosive loss of tooth enamel occurs only in susceptible individuals irrespective of patterns of food and beverage consumption, concluding the fact that consumption of an acidic drink or food alone is highly questionable to cause erosion.

The ability of a drink to resist buffering by saliva may play an important part in the process of erosion.[15] Cough syrups are also associated with a significant decline in PH of the saliva with an increased risk of development of caries in children.[7]

One of the studies among preschool children in Hong Kong[16] states that there is a decline in dental erosion with increasing parental education. In contrast to this, our study revealed that children of those parents who had a higher education status suffered from erosive tooth wear more easily. One possible reason to explain this could be the fact that parents with higher education have high socioeconomical status due to which their children can easily afford acidic(carbonated) drinks and food as compared to poor families.[16]

Dental erosive wear increases with increasing age.[17] As age increases exposure for dental erosion wear also increase.[18] This is in accordance with our results where children with age 5 years old have more dental erosive wear as compared to 3- and 4-years old children.

Upper Anterior teeth are more damaged sextant as compared to other due to dental erosive wear.[19] In our study 3% of upper anterior teeth had BEWE score=3, which demonstrates that upper anterior teeth are more prone to dental erosive wear and lower posterior teeth are least prone to the dental

erosion wear.

Various factors strengthening our results were a high sample size, a good inter examiner reliability (kappa value=0.76), and stratified random sampling technique for study population. However, certain limitations of this study must be investigated as the basic potential risk factors for erosive tooth wear including the types of acidic foods consumed and gastroesophageal reflux were not taken in account which might possibly lead to a bias during multivariate analysis. This demands for further research projects focusing on depth over the interplay between the medical conditions and the nutritional factors.

Nevertheless, the useful evidence provided by this study regarding the burden of erosive dental wear as well as its correlation with sociodemographic factors can provide a baseline data to serve as a convenient tool for designing community-based preventive programs.

Conclusion

There is a low prevalence of dental erosion among preschool children in Peshawar. However, increasing age, parental education as well as poor dietary and oral hygiene habits were the factors deemed to contribute towards increasing prevalence.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

A Comparative Cytomorphometric Analysis of Buccal Mucosal Smears of Cigarette Smokers and Naswar (Nicotiana Tabaccum) Users

Rabia Masood[1], Rozinah Jaffar[2], Nadia Zaib[3], Naila Umer[4], Sara Haq[5], Munnazza Javed[6], Ali Raza[7]

ABSTRACT

Objective: To compare the cytomorphometric changes in buccal mucosal cells of cigarette smokers, naswar users and non-users/smokers.

Study Design: Cross Sectional Comparative.

Place and Duration of Study: PGMI, Lahore & Islamic International Dental College, Islamabad: between July 2013-January 2014.

Materials and Methods*:* Cellular diameter CD, nuclear diameter ND and nuclear to cytoplasmic ratio N/C ratio were assessed in buccal smears taken with wooden spatula from clinically normal mucosa of smokers, naswar users and control group. The sample size was 99 male subjects of ages 15yrs-60yrs, divided into three groups (33 each group) i.e., M as control group, S as smoker group and N as naswar users' group. Slides were stained with three stains Hematoxylin and Eosin Stain, Giemsa Stain and Papanicolaou Stain. The data was collected through random sampling. The cytomorphometric variables were measured by using stage and ocular micrometers. The cytopathological variables as inflammatory cells, mitotic figures, pleomorphism and hyperchromatism were also studied. The results were then statistically analyzed using SPSS version 18.

Results: The mean cellular diameter of group M, S and N was 43.8µm, 54.3µm and 42.7µm respectively. The mean nuclear diameter of M, S and N was 9.97µm, 12.6µm and 11.8µm respectively. And the mean N/C ratio of group M, S and N was 1:4.4, 1:4.3and 1:3.5 respectively.

Conclusion: The comparative changes assessed by this study depicts cause effect relationship with smoking and naswar use. Association of these changes with dysplasia or pre-malignancy needs further verification with the help of specific immune markers.

Key Words: *Cytomorphometry, Tobacco, Naswar, Oral Neoplasms, Smokers.*

Introduction

Oral squamous cell carcinoma (OSCC) is one the most common malignant alteration of squamous epithelium encountered in oral cavity. It is one of the sixth most common malignant tumors in world and third most common in Pakistan.[1] There are multiple causative factors for OSCC among which smoking, use of areca nut, betel quid or pan and tobacco chewing, naswar, pan masala, gutka are considered to be major risk factors among Pakistani population.[2] Although visibly detectable due to the accessibility of the oral cavity, oral cancer has a high morbidity and mortality because it is diagnosed typically at an advanced stage when it is finally clinically visible. Early diagnosis is crucial for better prognosis.[3] Exfoliative cytology is used to investigate the effect of tobacco on the oral epithelial cells.[4] It is one of simple non-invasive investigative tool for early diagnosis of dysplastic changes in oral lesions.[5] Quantifiable methods based on the measurement of variables as nuclear diameter ND, cellular diameter CD and nuclear to cytoplasmic ratio N/C ratio can accelerate the sensitivity of exfoliative cytology for

[1]*Department of Oral Pathology*
Islamic International Dental College,
Riphah International University, Islamabad
[2]*Department of Pathology*
Services Institute of Medical Sciences, Islamabad
[3]*Depatment of Oral pathology,*
Foundation college of medicine and dentistry,
Foundation University, Rawalpindi.
[4,7]*Department of Oral Pathology*
Faryal Dental College, Lahore
[5]*Department of Community and Preventive Dentistry*
Saidu College of Dentistry, Swat
[6]*Department of dentistry,*
Rural Health Center, Bahawalpur
Correspondence:
Dr. Rabia Masood
Associate Professor
Department of Oral Pathology
Islamic International Dental College,
Riphah International University, Islamabad
E-mail: rabia.masood@riphah.edu.pk
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the early diagnosis of oral premalignant and malignant lesions, because these methods are precise, objective and reproducible.[4] Simple non-invasive techniques like exfoliative cytology can be employed as a chairside technique and in mass screening programs for identification of cellular changes in oral mucosa of individuals with tobacco habits. Various studies have been conducted among different population across the globe to see the effect of tobacco and its products on oral mucosal cells using this noninvasive tool.[6-9]

The purpose of present study was to compare the cytomorphometric changes in buccal mucosal cells of cigarette smokers, naswar users and non-users/smokers among Pakistani population and to analyze the cause–effect relationship between tobacco uses and quantitative alterations made.

Materials and Methods

This was Cross-Sectional comparative study which was carried out at Post Graduate Medical Institute, Lahore and Islamic International Dental College, Riphah International University, Islamabad. The Duration of the study was six months. The sample size was 99 in total, calculated by WHO calculator; divided into three groups of 33 each as M (control group), N (naswar users) and S (smoker group). Non-Probability Convenient sampling technique was used. A written consent proforma was filled and submitted by all the subjects included in the study, as per the requirements of the Ethical Review Committee. The study was approved by the institution's ethical review board. The letter number was: IIDC/IRC/2017/02/001.

Male subjects above 15 years of age were included in all the 3 groups. Among the naswar users, subjects using naswar for atleast three years or more and 3-4 times /day were included; as for the smoker groups individuals smoking 1 pack/day (20 cigarettes) for at least 3 years or more were included. While control group included the subjects with no history of tobacco use in any form. Subjects with poor oral hygiene, any pre-existing premalignant or malignant lesion, denture wearers, tobacco users of any form were excluded. Also, individuals suffering from chronic debilitating diseases or undergoing any drug therapies that may cause oral mucosal changes were also excluded.

Data was collected from the subjects by requesting them initially to rinse their mouth with water. Then smears were taken using a moistened wooden spatula from the buccal mucosa of all the subjects. Three glass slides per each subject were marked with their reference number and alphabet of their particular group. The smears were taken and immediately fixed in using Cyto-fixi spray (95 % alcohol).[10]

Slides of each subject were stained Hematoxylin and Eosin stain, Papanicolaou stain and Giemsa stain respectively. Cellular diameter (CD) and nuclear diameter (ND) of the 100 cells in each smear were measured by using pre calibrated ocular micrometer fixed in eye piece of microscope on 40 x. The ocular micrometer was pre-calibrated with the help of stage micrometer.[11] The following equation shows the calibration.

100 div on ocular micrometer = 30 divisions on stage micrometer (one div =10µm)

= 30×10

100 div on ocular micrometer = 300 um

1 div on ocular micrometer = x

x =3 µm

In each case 100 clearly defined cells, from left to right in N direction were analysed for variables CD, ND and N/C ratio using ocular micrometer.

Cytopathological variables i.e., Inflammatory cells, presence of mitotic figures, pleomorphism, hyperchromatism were also studied under microscope.

Data analysis was carried out using Statistical Package for Social Sciences (SPSS) version 18. One way anova, post hoc tukeys test was used to compare means of CD, ND and N/C among the three groups. p value of 0.05 or less was taken as statistically significant.

Results

After completing the performas the readings were compared in all three groups and all three stains. For each variable i.e. CD, ND and N/C ration mean was calculated in every group and then was compared and statistically analysed. Summarizing the cytomorphometric results in table I, the cellular diameter is highest in smokers on pap stain. Nuclear diameter ND shows a significant increase in smokers and naswar users on all three stains as compared to the control group.

The highest cellular diameter (55.22µm±3.36)

among all three stains was found to be in the smokers who smoked for more than 10 years. Likewise, in Naswar users the highest cellular diameter was recorded as 45.46 µm±1.65 in those subjects who had been using naswar for more than 10 years. Moreover, among all three stains CD was highest in smokers who consumed 2packs/day showed a value of 54.58 µm±2.95 as compared to others who smoked less cigarettes. Similarly, for naswar users, CD was found to be highest in those consuming naswar for 5-6 times per day i.e., 44.09 µm±2.02. One way anova was applied to compare cytomorphometric findings among groups with respect to frequency of smoking or naswar use /day and duration of use, however in both cases results were statistically insignificant with p-value more than 0.05.

When variance analysis was conducted to analyse any difference in the nuclear diameter between the three groups, a statistically significant difference was found (p = 0.000). The intergroup Post-hoc Tukey analysis revealed that the difference in the nuclear diameter between the smoker's group (12.68 µm± 0.91) and the control group (9.97 µm± 0.80) was significant. However, the difference in the nuclear diameter between the Naswar users (11.80 µm± 2.23) and the smoker group (12.68 µm± 0.91) was not significant (p > 0.005). While the difference in the ND between the naswar users' group (11.80 µm± 2.23) and the control group (9.97 µm± 0.80) was significant (p=0.001). The mean difference between CD, ND, and N/C ratio in all three stains, among the three groups, S, N and M was found to be statistically highly significant i.e., p=0.001 on ONE WAY ANOVA. While on post hoc Tuckey test between S and N, CD and N/C ratio were highly significant p=0.000 while ND was not significant. While between S and M, CD and ND both were significant and showed p=0.000 while N/C ratio was not significant. In comparison between N and M, ND and N/C ratio were found to be significant while CD was not significant.

The cytopathological variables such as presence or absence of inflammatory cells, pleomorphism, hyperchromatism and mitotic figures were also studied on all three stains. Although all the variables were studied on all three stains but the results were same for each one of them with a very negligible difference, thus for convenience of understanding the results observed on H&E stain only, are presented here. Out of 33 cases of each group, inflammatory cells were present in 23 (70%), 17 (51%) and 7 (21%) cases of naswar users, smokers and control group respectively. Chi square test was used, and statistically significant results were found between the groups with a p value of <0.05 With regard to pleomorphism, hyperchromatism and mitotic figures, none was found in any of the studied groups.

Discussion

Oral squamous cell carcinoma is caused by use of different forms of tobacco.[3] Commonly oral cancers are diagnosed at advanced stages, which results in its poor prognosis decreasing the survival rates among the patients. Oral exfoliative cytology has been proven to detect early changes in the cells even before the onset of the clinical lesion, and this technique is inexpensive and easy with high sensitivity rates and diagnostic values.[4,5] In the present study, cytomorphometric and cytopathological variables were studied on buccal cells using exfoliative cytology and compared among three groups i.e. naswar users, cigarette smokers and control group.

