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EDITORIAL

DOI: 10.33897/fujd.v4i2.434

Climbing the Ladder of Academia: Transformative Leadership in Healthcare

Yawar Hayat Khan[1]

The healthcare ecosystem is one of the most complex systems with unpredictable prospects. In a world where titles and positions matter and influence in the most significant ways, it would be unfair to term a modern healthcare leader as just an entitled position. Healthcare leadership is not merely a position but more of an action. In the swiftly evolving landscape of healthcare, the role of academic leadership stands at a critical point. As the healthcare industry faces numerous challenges and opportunities, the need for transformative leadership in academia has become more essential.[1] This editorial seeks to briefly highlight the dimensions of transformative leadership within healthcare academia and its significant role in shaping the future of healthcare.

As healthcare institutions provide the nurturing factors of future healthcare professionals, effective leadership becomes essential to ensure that students are not only well-prepared in their theoretical knowledge but also equipped with the skills necessary to face the difficulties of modern healthcare systems. Academic leadership in undergraduate medical and dental colleges encompasses several responsibilities which include curriculum development, faculty support, student engagement, and fostering a culture of continuous improvement and readiness to change.[2] New Leaders must balance these responsibilities while adapting to the rapid evolution of health sciences. A dynamic curriculum is one of the most significant features of quality education. Academic leaders must ensure that the current healthcare curriculum is evidence-based, integrates the latest research, and reflects the realities of clinical practice in a specific region. Transformative leadership must ensure the planning and development of modern curriculums which are at par with the recent advancements.[3]

Let us not forget that curricula are mere weapons, and we need soldiers to use them. Leaders in healthcare academia must prioritize faculty development by providing ongoing training opportunities, encouraging research, and fostering a collaborative environment.

An encouraging leader who supports the faculty in their professional growth not only enhances their teaching capabilities but also ensures they can serve as effective mentors and role models for students.[4]

With time, the effort and the journey that a person makes is lost and the most eloquent sign of success is the destination or the outcome. The biggest and most important stakeholders in our system are the students. It is the utmost need of the hour that healthcare leaders must cultivate an environment that promotes active learning, critical thinking, and scholarly growth. Academic leadership must come forward with support systems for student well-being, addressing mental health concerns, and ensuring a balanced workload. Engaging students in decision-making processes is also critical as they will be the future of our healthcare system. Medical Education leaders must instill a culture of continuous improvement within their institutions.[5] They must be equipped with qualities which empower them to encourage innovation, embrace change, and maintain high standards of excellence. By fostering an environment where both faculty and students are encouraged to challenge the status quo and seek better solutions, leaders can drive the evolution of educational practices and outcomes.[6]

Once our educational leaders have traced these essential requirements, they must not overlook the challenges and opportunities. The increasing complexity of healthcare, advancements in technology, and artificial intelligence, has evidently led to a requirement for leaders who are ready to accept technology-enhanced interventions into their academic structures. Academic leaders must integrate the use of artificial intelligence in data analysis and research, innovation in teaching methods, predictive analytics, and practical demonstrations.[7]

It is essential that academic leaders commit to their own continuous professional development as well. This includes staying informed about advancements in medical education, participating in leadership training programs, and seeking mentorship and peer support.

The future of healthcare depends on the strength and vision of its academic leadership. As the healthcare environment continues to evolve, so too must the strategies and approaches of those leading educational institutions. By embracing innovation, fostering collaboration, and maintaining a steadfast commitment to excellence, academic leaders can ensure that undergraduate medical and dental colleges remain at the forefront of healthcare education.

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ORIGINAL ARTICLE

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Lower Incisor Inclination and Symphysis Dimensions in Different Skeletal Patterns

Amna Farrukh[1], Quarat-ul-Ain Anwar[2], Sadia Asif Samdani[3], Samra Bokhari[4], Ayesha Basit [5]

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Objectives: To compare lower incisor inclination and symphysis morphology in Class I, II & III malocclusion individuals.

Materials and Methods: In 120 lateral cephalometric images of adults lacking previous orthodontic management, heights of the mandibular symphysis (LH), buccal (LA) & lingual (LP) cortex, as well as inclination, were all measured. Additionally, malocclusion types (Class I, II, & III) were considered. The independent t-test was utilized to evaluate differences in lower incisor location and symphysis dimensions. A *