With regard to cellular diameter, variable results are shown by various studies conducted worldwide, like Hande and Chaudhary in 2010 conducted a study using cytomorphometry and showed that systemic and external factors affect the cytomorphometric variables such as ND, CD and N/C ratio. As the CD is increased in smokers in the present study, it may be due to any factor which is caused by smoking cigarettes. The results of the present study, i.e, increase in the CD of smokers as compared to the control group, contrasts with the other studies carried out like in case of Sumit babuta (2014) and Goregen, (2011).[3,6] Whereby in a study conducted by Ramesh et al. (1999) CD was decreased in cigarette smokers.[7] Similarly, a study conducted by Ogden et al. (1997) also showed a decrease in CD of tobacco users.[1]

However, the results of buccal mucosal smears of naswar users showed strikingly similar results with study conducted by Hande and Chaudhary in 2010 showing decrease in CD.[8] Ramaesh et al in 1998 and Ogden et al in 1997 also showed a decrease in CD of tobacco chewers in their respective studies.[1,8] The decrease in the CD in the present study can be an

early detection of dysplastic or malignant change.[9]

The next variable studied in this study was nuclear diameter, both smokers and naswar users group showed an increase in ND in comparison with the control group. This may be due to various reasons including use of tobacco or increase in DNA content as stated by Hande and Chaudhary in 2010.[8] Other studies which have been conducted in the past on the same subject showed the similar results which are consistent with the findings of the present study i.e; increase in nuclear diameter of tobacco users, be they smokers or naswar users.[3,4,10,11]

Ogden et al observed in 1997 that 5 % average increased in nuclear diameter of smokers when compared with those of the non-smokers.[1] While a study conducted by Goregen in 2011 showed an increase of 16.5 % increase in ND of smokers as compared to non-smokers which was attributed to smoking.[8] None of the groups showed significant relationship between ND and duration or frequency of smoking or naswar use. This finding contrasts with the results of a studies which were carried out by Saranya, 2014 and Goregen, 2011.[3,12,13]

The third cytomorphometric variable studied in the study was N/C ratio, highest N/C ratio was observed in the naswar user group. This finding is due to the fact the ND in naswar user group was higher than the control group while their CD was smallest among the three groups (smokers, naswar users and control group) due to which the N/C ratio has automatically increased. carried out a study which showed that N/C ratio helps us to show the precise relationship in the altered cellular and nuclear diameter.[14] N/C ratio in the smokers was also higher when compared with the control group which could be because of increased CD and ND in the respective group. Increase in the N/C ratio can be indicative of an early dysplastic change because in squamous cell carcinoma the N/C ratio is increased to 1:1 from 1:4.[14] This result of the present study is also consistent with the results of previous studies conducted by multiple authors in the past decade.[6,12,13]

Conclusion

Changes in cellular diameter, nuclear diameter and N/C ratio was observed among smokers and naswar chewers when compared to control group which might indicate a cause affect relationship. The results seen in this study are limited to a reactionary change with smoking and naswar use. The relationship of these changes with pre-malignancy or malignancy needs further research with the help of more accurate methods as immuno-markers

Table I: Comparison of Cytomorphometric Readings in Three Stains H & E, PAP, Giemsa, in Smokers, Naswar Users and Control Group.

Stains	CONTROL			SMOKERS			NASWAR USERS		
	CD µm	ND µm	N/C ratio	CD µm	ND µm	N/C ratio	CD µm	ND µm	N/C ratio
H &E	43.81±2.01	9.97±0.80	1:4.4±0.41	54.38±3.31	12.66±0.92	1:4.3±0.39	42.72±8.00	11.80±2.23	1:3.5±0.68
PAP	43.81±2.01	9.97±0.80	1:4.4±0.37	54.41±3.29	12.68±0.91	1:4.3±0.39	42.72±8.00	11.80±2.23	1:3.5±0.69
GIEMSA	43.81±2.01	9.97±0.80	1:4.4±0.37	54.36±3.32	12.63±0.91	1:4.3±0.38	42.72±8.00	11.80±2.23	1:3.6±0.28

S= smoker, N= naswar user, M =control group.

CD= Cellular Diameter, ND= Nuclear Diameter, N/C= Nuclear /Cytoplasmic ratio

Table II: Result of Post Hoc Tukey Test Among Groups on H & E, Pap, and Giemsa Stain

Dependent Variable	Group	Group	Significance Value H & E	Significance Value Pap	Significance Value Giemsa
Cellular diameter	S	N	.000	.000	.000
	S	M	.000	.000	.000
	M	N	.664	.664	.664
Nuclear Diameter	S	N	.049	.047	.061
	S	M	.000	.000	.000
	N	M	.000	.000	.000
N/C ratio	S	N	.000	.000	.000
	M	S	.650	.676	.541
	M	N	.000	.000	.000

S= Smoker, N= Naswar User, M =Control Group.

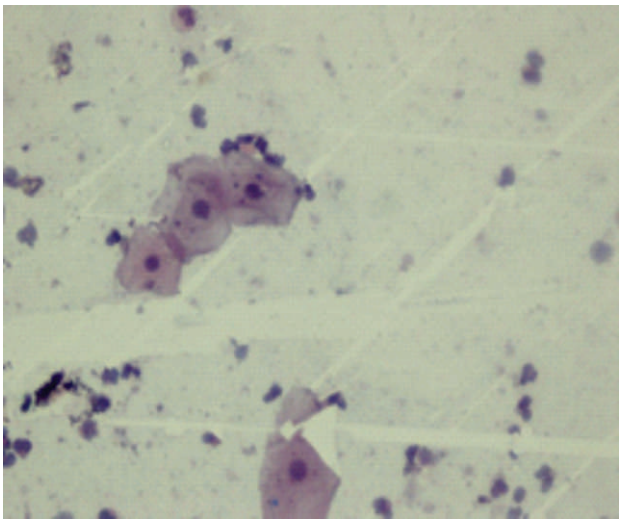

Fig. 1: Inflammatory cells in Naswar users at 40x

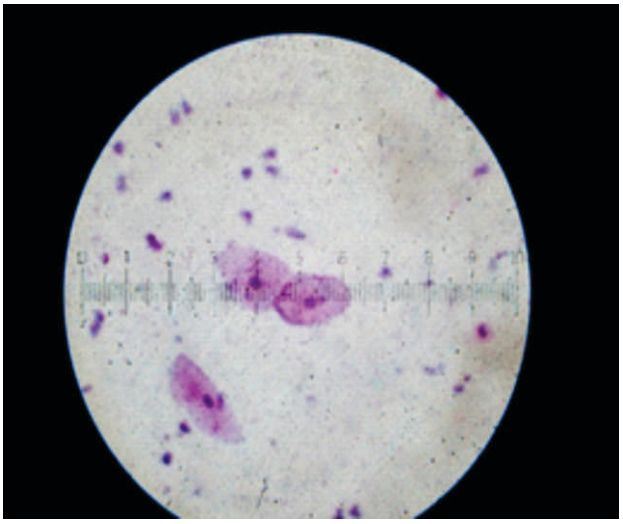

Fig. 2: Cells Stained with Pap Stain in Naswar Users With Ocular Micrometer At 40x

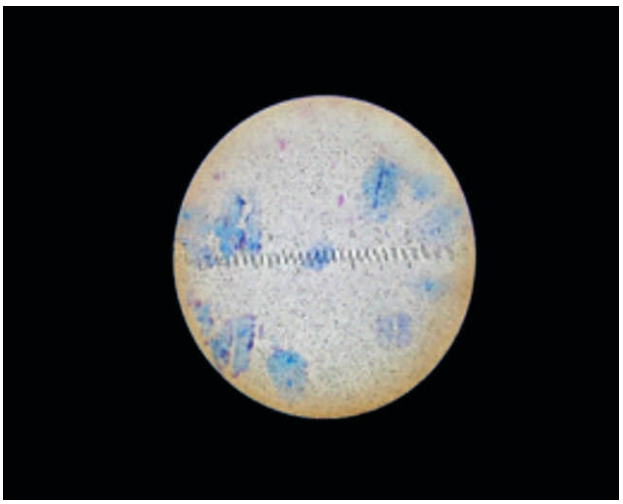

Fig. 3: Cells Stained with Geimsa Stain In Naswar Users With Ocular Micrometer 40x

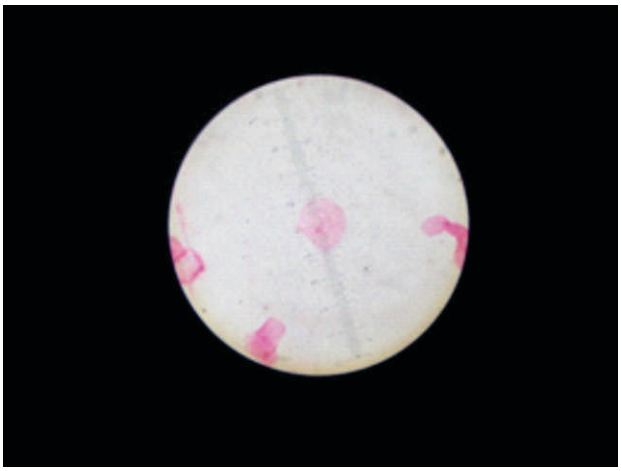

Fig. 4: Cells Stained with H&E Stain in Naswar Users with Ocular Micrometer At 40x

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Effect of Portage Early Education Program on The Neurodevelopment of Children with Cerebral Palsy

Erum Afzal, Mohammad Khalid Iqbal, Nadia Iqbal, Kausar Aftab

ABSTRACT

Objective: To determine the effect of portage early education program (PEEP) on the neurodevelopment of cerebral palsy children.

Study Design: The Quasi-experimental- pre and post design

Place and Duration of Study: Developmental pediatrics department, the children hospital, and the institute of child health Multan from 1st January 2020 to 24 December 2020.

Materials and Methods: We enrolled 58 children of 2 to 10 years of age, both gender, diagnosed as spastic cerebral palsy for this study. All the children were assessed pre- and post-program using PEEP and GMFM (Gross Motor Function Measure) twice 6 months apart. They were advised regular weekly PEEP based therapeutic Sessions at hospital by multidisciplinary team, and continuation of these therapies at home. Data was analyzed by using SSPS version 16. The mean difference in the scores of the developmental levels, initial and after 6months was compared by using paired t test.

Results: Out of 58 study subjects, male were prominent; 42(72.41%). Most of the participants had quadriplegia type of spastic Cerebral Palsy 26(44.83%), with gross motor function level 5, [24(42.86%)]. The mean comparison of Developmental Quotient of children calculated at initial stage and after six months in areas of gross motor, cognition, self-help, socialization, and gross motor function measure was found statistically significant(p-value<0.001)

Conclusion: Children with Cerebral palsy are associated with delayed development in certain developmental domains other than involvement of motor and posture. PEEP is an effective tool for improvement in Development of CP children

Key Words: *Cerebral Palsy, Portage Early Education Program, Spastic Quadriplegia.*

Introduction

CP is a broad term which is defined internationally as follows:

"Cerebral palsy describes a group of permanent disorders of the development of movement and posture, causing activity limitation that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain." [1] CP has prevalence of 1.5–5.6 cases per 1000 live births. CP is classified by Geographical classification, Physiological classification, and Gross Motor Function Classification System (GMFC system).[2] Diagnosis is mostly clinical. Important etiology includes Brain injury or abnormal brain development, pre and post maturity, Cerebral leukomalacia, periventricular–intraventricular hemorrhage, hypo perfusion injuries and Cerebral infections or inflammations[2,3], Although, the brain damage is not progressing, but its manifestations keep on changing with development of child, resulting in limited participations in the different life areas and activities.[4] Similarly CP is a motor disorder but it has associated problems of sensation, perception, cognition, communication and behavior, musculoskeletal problems and epilepsy [1] which manifest as complications like intellectual or learning disability (40%); epilepsy (30%); movement disorders (20%); visual impairment (16%); malnutrition, gastro esophageal reflux, obesity, hydrocephalus (14%) and developmental problems. These problems must be managed by involving multidisciplinary team.[2,5] Early intervention results in the better outcome of the patient symptoms.

Department of Developmental- Behavioral Pediatric Children Hospital and the Institute of Child Health, Multan

Correspondence:
Dr. Erum Afzal
Assistant Professor
Department of Developmental- Behavioral Pediatric Children Hospital and the Institute of Child Health, Multan
E-mail: erumafzal@yahoo.com

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Treatment modalities includes physiotherapy, occupational therapy, psychotherapy, speech and developmental therapy and inclusive education for these children. The portage early education program (PEEP) began in Great Britain and is now practiced worldwide for developmentally delayed children. It is based on the idea that genetic and environmental factors have a great role in the development of the brain, in both functional and structural aspects.[6] The brain plasticity is more during early life. During this period, the environmental factors also strengthened adaptive and compensatory skills[6] therefore intervention started in infantile period reveals better results.[7] It emphasize the importance of hospital based and home therapy by parents for improvement of the children with delayed developmental. There is a critical role of timely intervention for the better outcome of children with special needs. PEEP includes therapeutic tasks for almost all developmental domains. It not only involves individualized intervention but emphasize great importance to the parental role as a therapist. Because better results are achieved with parental participation and execution.[8]

Although studies about Intervention in Global developmental delay and Autism are present in literature but Studies on the outcomes of children with CP are surprisingly few[7] in the present study, we applied the PEEP to children with CP and observed effect of PEEP on the neurodevelopment of cerebral palsy children.

Materials and Methods

This Quasi-experimental- pre and post design was carried out in outpatient department (OPD) of Developmental and behavioral pediatrics of CH&ICH Multan. We enrolled 58 children presented with delayed development, abnormal muscle tone, and hyperreflexia, clinically diagnosed as CP[1, 2], ages between 2 to 10 years, both gender from January 2020 to December 2020 by convenient sampling. The children having Degenerative brain disorders, Myopathies, Neuropathies, Inborn error of Metabolism, chromosomal abnormalities, severe hearing deficit, and did not gave consent, were excluded. These disorders were diagnosed on clinical features, examination findings and available investigations. Sample Size was calculated through STATA 15, using paired t-test for correlated means.[9]

Procedure of the study was told to the Parents/guardian after taking written consent. For all CP children detailed history was taken from parents/guardian. Their socioeconomical status was noted. Complete neurological examination was done in all children. Type of CP was determined. PEEP and GMFM (Gross Motor Function Measure) was used to assess developmental levels in all domains and functional severity of motor function respectively. A trained and expert clinical psychologist with more than 10 years of experience working with PEEP, administered and assessed every child for his/her interests, deficit and learning capacities, in a quiet room with peaceful surroundings. Portage has five development key areas along with infant stimulation, applied up to 6 years of mental age. These are gross motor (GM), cognition(C), self-help (SH), socialization(S) language (L). Each area had a specific checklist according to age. Total number of items are motor: 140, Cognition: 108, Self-help: 105, Socialization: 83 and language: 218 and infant stimulation: 45. All patients were assessed according to checklist items. When there were 10 consecutive negative items, at that point of checklist stops. Positive items were obtained by subtracting failure items from total. Developmental age was assessed by first subtracting failures from total to calculate positive items (Total – failure = positive items). Then the positive items were divided by total items and then multiplied by 12 to find out developmental age (Development age=positive item/total item × 12). Developmental age is used to access his/her developmental quotient in all areas by: DQ=DA/Chronological age × 100). She assessed the mental age in all 5 domains and individualized training programs (IEPs) were developed according to each child's development levels and needs. Sessions were started to overcome deficits by Psychologist, speech therapist, occupational and physiotherapist. The sessions / training program was performed on every visit on weakly basis in the department for at least half hour, during which parents were also trained. Parents were advised to spend at least 2 hours per day for continuation of these therapies/activities at home. After 6 months the resulting effects were Re-evaluated by assessing PEEP and GMFM.

Approval was taken from the institutional ethical

committee. No conflict of interest was involved in this study. No financial support was provided by the institution or pharmaceutical company.

All the data was entered on preformed Performa. Statistical analysis was done by using SSPS version 16. The mean difference in the scores of the developmental levels/quotients, initial and after 6monthsof therapy was compared by using paired t test. $P < .05$ was considered statistically significant and 95% confidence interval was used.

Results

Out of 58 patients 42(72.41%) were male with male to female ratio of 3:1. Most of the children 28(48.29%) were age group >4-7years (Table I). Mostly Children were diagnosed having spastic quadriplegic type 26(44.83%) with level 5 GMFM 24(42.86) (Table II). DQ of CP Children in areas of GM, C, SH, S, L and GMFM was found statistically significant with therapy (Table III).

Table I: Basic Characteristics of Participant (n=58)

Characteristics		N (%)
Gender	Male	42(72.41)
	Female	16(27.59)
Age group distribution		(29.17±19.21)
2-4years		14(24.14
>4-7years		28(48.29)
>7-10years		16(2.59)
Socioeconomic Status	Poor	36(62.06)
	Average	04(6.90)
	Middle1	8(31.03)

Table II: Type of CP & GMFM (n=58)

Type of CP	Spastic Quadriplegic	26(44.83%)
	Spastic Diplegic	17(29.13)
	Spastic Rt Hemiplegic	10(17.24)
	Spastic Lf Hemiplegic	05(8.6)
GMFM Level	Level II	08(13.79)
	Level III	11(18.96)
	Level IV	15(25.86)
	Level V	24(42.86)

Discussions

In this study DQ of CP Children in areas of GM, C, SH, S, L and GMFM was found statistically significant with therapy (Table III).

The current hospital-based research showed that most children were male, age group >4-7years, of spastic quadriplegic type 2, with level 5 GMFM. All the recruited CP children have delayed development in all developmental domains (GM, SH, C, S, L), these were assessed and trained using PEEP, which is an effective tool for the treatment of CP for neurodevelopmental rehabilitation. Portage guide is a perfect checklist for assessment and training in structured settings. Due to its, interesting, scientific, logical, and easy applicable nature, it has been used worldwide for early intervention for the development and training of CP children .[7] Our children showed good improvement after 6 months of therapy weakly at hospital by multidisciplinary team and home by parents/family member on daily basis.

Table III: Comparison of Developmental Profile Between Children Initial and after six months of PEEP Therapy

Variables	Initial (n=58)	After six months (n=58)	P-value
Gross motor	22.61±3.87	28.86±4.94	<0.01
Cognition	19.30±3.31	29.93±5.13	<0.01
Self-help	18.77±3.21	29.12±4.99	<0.01
Socialization	23.35±4.0	29.12±4.99	<0.01
Language	22.28±3.82	28.64±4.91	<0.01
GMFM levels	0.62±0.10	0.93±0.16	<0.01

These findings were similar to others as, Sorensen, Kristian described the better outcome of cerebral palsy with regular intervention in longitudinal study conducted in Norway.[10] A study carried in china where they rehabilitated the children with Global developmental delay including cerebral palsy using PEEP for 6 months period, They found marked improvement in development of the children with regular developmental, occupational and physiotherapy and they found PEEP an effective tool.[9] A study was planned in Lebanon for rehabilitation of children with special needs, which also favored the importance of regular therapy and described portage as an effective tool for home therapy.[11] this favors of our results. Sharon Barak also described the improvement in functional independence of CP children with regular therapy.[12]

Similar results were obtained by Iona Novak in systematic review of intervention of CP children and adults.[13] early intervention services and follow up

program results in the better outcome of CP children, indicated by Ekaterina in Moldeve.[14]

A study done in National Institute of Rehabilitation Medicine (NIRM) Islamabad described that early and regular physiotherapy results in improvement in GM functions in CP[15].Verschuren in Netherland also found physiotherapy as effective in gross motor outcome of the CP children[16], while Heilkam et al described no significant improvement in infant outcome with only physiotherapy intervention, but family quality of life improved.[17]

We found predominantly male child with age range 4-7years and poor socioeconomic status, these findings are like another one.[11]

Limitations of this study includes that National data showing PEEP intervention in CP is very less. The current study is of limited time duration. Although our result showed positive effects with only 6 months of PEEP implementation, further research is needed to prove the long-lasting effects with continuation of intervention for longer duration. Results must be compared to control group.

Conclusion

PEEP is an excellent effective interventional system for neurodevelopment of CP children with delayed development, which covers therapy in all developmental areas for a long time for better outcome.

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CONFLICT OF INTEREST

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Frequency of Attention Deficit Hyperactivity Disorder Symptoms in Medical Students and Associated Factors-A Cross Sectional Study

Faqeeha Batool[1], Fatima Khaliq[2], Sidra Hamid,[3]

ABSTRACT

Objective: To study the frequency of ADHD symptoms in medical students and its association with their physical activity, screen time and sleep pattern.

Study Design: Cross sectional descriptive study.

Place and Duration of Study: This study was carried out among first year and second-year medical students of Rawalpindi Medica l University, Rawalpindi from June 2017 to August 2017.

Materials and Methods: Data was collected using a self-administered questionnaire derived from literature. Sleep deprivation was assessed using Epworth Sleepiness Scale. ADHD symptoms were assessed using Adult ADHD Self Report Scale (ASRS-V1.1) Symptom Checklist. Significance value was set at $p<0.05$. The questionnaires were distributed among three hundred medical students and sample size of 271 was met after discarding responses with missing information and not meeting inclusion criteria. Data was analyzed using SPSS version 23. Chi square test was used to determine the association of ADHD symptomology with sleep pattern, physical activity, and screen time.

Results: 12.17% (n=33) respondents fell in ADHD spectrum as they scored more than 4 in ASRS V1.1. Significant relation was not established between ADHD symptoms and sleep deprivation (p=0.58). The relation between physical activity and ADHD symptom turned out to be significant (p=0.045). Total screen time and ADHD did not show a significant relation(p=0.266). Similarly, TV hours were not significantly associated with ADHD symptoms (p=0.932). However, laptop usage hours per day (p=0.04) and phone usage hours per day (p=0.007) were significantly related to ADHD symptoms.

Conclusion: Lack of physical activity and prolonged screen time have significant correlation with self-reported ADHD symptoms in medical students. However, sleep deprivation is not significantly associated with ADHD symptomology. Hence, cutting down the screen time particularly laptop and mobile usage hours and increasing the time of physical activity might help in preventing and alleviating ADHD symptoms.

Key Words: *Attention Deficit Hyperactivity Disorder, Exercise, Preclinical years, Screen time, Sleep.*

Introduction

ADHD is amongst common chronic neuro developmental disorder, which is characterized primarily by impulsivity, hyperactivity, and inattention.[1] Two third of the children diagnosed with ADHD experience persistence of the symptoms in adulthood as well.[2] The prevalence of ADHD in adults varies from 1.2% to 7.3%[14]. Adults show a broad spectrum of behavioral and psychiatric issues comprising of anxiety, depression, memory deficits and academic incompetence. ADHD has the potential to make an individual more susceptible to substance abuse disorders as well.[3] The mean prevalence of pediatric mental problems in Pakistan is estimated to be 15.8% with ADHD being the most common diagnosis.[4] Growing evidence suggests that individuals with probable ADHD show more involvement in sedentary lifestyle.[5,6] Similarly, screen time has also been reported to have significant association with ADHD symtoms.[7] Sleep disturbances act as an independent risk factor for ADHD or they may appear as a symptom.[8,9] A study disclosed that students with ADHD had lower scores in adaptation to college, self-esteem and social skills compared with the control. The gradual decline in the grades of ADHD identified students owes to their inability to focus during lectures in the classrooms, lack of interest in task completion and task

[1,2]*House Officer/Department of Physiology*[3]
Rawalpindi Medical University, Rawalpindi
Correspondence:
Fatima Khaliq
House Officer
Rawalpindi Medical University, Rawalpindi
E-mail: fatimakhawaja28@gmail.com
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comprehension.[11,12]

ADHD in adults has not been extensively studied in Pakistan. Limited number of research are available especially in adult students. The negative impact of ADHD symptoms on academic performance and learning abilities has been well documented which rationalizes the need for further research in this domain. The occupational and social implications of ADHD impair quality of life to a great extent and if left undiagnosed can adversely impact an individual's life. Given the lack of evidence, this study was designed to find the frequency of ADHD symptomology in medical students and to determine its association with physical activity, sleep pattern and screen time. In case positive associations are found, the standard protocol and guidelines should be modified in a way that any individual diagnosed with ADHD should be screened for abnormal patterns or duration of screentime, physical activity and sleep. The objective of this study was to determine the frequency of ADHD in medical students and its association with physical activity, sleep pattern and screen time.

Materials and Methods

It was a cross-sectional study, carried out among first- and second-year medical students at Rawalpindi Medical University, Rawalpindi and extended from June 2017 to August 2017. Data was collected from first- and second-year students only because of division of preclinical and clinical year students into distant campuses. Therefore, collection of data got limited to preclinical years only because of constraint of distance. The sample size was calculated using WHO calculator which came out to be 271. However, proformas were initially distributed among 300 students via nonrandomized convenient sampling technique. Confidentiality and anonymity of the respondent was maintained, and participant provided a response upon his consent. After filtering out responses with missing information, 271 out of 300 proformas were considered appropriate for analysis based on inclusion and exclusion criteria. The student with preexisting diagnosed psychiatric illness or sleep disorder and with exam score of less than 70% was excluded from study. Questionnaire with missing information was also excluded. The proforma was reviewed by Institutional Research Forum for ethical issues and was approved for administration after gaining ethical approval from Institutional Ethical Research Forum (Ref.RMU/PR-15 /2018, Date: 10th February ,2018). The Adult ADHD Self-Report Scale-Version 1.1 (ASRS-v1.1) Screener[15] was used to screen adults with ADHD. ASRS-v1.1 Screener is a symptom checklist of the 18-question World Health Organization ASRS, which evaluates all 18 *Diagnostic and Statistical Manual of Mental Disorders, Text Revision*, 4th edition, Criterion A symptoms of ADHD. Data was collected by distributing proformas in medical students manually. With 45 responses collected initially, Cronbach's alpha was calculated for determining internal consistency. It came out to be 0.74. Only then was ASRS administered in targeted audience.

The proforma consisted of four sections. First section comprised of demographic profile asking the subject's name, age, MBBS year, academic scores, and status (day scholar or boarder). Second section included questions about subject's physical activity and screen time in a week. Physical activity status was evaluated as sedentary or active by considering number of times a student exercised a week for at least 30 minutes. Laptop, television, and phone usage hours per day were determined separately and later summed up to determine their total daily screen time. The third section was a standardized Epworth Sleepiness Scale comprising of eight questions aimed at evaluating subject's tendency to doze off while being engaged in eight different situations. Score ranging from 0 to 3 was to be assigned to each situation based on criteria; 0 if the subject never dozed off, 1 if there was slight chance of dozing, 2 if there was moderate chance of dozing and 3 if there was high chance of dozing. Later all the item scores were summed up to acquire a grand score. Three score ranges categorized sleep habits as normal, borderline or abnormal based on the criteria: 0-10 Normal, 10-12 Borderline and 12-24 Abnormal. The fourth section of the form was Adult ADHD Self Report Scale (ASRS-V1.1) Symptom Checklist consisting of eighteen questions consistent with the DSM-V criteria. However, this questionnaire is a general assessment and not a confirmatory tool. Its results only declared the patient as being either symptomatic or not. Out of the eighteen questions, first six questions were stronger predictors of ADHD.

The questions generally were about attention span, ability to remember important things, ability to procrastinate on important tasks and patience. The scoring scheme was based on five-point Likert scale consisting of five response levels namely never, rarely, sometimes, often, very often. If four or more question statements received often/very often response, the subject was considered to have symptoms highly consistent with ADHD.

Data was then entered into SPSS. Nonparametric data was analyzed using SPSS version 20 for a confidence interval of 5 and confidence level of 95%. Association of screen time, physical activity and sleep pattern with ADHD symptoms was determined using chi square test. The significance value was set at $p<0.05$.

Results

Relation of ADHD Status with Demographic Characteristics

The frequency of self-reported ADHD symptoms was 12.17% (n=33). These ADHD vulnerable students met the criteria of DSM V. Remaining 87.8% (n=238) did not meet the screening criteria of ADHD and thus were not considered ADHD vulnerable. Out of the total sample size of 271, 30.6% (n=83) participants were 1st year MBBS students while 69.4% (n=188) were 2nd year MBBS students. Out of 83 first year MBBS students, almost 10% (n=)8 were ADHD symptomatic. Whereas 13.5% (n=25) of 188 second year MBBS students showed ADHD symptoms. ADHD status did not vary significantly between first- and second-year students (p=0546). 44.6% (n=121) participants were non-boarders while 55.4%(n=150) were boarders. 12.5% (15 out of 121) of the day scholars were diagnosed with ADHD symptoms. On the other hand, 12% (18 out of 150) of the boarders exhibited the symptoms. However, the relation was not significant (p=1.00). 65.5% (n=25) of ADHD vulnerable were female but relationship was not significant (p=0.117).

Table I: Relation of Total ADHD Score with Demographic Characteristics

Demographic Variable	Mean ADHD Score	P value
Gender		
Male	50.1 + 8.68	0.227
Female	51.6 + 10.22	
MBBS year		
1st year	49.4 + 8.98	0.058
2nd year	51.8 + 9.96	
Boarding status		
Boarder	51.4 + 9.02	0.474
Day scholar	50.6 + 10.54	

Relation of ADHD Symptomology with Sleep

Mean Epworth scale score came out to be 9.69 (SD=3.36). 53.9% (n=146) had normal sleep pattern, 26.6% (n=72) had borderline pattern and 19.6% (n=53) had abnormal sleep pattern. Mean Epworth scale score did not vary significantly between males and females (p=0.668), between day scholars and boarders (p=0.802) and between first- and second-year students (p=0.0,321). A significant relation was not found between self-reported ADHD status and sleep pattern (p=0.58). However, total ADHD score had positive correlation with total Epworth scale score (r=0.158, p=0.009) showing greater tendency of respondents with disturbed sleep pattern to develop ADHD symptoms. Among ADHD symptomatic students, about 42% (n=14) had normal sleep pattern while 56% (n=132) of those without ADHD symptoms had normal sleep pattern. 42.42% (n=14) of ADHD vulnerable students had normal sleep pattern,9 (27.27%) was at the borderline while 10 (30.30%) turned out to have abnormal sleep.

Table II: Relationship of ADHD Symptomology with Sleep

Sleep Pattern	ADHD Status		Total	P value
	Symptomatic N (%)	Asymptomatic N (%)		
Normal	14 (42.42%)	134 (56.30%)	146 (53.87%)	0.58
Border Line	9 (27.27%)	62 (26.05%)	71 (26.19%)	
Abnormal	10 (30.30%)	42 (17.64%)	52 (19.18%)	
Total	33 (100%)	238 (100%)	271 (100%)	

Relation of ADHD Symptomology with Screen Time

Mean total screen time was 6.75 hours per day (SD=2.24). Mean screen time of males was significantly higher than females (p=0.006). Mean screen time of day scholars and boarders was found to be same (6.7 hours, SD 2.2, p=0.574). Similarly, mean screen time did not vary significantly between first- and second-year students (p=0.992). Mean screen time of ADHD symptomatic students (7.4

hours, SD 2.76) was slightly higher than those with no ADHD symptomology (6.7 hours, SD 2.15). However, relationship was not significant (p=0.078). Out of 33 ADHD symptomatic students, a vast majority i.e., 85% (n=28) had screen time of more than 2 hours a day. Total ADHD score showed significant positive correlation with total screen time (r=0.176, p=0.004). This leads us to an inference that those with higher screen time are more vulnerable to develop ADHD symptoms.

Table III: Relation of ADHD Symptomology with Screen Time

Screen Time	ADHD Status		P value
	Symptomatic (Mean, SD)	Asymptomatic (Mean, SD)	
Total Screen Time	7.39 + 2.76	6.65 + 2.15	0.078
TV Screen Time	1.55 + 0.97	1.51 + 0.88	0.824
Mobile Screen Time	3.94 + 1.49	3.87 + 1.31	0.069
Laptop Screen Time	1.91 + 1.44	1.66 + 1.02	0.223

Relation of ADHD Status with Physical Activity

Out of total 271 students, 42.8% (n=116) did not exercise at all, 23.6% (n=64) exercised once, 21% (n=57) two to three times weekly, 5.5% (n=15) four times and 7% (n=18) more than five times weekly. A significant relation was found between physical exercise and ADHD symptoms (p=0.045). Among ADHD symptomatic respondents, 51.5% (n=17) reported to have never exercised regularly. Whereas, among ADHD asymptomatic individuals, 41% (n=99) had never exercised regularly. 27.3% (n=9) of the ADHD vulnerable students exercised once per week for half an hour and 21.2 (n=7) exercised twice or more than twice weekly on regular basis. A significant correlation was not found between total physical activity hours and total ADHD score (r= -0.31, p=0.606).

Table IV: Relation of ADHD Symptomology with Physical Activity

Physical Activity (at least 30 minutes)	ADHD Status		P value
	Symptomatic N (%)	Asymptomatic N (%)	
Never	17 (51.5)	99 (41.6)	0.045
Once	9 (22.27)	55 (23.30)	
2-3 times	1 (3.03)	56 (23.53)	
4 times	1 (3.03)	14 (5.88)	
5 or more times	5 (15.15)	14 (5.88)	
Total	33 (100)	238 (100)	

Discussion

The objective of this study was to study the presence of ADHD symptoms in medical students and contribute to this domain of research in medicine left partially and incompletely addressed as compared to the Western world.[13] The frequency of self-reported ADHD came out to be 12.17% which was high in comparison to 7.6% in Korean college students[10]. Physical activity and laptop and mobile usage hours were found to have significant association with ADHD symptomology in our study. Significant relationship did not exist between abnormal sleep time and ADHD. However, growing evidence suggests that sleep disorders are more common in individuals with ADHD. It was depicted in a research that those with clinically relevant ADHD symptoms had high prevalence of insomnia and reported longer as well as shorter sleep duration more often[16]. A research claimed that ADHD identified children had an average total sleep time of 8 hours 19 minutes whereas the individuals in control group had average sleep time of 8 hours 52 minutes.[17] ADHD suspects find it hard to go to sleep. One research stated that treating sleep problems may eventually lead to diminution of inattention and hyperactivity in children.[18]

Our study revealed a significant relationship between physical activity and ADHD symptoms. In a recent study, it was shown that those with ADHD were significantly less likely to meet recommended levels of physical activity as compared to those without ADHD.[20] Interventional studies have also demonstrated that physical activity helps in improving ADHD symptoms.[19] However, it has also been observed that a significant relationship between physical activity and ADHD symptoms does not exist[5]. To facilitate the respondents, separate questions were designed to inquire about laptop, mobile and television usage time. Later, each time span was added up to evaluate overall screen time. Significant relations were only obtained between ADHD and laptop and mobile usage hours

independently. A significant relationship between high screen time and ADHD symptoms has been found in previous studies also.[5] A recent study also revealed that children with ADHD are less likely to limit screen time to less than 2 hours per day.[21]

The findings of our study support the need for ongoing efforts to address lifestyle factors among the medical students. They also stimulate further investigation about the needs of youth with ADHD from both public health and clinical perspectives.

Limitations

Our research study has few limitations. The research results cannot be generalized due to small sample size and usage of nonrandom convenient sampling technique owing to constraint of time. We also had no information about occurrence of ADHD symptoms in childhood of the participants.

Conclusion

ADHD is found to have high prevalence in our study signifying the need to address it at a profound level in our society via thorough investigations. Prolonged screen exposure and lack of physical activity have significant association with ADHD symptomology. This highlights the importance of cutting down the screen time of the suspects and increasing their time of physical activity. Further epidemiological studies are warranted to determine the exact prevalence of ADHD in general population, to estimate ADHD burden in our society and to evaluate whether interventions could have a positive influence on the associations.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Effects of McConnell Taping Combined with Strengthening Exercises on Quadriceps Angle and Intensity of Pain in Females with Patellofemoral Pain Syndrome

Ruqia Begum, Furqan Ahmed Siddiqi, Wardah Ajaz Qazi, Kanwal Zafar, Arva Naeem, Nida Kiani, Samina Javed

ABSTRACT

Objective: To determine the effects of McConnell taping combined with strengthening exercises on Q angle and intensity of pain in females with patellofemoral Pain Syndrome.

Study Design: Randomized control trial

Place and Duration of Study: Physical Medicine & Rehabilitation department of Fauji Foundation Hospital Rawalpindi from 1st Jan to 31st June 2018.

Materials and Methods: Females with patellofemoral pain syndrome with age 25-45 years, having anterior knee pain, limited/painful knee Range of motion and increased Q angle>18 were included in the study through non-probability convenience sampling technique .Numeric Pain Rating Scale(NPRS)and Goniometry tools were used to measure the outcomes. A total of 70 approached cases only 48 met the inclusion criteria, out of which 40 subjects completed the treatment protocol. Subjects were divided randomly in to experimental and control groups. Both groups received standard treatment protocol including Trans Cutaneous Electrical Nerve (TENS) and Heating Pad for 15 minutes while Experimental group received McConnell taping in addition. Data was analyzed by using SPSS Version 21.

Results: There was significant improvement in pain intensity and Q angle in experimental group after McConnell taping p value was <0.05 for pain. Flexion ROM was significantly improved in both groups p<0.05.while extension ROM was in normal Range pre and post treatment p<0.05.

Conclusion: Results of this study shows that McConnell taping reduces pain intensity and Quadriceps Angle in patients with patellofemoral pain syndrome.

Key Words: *Patellofemoral pain syndrome, Quadriceps Angle, Range of motion, Taping technique, Visual Analogue Scale.*

Introduction

The Patellofemoral pain syndrome (PFS) is a possible cause of the anterior knee pain .It predominantly affects the female patients.[1,2] Patellofemoral pain syndrome contributing to an estimated of 30-40% of all sports medicine visits[3, 4] In the united states 15-45% individual reports PFPS.[5] Typical symptoms are knee pain on anterior aspect which is exacerbated by ascending and descending stairs, squatting as well as prolonged sitting.[6, 7]An increased in Q angle >15 degree is considered the predisposing factor for patellofemoral pain syndrome. Q angle is a static measurement which is taken in supine position without the activation of quadriceps.[8,9] Clinically Quadriceps angle, lateral hyper mobility of patella and J sign are mostly used for the evaluation of Patellar maltraking.[8] Structural rehabilitation Programme is implemented for management of PFPS including Rest, Patellar bracing and McConnell taping is mostly used for the treatment of patellofemoral pain syndrome which improves quadriceps function, patellar alignment and decrease Q angle.[6,10-12]

The available research evidence, however, would suggest that either taping change the Quadriceps angle or not. In previous studies McConnell taping enhanced the activity level of Vastus Medialis Oblique relative to Vastus lateralis, and decrease pain and improved function but the direction of tape and its effects on Q angle were not targeted in this study.[9] Some studies revealed that McConnell taping shows positive results for patellofemoral pain syndrome, but the evidence is limited on the

Foundation University College of physical therapy, Foundation university school of Health Sciences, Islamabad
Correspondence:
Dr. Ruqia Begum
Lecturer
Foundation University College of physical therapy, Foundation university school of Health Sciences, Islamabad
E-mail:rr.ruqia544@gmail.com

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outcome of the taping on Q angle.[13] A study was conducted by Engy F et al in 2021,the result of their study significant difference between VAS and lower extremity function after McConnell tape with p value was <0.05.[14]

Another study was conducted by Aminaka, and Gribble examined the effects of McConnell taping on knee pain and Hip and knee kinematics in the sagittal plan during dynamic balance setting. The patients with patellofemoral pain syndrome group with McConnell tape showed a reduction in knee pain and improvement in balance compared to non-tape condition. However there were no significant differences in hip and knee angle in the sagittal plan.[15] Therefore this study was planned to investigate the effects of taping on the Q angle and pain level in patients with patellofemoral pain syndrome.

Materials and Methods

This randomized control trial was conducted at Physical Medicine & Rehabilitation department of Fauji Foundation Hospital Rawalpindi from 1st Jan 2018 to 31st June 2018.Study was approved by Research Ethical Committee of Riphah International University Islamabad. The inclusion criteria of the study were known cases of Patellofemoral pain syndrome, age 25-45, having anterior knee pain, limited/painful knee ROM and Q angle>18 were included in the study. Participants having any history of knee surgery, systematic disease and other neuromuscular conditions were excluded from the study. After taking consent subjects who fulfilled the inclusion criteria were divided into group A (Experimental) and group B (Control) through convenience sampling technique. Open Epi tool was used for sample size calculation. Sample size calculated was 40 and 20 patients were assigned in each group. Study participants were assessed at base line and at the end of 2 weeks post intervention. In the control Group treatment protocol was traditional exercises including Quadriceps Isometric and Hamstring Stretching 10 repetition with 3 sets for 4 days/week, Trans cutaneous Electrical nerve stimulation (TENS) with frequency 50-100HZ,Continous cycle time and Heating pad for 15 minutes. Total duration of each session was 45 minutes for 2 weeks. While experimental Group was given additional McConnell taping. The patient was in supine position. Total time for taping was 2 minutes in which a cover roll tape almost 15 cm in size was first applied directly over the skin. Then 12 cm rigid tape leukotape P was applied by starting from lateral condyle of femur, anchor the patella and end on posterior aspect of the knee. For shifting of patella on medial side enough force was applied. At end of completion of taping procedure, a pouch of skin\crease almost 2 cm in width was visible on medial aspect of the knee. The participants were then instructed to remove the tape before going to bed. Study Outcomes i.e., pain and Q angle were measured through Numeric pain Rating scale and by goniometry. Quadriceps Angle was statistically measured by using goniometer from three points i.e., anterior superior iliac spine, midpoint of patella and tibial tuberosity. Data was analyzed by using SPSS 21. Nonparametric test (Mann Whitney U) was applied for comparison between groups.

Results

Data of the study was stated as mean and standard deviation.Comparasion of the two groups was done by using Mann Whitney U test while considering the p<0.05 as statistically significant. A total of 70 approached cases 48 patients met the inclusion criteria. Only 40 subjects completed the treatment protocol 20 in each group. Treatment protocol included the application of McConnell taping with traditional exercise regimes for Group A and group B received only traditional exercise. Commonly affected population was workers (50%). Mean of the age in the Experimental Group was 36.05 ±7.35 years while in the Control group was 37.05±4.96. Mean and SD of Q angle of participants was 18.05±3.02. Group A (Experimental) showed significant decrease in Q angle as compared to l group B (Control) p<0.05.The intensity of the pain was significantly reduced in both the groups p<0.05.

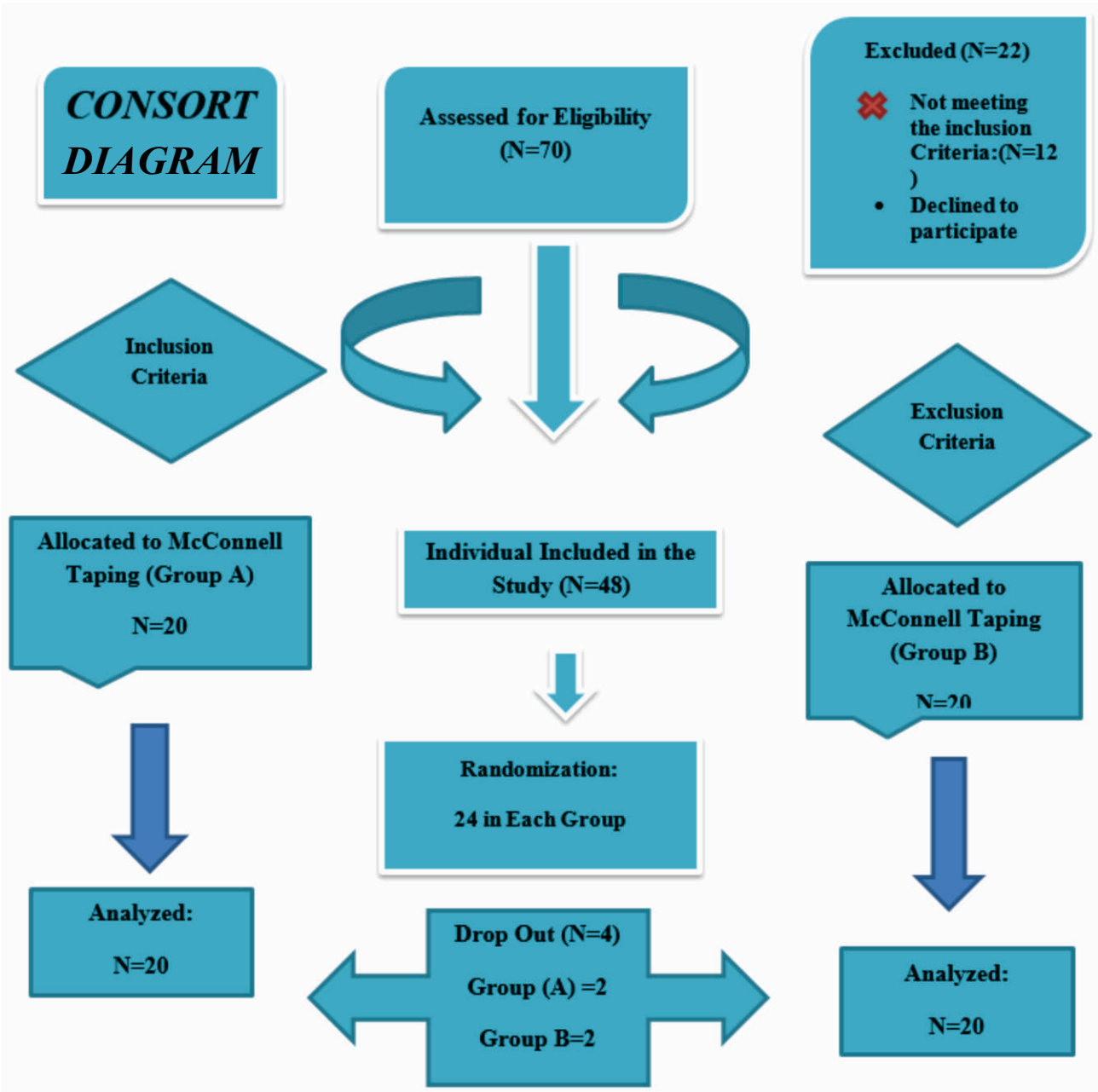
Discussion

Patellofemoral Pain Syndrome is a common cause of anterior knee pain, it mainly affects females. The present study investigated the immediate effects of McConnell taping on Q angle and knee joint pain in females with patellofemoral pain syndrome**.** Intensity of the pain was reduced in both groups, but its effects were noticed in experimental group as compared to control group with p value was <0.05. Overall mean Numeric pain rating scale decreased

Table I: Comparison of Q Angle, Intensity of Pain and Knee ROM between Experimental and Control Groups

Variables		Mean±SD(Experimental Group)		Mean±SD(Control Group)	P value
Age		**36.05 ±7.35**		**37.05±4.96**	**0.02**
Q Angle		**Pre**	19.05±3.02	19.29±1.56	0.11
		Post	14.0±2.01	18.01±1.72	0.00
NPRS		**Pre**	8.28±1.18	7.19±1.87	0.09
		Post	2.90±1.16	4.23± 1.60	0.05
Knee Range of motion	Flexion ROM	**pre**	125.06±8.87	120.09±5.97	0.06
		post	138.67±3.34	136.57±3.95	0.04
	Extension ROM	**pre**	0.54±1.5	0.00±0.00	0.05
		post	0.59±.67	0.00±0.09	0.00

significantly after taping from 8.28 to 2.9 in Experimental group. A previous study reported that patients with patellofemoral pain syndrome who were provided McConnell taping for two weeks reported significantly reduced pain score immediately after treatment and for 12 month follow up. Also 80% subjects achieved normal onset timing of Vastus medialis oblique and Vastus lateralis during squat and seated knee extension at 12 month follow up.[16,17]



Another study examined the EMG activity between VL and VMO while the individual used the muscles for eccentric phase of descending stairs and concentric phase of ascending stairs. They found the peak EMG ratio of VMO and vastus lateralis in descending stairs was lower than the ascending stairs.[A] double blinded randomized control trial was conducted on 30 patients with patellofemoral pain syndrome. They treated the patients for 12 sessions for a period of 2 weeks. Significant improvement was noticed in pain intensity in both groups.[18]

Similarly, a study was conducted by A.M Clifford in 2020 in which they used McConnell taping as well as tibial internal rotation limitation taping for Patellofemoral pain syndrome (PFPS). The results of this study revealed that pain intensity were decreased in both taping techniques.[19] The results in Current study also suggest that McConnell Taping is more effective in decreasing Q angle in patellofemoral pain syndrome. In this study the adjusted Q angle values for laterally and neutral placed patella was very close to the Centre of the reported ranges of Q angle after adjustment of lateral patellar displacement in the experimental group as compared to the control group. The present study suggests that increasing knee flexion Range of motion decrease the Q angle and patellar lateral displacement p value <0.05.The results of this study are supported by Tsung Yu-Lan in which they found the immediate effects of McConnell taping on pain and Q angle in patients with patellofemoral pain syndrome p value0.05.[3]A study was conducted by Ajlan Sac et al in which they found that higher Q angle is associated with decreased knee strength and taping decrease pain and also Q angle in patients with PFPS. [20]

Conclusion

The result of this study shows that McConnell taping combined with strengthening exercises to decrease pain intensity and Quadriceps Angle in patients with patellofemoral pain syndrome.

Limitations

Prolonged effects of the study were not measured as time duration was limited. Data was collected from single setting of physical medicine and rehabilitation department of Fauji foundation hospital Rawalpindi, so diversity was not achieved.

Disclaimer

It was presented online in World Conference on Exercise Medicine in Malaysia on 2nd Nov 2021.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Determining Students Preferred Learning Styles, Revisited as A Need of Today

Atteaya Zaman[1], Lubna Rani Faysal[2], Saima Mumtaz[3], Aqsa Malik[4], Yasir Iqbal[5], Tehmina Qamar[6]

ABSTRACT

Objective: To determine the most preferred learning styles of the medical undergraduates and to emphasize upon its utility in student centered teaching.

Study Design: Descriptive, cross-sectional study.

Place and Duration of Study: The study was carried at the Department of Biochemistry, Federal medical & Dental college from October to November 2019.

Materials and Methods: The study was carried on 1st year MBBS students after the approval of institutional ethics committee. A total of 85 students participated in the study out of class of 100 students. The sampling was purposive. The VARK (Visual, auditory, read-write, & Kinesthetic) inventory Tool version 7.1 was used as a survey questionnaire to gather the data about the preferred learning styles by the students. The collected responses were documented as VARK scores which were analyzed by using SPSS version 21. The quantitative data was expressed as frequencies & percentages

Results: Out of 85 students who took part amongst 100, 29% were males while 71% were females. The mean age of participants was 18.3 years. About 63% students preferred multimodal learning style while among the students preferred unimodal learning style, the predominant learning style identified was kinesthetic (34%), followed by auditory (15%) and visual (12%) and lastly read-write (8%).

Conclusion: The students prefer to use a combination of learning styles rather than sticking to one style predominantly. The cognizance of educators for learning styles of the students and planning of teaching activities accordingly optimizes their learning.

Key Words: *Learning Styles, Medical Students, Student Centered Teaching, Teaching-Learning Methods, Undergraduate Students.*

Introduction

Learning styles is a combination of complex cognitive, affective, and physiological characters which serve as an indicator of how the information is perceived by the learner.[1] It is an individual's natural and characteristic pattern of securing and perceiving information.[2]

[1]Department of Biochemistry/ Anatomy[3]
Federal Medical and Dental College, Islamabad
[2]Department of Dermatology
Pakistan Railway Hospital, Rawalpindi
[4]Department of Biochemistry
Mohtarma Benazir Bhutto Shaheed Medical College, Mirpur AJK
[5]Department of Ophthalmology
Watim Medical College, Islamabad
[6]Department of Biochemistry
Rawalpindi Medical College, University

Correspondence:
Dr. Atteaya Zaman
Assistant Professor
Department of Biochemistry
Federal Medical and Dental College, Islamabad
E-mail: attiadr@hotmail.com

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It is a challenge to impart new knowledge in a limited time frame so that it is easily perceived, retained, and interpreted by the students. It is also imperative on part of instructor to have awareness and understanding of styles of learning of students to facilitate the learning process.[3] Some of the students have preference for multiple learning styles whereas others prefer only one learning method.[4] Students with visual learning preference take in and give information completely and often make diagrams to comprehend concepts. Students with aural learning preference would like to listen while learning. Students with read-write learning style, favor textbooks to understand learning material whereas those with kinesthetic learning will like hands-on approach, including real-life examples and application of new materials.[5]

Exploring the preferred way of learning by the students is an important activity but unfortunately our educational system there is no provision of any such activity to identify the learning styles of our medical students. Furthermore, knowledge on

students' styles of learning is a neglected approach in our medical classrooms. As a result, curriculum has produced a generation of medical graduates who are ignorant about their preferred learning styles and even the teachers are not aware how to convey their message effectively.[6] Therefore, the medical students face difficulties in perceiving and retaining information, this leads to academic failures which can be easily prevented if predicted earlier.[7]

The literature search does not identify any solitary fine-teaching-learning plan that is found to work for each individual learner, it happens to be the sole responsibility of instructors to cater for the variety of learning styles amongst students and design a blended, suitable teaching approach to address the learning needs. The ability to facilitate all the students with different learning preference allows educators to help in enhancing student's performance.[8] Identifying styles of learning can potentially be highlighted in medical curriculum so as it encourages blending of teaching methodologies with diverse learning styles in entire batch of students, particularly aimed at low scorers, slow learners, or below average learners to perform better concomitantly.[9]

The present study is focused on the significance of addressing the diversity of styles of learning among medical students and its importance to plan the teaching strategies accordingly. The study conducted emphasizes upon the dire need of having knowledge of students' preferred learning styles to deliver the content effectively & its colossal impact in student centered teaching.

Materials and Methods

The study was descriptive, cross-sectional, carried on 1st year MBBS students at Federal medical & dental college from October to November 2019. It was conducted after the approval from institutional ethics committee and permission of the Director of the medical college.

An informed consent was taken before the initiation of the study. All the students of first year MBBS were included except for those who were absent on the day of data collection. It was a purposive sampling. The data regarding students' responses for their preferred learning style was collected by using VARK learning styles inventory, an established tool to determine learning styles. VARK questionnaire is a valid & reliable tool used already in many studies. VARK is an abbreviation of four sensory modes of knowledge acquisition (visual, aural, reading- writing & kinesthetic). It comprises of 14 questions of multiple choice with four options to select an answer. All options correspond to four learning preferences. Students can select more than one choices for every question. The collected data was documented and put to analysis in SPSS version 21.

Results

Out of 100 students 85 opted to participate in the study. Mean age of students was 18 ± 3.15 years and 71% were the females (Figure 1). It was noted that predominant learning style in participants was kinesthetic (34%), followed by auditory (15%), then visual (12%), and lastly read-write (8%). (Figure 2) Most of the students preferred more than one learning style in which majority used bimodal learning style in different combinations like VK 32%, VA 31%, AR 30.50%, and RK 28.0%, while some of the students opted for tri-modal predominant learning style as ARK 13%, and VRK 12%, and 3.5% preferred the quadri-modal style. (Table I) There was no effect of gender in choosing the preferred learning style.

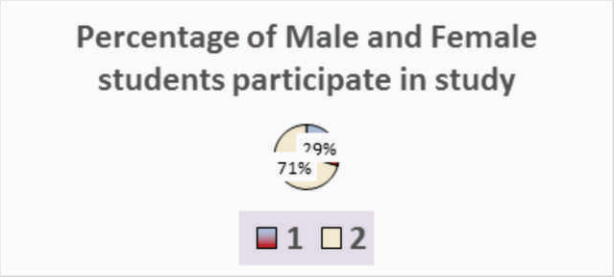

Fig. 1: Gender Distribution of the Participants

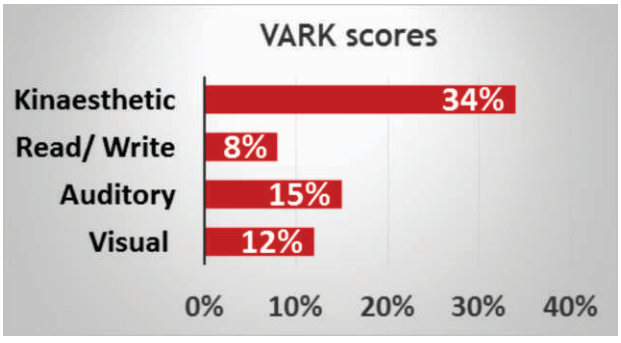

Fig. 2: Unimodal Preference of Participants

Discussion

In the present study, majority of students 63% displayed preference for multimodal styles of learning, showing their multivariate approaches for

Learning style	Percentage of the Participants (n=85)
VK	32
VA	31
AR	30.50
RK	28
ARK	13
VRK	12.4
KA	12
VARK	3.50

Table I: Multimodal Preferences of The Participants for Learning Styles

acquisition of knowledge with highest number of students having preference for VK (32%) followed by VA (31%). Among the unimodal learning style, the highest percentage was for Kinesthetic (34%) followed by auditory (15%), visual (12%) and the lowest number of students opted for Read/write (8%). There was no association of gender with the learning style.

The days of just delivering a lecture to a passive group are over. The medical educationists are now adapting to the newer teaching strategies according to the need of a learner keeping their preferences to attain knowledge, a paradigm shift from teacher centered to the student-centered teaching. [10] It is imperative to understand the diverse learning styles of the students and their importance in achieving academic excellence.[11]

There are various studies to explore the students' preferences for the learning styles with variable findings. In a study conducted at Turkey in 2006 on first year medical students by using the Turkish version of VARK, the results were like our study, 63.9% preferred the multimodality while 36% preferred the unimodality. In unimodality the highest percentage was of kinesthetic learners in both studies; 23.3% in their study while 34% in our study. The percentage of students using quad modality was 12.9% vs 3.5% in our study. [12]

In the present study, majority of students (63%) displayed preference for multimodal styles of learning, indicating their preferred multivariate approaches for perceiving information. While a similar work by Nuzhat et al states that a high percentage of students exhibited multi modal learning style i.e. about 72.6%. [13] This implies that most students learn effectively if modes of information transfer include a combination of strategies which strike pictorial, auditory, read-write and kinesthetic styles. Increased utility of multimedia for instruction can ensure to give prospects for students to be presented with numerous representations of study material i.e., text, audiovisual, auditory, imageries and interactive content to provide for more productively to varied styles of learning preferred in students.[14] In another study done by Baykan on medical students of first year reported similar findings, 36.1% of the learners favored unimodal method while 63.9% favored multimodal styles while no noteworthy contrast was appreciated between gender in preferred learning styles.[15]

Contrary to these findings, there are variations in reports on preferences of learning of medical students from different countries which can be attributed to variations in practices of teaching being adapted on premedical times and learning culture of that region. Among all these studies there was no association of the gender with any preferred learning style while the findings regarding gender association were quite different in a study conducted by Wehrwein EA, Lujan HL, DiCarlo SE. where male students predominantly preferred quad modal instruction, while the majority of female students opted for the unimodal instruction with a preference for Kinesthetic mode.[16] Hence showing that male and female students have significantly different learning styles.

While some of the students show keenness for preferring single modality out of the four, majority of the students use the multimodal learning style, and they must make a special effort to comprehend the content delivered. To cater to these requirements, teachers should first be made aware of learning styles of their students, which he or she is going to teach. Active student involvement in their learning plays a vital part in enhancing thinking abilities like inquiry and information analysis. This task can be possibly achieved only if active instructional strategies and learning approaches are adapted in the classrooms according to the learning needs of the learners rather than passive learning in the form of conventional classroom lectures which were mainly centered to the needs of auditory learners.[17]

Unmatched teaching–learning methodologies and learning styles can adversely affect learning and cause dissatisfaction on part of students.[18] Therefore, methods of tailoring instruction to students' preference of learning style are strongly debated upon. This stands out with a study performed by Stirling BV who reported that the teaching staff was voluntarily using teaching methods for active learning that were preferred by student and adapted these styles of learning as their most favored method of gain of knowledge. Correlating students' learning style preferences and instructional needs also provides a chance of personalized intervention strategies because of better matching between teacher and students.[19] Providing training facilities to medical facilitator to develop better understanding and knowledge of students' favored style of learning can certainly consequence in better reflection and acquisition of knowledge This is in congruence with one of the studies conducted in Saudi Arabia which state that students would be greatly benefitted if tutors and facilitators understood the elements that can be affecting and influencing students' styles of learning.[20] Although this is not a first study of its kind in Pakistan, before in 2016 a study conducted in Lahore at University college of medicine & dentistry by Najma Naz, Rehan Ahmed Khan & Gohar Wajid on students learning styles preferences showed interestingly some different results. About 54% students preferred for multi modal style and 46% for the unimodal, with 66% visual & only 18% kinesthetic learners. [21] While in our study it was only 12% visual and 34% was kinesthetic as a preferred unimodal learning style among the students. In the same region the students' preferences for learning are grossly different. Hence the current study strongly emphasizes upon the efforts to explore the learning styles preferences of the students, by all the medical institutions before the start of their educational programs, as the combination of various styles adapted by the students may be different. To achieve the maximum educational outcome, the teaching methodologies adapted by the institution must be aligned with the learning styles of its learners. Also, there is a need to explore whether preferred styles of learning amongst students vary as they advance from preclinical spiral towards clinical spiral, as most of the studies including the current study are done on the students from pre-clinical years.

Conclusion

There are different types of learners among the medical undergraduate with diversity of learning styles therefore the facilitators knowledge and understanding of various learning styles of students is mandatory to create a productive learning environment for all students to achieve academic excellence.

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DATA SHARING STATMENT

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ORIGINAL ARTICLE

Leadership Styles of Change Leaders Steering Curriculum Reforms in Pakistan

Ayesha Naveed[1], Sana Javed[2], Sakina Sadiq[3], Amer Siddiq[4], Irum Rehman[5], Rizwana Kamran[6]

ABSTRACT

Objective: To identify the leadership styles of medical educationists during their journey of bringing the curricular reform at their respective institutions".

Study Design: This was a cross-sectional descriptive study that focused on self-perceived leadership style.

Place and Duration of Study: This study was conducted in Riphah International Islamabad from February to July 2019.

Materials and Methods: Multifactor leadership questionnaire consisting of 45 items was used, having a 5-point Likert scale to see the predominant leadership style of the medical educationists involved in curricular reforms. Item 1-36 corresponds to the predominant leadership style.37-45 pertains to outcomes of leadership. Data was collected from 14 participants who were willing to participate in the study. Results were entered on an excel sheet and mean scores were calculated.

Results: The predominant leadership style of medical educationists came out to be transformative leadership with a mean score of 3.24. Leadership style mostly used was collaborative and transformative and transactional leadership style was also adopted.

Conclusion: Medical educationists faced many challenges during their journey of Educational Reform. The predominant leadership style identified is Transformational. Other leadership traits identified in change leaders are, Transactional leadership which monitors deviations and mistakes with a mean score of 2.81, and passive Avoidant behaviors are practiced the least with mean frequencies less than 1. As leaders, they must be prepared for the uncertainty and unexpected events and adapt themselves to the changing environment.

Key Words*: Change, Curricular Reforms, Educational Leaders, Leadership Styles, Transformational leadership.*

Introduction

In Pakistan, most medical schools are still following discipline-based, teacher-centered curricula and are in silos from the rest of the world. Only a minority have included new pedagogical approaches and reforms in the curriculum.[1] The need for change has been noted and accepted to some extent.[2]

Medical educationists are the middle leaders which make change happen.[3] Leadership has been described as an important factor in sustaining curriculum change.[4] The importance of strong leadership which can rally the faculty to common objectives has been highlighted.[5] Change leaders need to navigate the change at three levels: self, others, and organizations. It is the leader's job to create readiness for change in an organization.

Leaders' perspectives on the process of curriculum change were conducted by Velthius in the medical schools of the Netherlands, who pointed out three main issues faced by the leaders: dealing with stakeholders, resistance, and steering of the change process.[6] It is proven that leading change takes will, understanding, and involvement.[7] Successfully leading curriculum reforms requires ownership of the change process along with motivation.[8,9] Although, change in medical education is an ongoing process globally, but it will not last unless leadership and the change process are understood.

[1,6]*Department of Health Professions Education*
CMH Lahore Medical College and Institute of Dentistry, Lahore
[2]*Department of Family Medicine*
Military Hospital, Rawalpindi
[3]*Department of Dermatology*
Army Medical College, Rawalpindi
[4]*Department of Pathology*
Pakistan Kidney and Liver Transplant and Research Centre, Lahore
[5]*Department of Physiology*
Margala College of Dentistry, Islamabad

Correspondence:
Dr. Ayesha Naveed
Assistant Professor
Department of Health Professional Education
CMH Lahore Medical and Dental College, Lahore
E-mail: drayeshanavid@gmail.com

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In past, no such studies were carried out in which the leadership style of the leaders in health professions education steering the curriculum reforms were identified. exploring the perspectives of medical educationists as a change agent would expand and enrich our understanding of the complexities associated with curriculum change. bringing a change is not an easy job it requires a strong leader who is aware of challenges and has the vision to overcome those by navigating their leadership styles.

Kurt Lewin is known as the founder of 'Change Management' with his three phases for the change process: Unfreeze, change, and refreeze.[10]

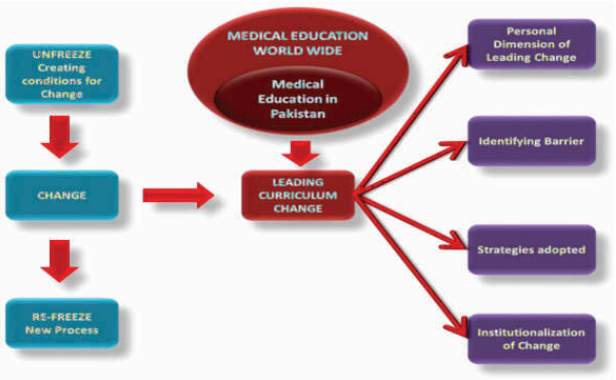

Fig. 1: Conceptual Framework

Materials and Methods

A cross sectional descriptive study was carried out at Riphah International University Islamabad from February 2019 to July 2019. Purposive (homogenous) sampling technique was used to gather the data which included 14 medical educationists involved in curricular reforms from four different universities which includes Shifa college of Medicine, Islamic International medical college, Fauji Foundation University & Khyber Medical University. Ethical approval of the study was obtained from Ethics Review Committee, Islamic international Medical College. Informed Consent was taken from the participants. Permission to reproduce the Multi leadership Questionnaire was taken from Mind Garden.

Key persons involved in implementation of reforms in medical schools with a background in medical education. Those who are not willing to participate in the study.

Data was collected on multifactor leadership questionnaire which was sent to the participants though emails and responses were collected. Permission to administer the campaign was obtained by Mind Garden. Multi leadership Questionnaire is a pre validated questionnaire, the construct validity of which has been established through confirmatory factor analysis.[11] Data was received from online survey and the results were entered on excel sheet and mean scores were taken. The predominant leadership style of the participant was determined.

Results

There were 14 participants out of which 7 were males and 7 were females, all of them were senior faculty members from their institutes. All of them had back grounds from MBBS or BDS and all had post graduate qualifications in Health professions education.

The predominant leadership styles of these change leaders are displayed as follows:

Table I: Predominant Leadership Style of The Respondents

Leadership Subdivisions	Mean Scores of Participants	Standard Deviation
Transformational Leadership		
Builds trust Idealized Influence – Attributes	3.01	0.64
Idealized Influence Behavior Acts with Integrity	3.41	0.38
Encourages others Inspirational motivation	3.33	0.23
Encourages Innovative Thinking (Intellectual Stimulation)	3.22	0.41
Coaches & Develops People (Individualized Consideration)	3.29	0.36
Transactional Leadership		
Rewards Achievement (Contingent Reward)	3.33	0.44
Monitors Mistakes (Management-by-Exception: Active)	2.81	0.66
Avoidant Passive		
Fights Fires (Management-by-Exception: Passive)	0.64	0.43
Avoids Involvement (Laissez-Faire)	0.52	0.61
Outcomes Of Leadership		
Generates Extra Effort	2.95	0.44
Is Productive	3.44	0.41
Generates Satisfaction	3.45	0.43

Five I of Transformational Leadership	3.24	0.27
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Participants mean score showed that Transformational leadership style was rated as the highest (3.24), followed by transactional (3.07). Idealized influence (behavior) with integrity was the dominant style adopted by medical educationists which falls under transformational leadership. Comparison of males and females showed 'Individualized influence (behavior)' (Mean =3.3) the most dominant leadership style among males, while 'Encourages others' Inspirational motivation (Mean =3.34) was the dominant style among females.

Trust, integrity, and coaching styles are considered the most active and effective. The passive avoidant leadership styles have been regarded as the most ineffective form of leadership. Falling in between the two extremes of effective / ineffective and active /passive is transactional leadership styles which is reward based.

Discussion

The purpose of this study was to explore the Leadership styles of medical educationists and challenges faced during curricular reforms Leadership style of successful educational leaders can help future change agents in identifying the successful leadership practices and improve their leadership skills.[12]

The predominant leadership style of medical educationists came out to be Transformative leadership. It is the leadership style as perceived by the participants now which depends on the circumstances, although it came out to be transformative leadership style, but it may not be the only style they used during their journey of reform. Empirical evidence shows that transformative leadership is regarded as the most effective style in bringing change in an institute.[13,14] Yukl argued lack of evidence of situational and contextual factors on the effectiveness of transformative leadership.[15] Furthermore, Hamstra, Yperen, Wisse, and Sassenberg (2011) studied transformational leadership and follower commitment and concluded that this area requires further exploration.[16] During the planning phase when the idea is still in the initial stage, the faculty has to be convinced and motivated to adopt a new strategy, transformative leadership is regarded as the most effective. There is scarce evidence available in literature regarding role of gender in transformational leadership. In our study Males and females did show slight differences. Males showed higher scores for 'Individualized influence (behavior)' (Mean =3.3) while females scores showed an inclination towards 'Encourages others' Inspirational motivation (Mean =3.34). Individualized influence is a behavior characteristic which shows high consideration for its followers and is dependent on two-way communication. Moreover, different leadership sub-strategies that were adopted by female and male participants were identified. Female participants demonstrated collaborative techniques in contrast more male members opted for harsher measures when the need arose. Most of the strategies adopted were collaborative so broadly they also fall under

transformative styles. According to Bass female leaders demonstrate transformational behaviors as compared to males but leadership styles depend not only on personal traits, personal beliefs and values but also on the environment and surrounding 17, 18 all these factors help shape leadership styles. Organizational cultures also encourage certain leadership style and discourage others. Participants in the study pointed out that communication skills, collaboration were the most important assets in the journey of curricular change.

Limitations of Study is leadership measure. Multi leadership questionnaire self-form was used which describes the leadership style of the individual as perceived by themselves.

Another limitation of this study is that this was the leadership styles of the participants at present. We did not have the leadership styles of any participants when they were in the early phases of their journey. Since we first identified the institutes where successful reforms in medical education had taken place the sample size of medical educational was restricted.

Future work: It is recommended that this could have been more interesting to measure the leadership style of a large sample of medical education leaders.

Conclusion

Medical educationists leading the curricular reforms faced many ups and downs during their journey of Educational Reforms. Curricular reforms are challenging and not a single leadership style or strategy can be labeled as successful for which they have to navigate their leadership styles according to the needs. The predominant leadership style identified is Transformational. Other leadership traits identified in change leaders are, Transactional leadership (Rewards Achievement) which monitors deviations and mistakes (Management by Exception Active) with a mean score of 2.81, and passive Avoidant behaviors are practiced the least with mean frequencies less than 1.

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CONFLICT OF INTEREST

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Perception of MBBS Students About Structured Versus Traditional Viva Examination Formats

Fareeha Naseer Syed, Attia Sheikh, Syed Atif Hussain Andrabi

ABSTRACT

Objective: To explore the perception and views of undergraduate medical students about the significance of structured versus traditional viva formats.

Study Design: It was qualitative exploratory research

Place and Duration of Study: The study was conducted in Pathology department of CMH Multan Institute of Medical Sciences from December 2019 to August 2020.

Materials and Methods: Four sets of focused group discussions were carried out, each group comprising of 8 students of fourth year MBBS who had undertaken both structured and traditional viva examinations in the subject of Pathology. The students who did not appear in the exam and those who did not volunteer for the study were excluded from the study. The interviews were audio recorded followed by transcription and manual thematic analysis. The students identified their preferences for the type of viva which gave an umbrella of themes. The subthemes were then identified to find out the exact reasons of their preferences.

Results: The results of the study yielded five themes and sub themes. The main themes were attitude towards exams, exams preparation, time management, student teacher relationship and relevancy of content of viva. The students suggested that viva exam of all subjects should be structured to maximize uniformity of content coverage, time management and attitude improvement for both faculty and students.

Conclusion: The students were Overwhelmingly satisfied with structured viva as compared to traditional viva format. They emphasized structured viva as their preferred assessment method as traditional viva does not truly reflect a student's competence.

Key Words: *Assessment Methods, Perception, Structured, Students, Traditional Viva.*

Introduction

The rapidly evolving medical education system has made the assessment of medical students a challenging task. There have been a number of ways by which students can be assessed but viva voce has always been an integral part of students' evaluation[1,2]. Traditional viva voce has long been used as a summative assessment tool[3]. Though it has some potential strengths like greater compliance and flexibility both on part of students and teachers [4] ,this method also has some serious flaws in it[5]. It is more teacher centered, time consuming, variable, examiner biased, difficult , not interactive, with tense atmosphere during exam.[6]All these demerits make both the validity and reliability of this method questionable[7,8.]In order to overcome these difficulties a much reliable approach was much needed and it was provided by structured viva format. It has been introduced in various medical universities globally [9,10,11]. This modified format helps in eliminating many flaws including the element of bias and gives an equal and fair chance to every student.

A lot of research has been done and methods of structured exam devised. Students desire the needed change in assessment methods. Hashim R et al. confirmed in their study that 98% of their students were satisfied with the structured viva format [9]. Though many quantitative and some qualitative data endorse the efficacy of structured format but literature review shows very little work done in this area ethnographically. Ethnographic research is one of the best and unique ways to explain students'

[1]*Department of Pathology/Department of Medical Education*[2]
CMH Institute of Medical Sciences, Multan
[3]*Department of Radiology*
Combined Military Hospital, Multan

Correspondence:
Dr. Fareeha Naseer Syed
Assistant Professor
Department of Pathology
CMH Institute of Medical Sciences, Multan
E-mail: fareeha1976@gmail.com

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perception about viva examination whereby the researcher documents the culture, perspectives and practices of people in a particular setting[12,13,14]. Detailed informal or conversational interviews allow to probe their issues in a more naturalistic manner. A more recent form of ethnography, the Focused Ethnography (FE), investigates a specific issue among small groups of people instead of whole communities, for example, students of a medical college[15].Because, the scope of FE is narrow, the researcher generally has better and more knowledge about the topic under study and does not need immersion in cultural practices and engagement in long-term fieldwork. Thus, FE is more feasible for busy medical educators who are curious and want to explore outcomes in their own setting[16,17,18].

With this background knowledge, we decided to carry out a qualitative research project in Pathology department of CMH Institute of Medical Sciences Multan. We wanted to explore what our students feel about the viva examination systems being followed in our setting and convince our faculty that our students are aware and desirous of a much-needed change in that system. Our students volunteered to both structured and traditional viva formats followed by recording their perceptions and views about the two formats via focused group interviews.

Materials and Methods

This qualitative, focused ethnographic study was conducted from December 2019 to August 2020 at CMH Multan Institute of Medical Sciences, Multan, Pakistan. After taking approval from institutional ethics review board the sample was collected using purposive sampling technique from among fourth year medical students who had undertaken their viva voce in the department of Pathology at CIMS Multan at the end of second modular examination. Those students who did not appear in the exam and those who did not volunteer were excluded from the study.

There were 100 students, who were divided into four batches of 25 students each. Viva was conducted on 4 consecutive days. Each student had to take both structured and traditional viva examinations by two separate examiners. The students were briefed about the new viva format beforehand.

For structured viva, questions with keys were prepared mutually agreed by all the faculty members with increasing difficulty level as per the Bloom's taxonomy of educational objectives of cognitive domain, i.e, easy, moderate and hard. Each student was given an equal time. There were four pools of questions, one pool of ten questions to be used each day with equal marks distribution for each batch(Table I).

Table I: AN EXAMPLE OF A POOL OF 10 QUESTIONS FOR STRUCTURED VIVA (TOTAL MARKS:10; TIME:10 min)

QUESTIONS	DIFFICULTY LEVEL	COGNITIVE LEVEL	MARKS
Q1. What is anthracosis?	Easy	Recall	1
Q2. What is an atheromatous plaque composed of?	Easy	Recall	1
Q3. Define Barrett esophagus.	Easy	Recall	1
Q4. Define cirrhosis.	Easy	Recall	1
Q5.What are pathological complications of atherosclerosis?	Moderate	Explanation/Reasoning	1
Q6.How can you differentiate between bacterial and viral pneumonias on lung biopsy?	Moderate	Explanation/Reasoning	1
Q7. Which serum markers are used to assess hepatocyte integrity?	Moderate	Explanation/Reasoning	1
Q8. What is the importance of ANCAs in the diagnosis of vasculitis?	Difficult	Correlation/Analysis	1
Q9. Explain the role of spleen in pneumonias.	Difficult	Correlation/Analysis	1
Q10.Give the differential diagnosis of villous atrophy in small intestine.	Difficult	Correlation/Analysis	1

The traditional viva examination was conducted conventionally with examiner asking 10 random but relevant questions and with the same time limit. Maximum 10 marks were awarded to this part of exam too.

In order to control bias it was assured that the viva questions for the structured examination prepared were kept in complete secrecy; only the examiner knew about those at the time of the exam. The students who had taken the structured viva were kept separate from rest of the examinees with strict compliance to exam protocols. Everyday a separate pool of questions was used. Same couple of examiners conducted the viva on all the four days to remove teacher-teacher bias.

After taking informed consent the focused group interviews were taken at the end of viva each day from those students who volunteered. Each group interview lasted for about 60minutes. The questions used for focused group interview were finalized after being validated by experts in the field of medical education. The opinions of the students were both audio recorded as well as noted down by the moderator. The audio recordings were later transcribed verbatim. Thematic analysis was conducted. In the first stage day wise coding was done which produced four sets of codes (D1-D4). Every individual in a group was further given a lettered code from A to H. In the second stage these codes were arranged and then evaluated into themes and subthemes.

Results

Of the hundred students , four groups of students (32%), each comprised of 8 students, volunteered for focused group interviews. Results of the study revealed five major themes and subthemes after consensus of the researchers. (Table II).

The first theme was "Attitude towards exams". Most of the students felt that during traditional viva there was generally an aura of fear and anxiety. Viva is a test of communication skills and not everyone is good at it. Many students could not answer because of anxiety or shyness despite of knowing the answer. Their self-confidence was boosted with structured viva format. According to one student, "I've never felt so confident in any viva examination before. Structured viva is far better way to express myself. It was just like a quiz show where I was answering and scoring." (D1-F). In traditional viva students felt the examiner's bias when he changed difficulty level of question from easy to hard for some students and vice versa, "I think I had a better connection with my examiner taking structured viva. I didn't feel nervous.

Table II: Medical Students' Perception About Traditional and Structured Viva Examinations

Theme	Sub-Theme	Students' Remarks
Attitude towards Exams	Boosting the confidence of students Reduction in anxiety & fear	"I've never felt so confident in any viva examination before. Structured viva is far better way to express myself. It was just like a quiz show where I was answering and scoring." (D1-F). "I think I had a better connection with my examiner taking structured viva. I didn't feel nervous. But in traditional viva it was not the same. We never bonded." (D4- B)
Exam Preparation	Uniform coverage of syllabus	"It will really help in final exam preparation as it covers all the aspects of the syllabus. There was no drifting sideways. I think structured viva should be the preferred method for our assessment." (D2-H)
Time Management	Equal time management by students Equal time distribution by faculty	"Previously my viva used to linger for as long as half an hour. It was a relief that this exam finished in time. Since it was time bound so it will also help me in time management in my final exams." (D3-C).
Student-teacher Relationship	Gender bias Favoritism	"I felt that the examiner disapproved of me irrespective of what answers I gave during traditional viva examination. It was a prolonged exam which I wished to end early. However, during structured viva there was no such feeling."(D2- C) "I'm sure that my colleague was given extra attention. It happened during traditional viva when the examiner didn't have an y pool of questions to ask from and he simply was asking his favorite questions from only some students" (D3-A)

But in traditional viva it was not the same. We never bonded. I wasn't given a chance." (D4- B)

The second theme was "Exam preparation". Although uniform coverage of every topic in a large group is an uphill task. However, the results of our study showed that majority of the students were satisfied with the structured viva exam. All the question asked were sufficient to cover the relevant topic and the required learning outcomes were met. One of the students said "It will really help in final exam preparation as it covers all the aspects of the syllabus. There was no drifting sideways. I think structured viva should be the preferred method for our assessment." (D2-H).This was not the case with the traditional viva. The examiner usually stuck with one or two questions of his choice.

The third theme was "equal distribution of time". Students felt that time distribution was more uniform during structured viva than traditional viva though overall duration of both exams was same. In traditional viva the time was lost more on some questions than others."Previously my viva used to linger for as long as half an hour. It was a relief that this exam finished in time. Since it was time bound so it will also help me in time management in my final exams" (D3-C).

The fourth theme that emerged was " Student-teacher relationship". Examiner's approach to present difficult questions to different students might have shown bias. Most of the students felt that gender bias was not felt at all during structured viva but during traditional viva some of them experienced it. One of the students who experienced gender bias during traditional viva mentioned that in a reserved manner, "I felt that the examiner disapproved of me irrespective of what answers I gave during traditional viva examination. It was a prolonged exam which I wished to end early. However, during structured viva there was no such feeling."(D2- C). Another student was very much unhappy of the favoritism shown by the examiner, "I'm sure that my colleague was given extra attention. It happened during traditional viva when the examiner didn't have any pool of questions to ask from and he simply was asking his favorite questions from only some students" (D3-A)

The final theme was "relevance of content of viva questions". For structured viva examination, most of the students believed the questions were relevant, focused and according to their syllabus and content. However, for traditional viva some students complained that they were asked out of syllabus questions as their viva was drifted sideways. "I think structured viva was more relevant than traditional viva as it covered the important topics without wasting time on unnecessary details.". (D4- G)

Discussion

Our study is unique as no one has used a focused ethnographic technique to take into account students' views about both traditional and structured viva examination formats. Majority of students favored the structured format of viva while highlighting the issues of traditional format.

Traditional viva examination system has now been obsolete in many parts of the world because of its high degree of subjectivity, bias and poor validity.[19,20] Such imperfections can be eliminated by the use of structured viva format. Structuring can be challenging, as it requires a large Q bank with valid keys, frequent updates , difficulty levels according to Miller's pyramid must be ensured, and it all requires a dedicated faculty, space and time.[20,21] Majority of the studies conducted now reveal that both students and faculty believe that structured viva owns a satisfactory level is terms of the efficacy of assessment[22,23].

The main objective of our study was to determine the perceptions and views of our undergraduate students about structured versus traditional viva formats. About 99% of our students expressed that the questions asked in structured viva were relevant, syllabus was uniformly covered, and it helped in equal time management. Dangre-Mudey G et al. also confirmed similar findings in their study where 52% of their students agreed on uniformity of covered syllabus and 56% students agreed on equal time distribution among students in structured viva.

Most of our students (almost 98%) believed that examiner in structured viva was more friendly, unbiased and did not ask repetitive questions, however, during traditional viva the examiner was usually moody, focused on some topics and students. Such findings are mirrored by another study conducted by Shah HK et al. where 75% of the students favored structured viva for the same reasons.

The medical education research has been moving towards a more interpretivist approach and focused ethnography has provided a more pragmatic way to execute this[17,18]. We used focused group interviews as a tool to indulge into the social culture of our medical students, in order to comprehend and realize the real time issues that our students might be facing while dealing with professional studies and high-stakes examinations. Shadab et al.[22] conducted a similar qualitative study in a clinical setting which showed comparable results as ours. Medical educationists have been working hard on making the assessment methods more objective with promising results[23,24]. Our study highlighted the inherent issues in the traditional viva examination. Structured viva is a good way to improve student-teacher relationship, boosting students' confidence, enhancing their communication skills, higher cognitive functions and application of knowledge[25].It also helps students identify their weak areas. In future they can work on their shortcomings and work harder to achieve better.

The main limitation of the current study is that it was carried out on the students of just one medical college. Also, it could not involve students of other classes due to time constraints.

Future studies should include ethnographic research models being applied on students of other classes as well as other medical colleges to improve its validity and reliability further. Future studies should also be conducted on the use of structured assessment methods in clinical examinations too.

Conclusion

From this study it was concluded that our students were overwhelmingly satisfied with structured viva as compared to traditional viva format. They emphasized structured viva as their preferred assessment method as traditional viva does not truly reflect a student's competence. They believed that in the form of structured exam, they found a better approach to boost their confidence, overcome the fear of traditional viva exam, uniformly cover the syllabus, and get better at applying knowledge to deal with specific problems in future clinical practice.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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Authors have declared no specific grant for this research from any funding agency in public, commercial or nonprofit sector.

DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

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SUBJECT AREA: JIIMC is a multi-disciplinary medical journal that publishes scientific research articles related to biomedical sciences.

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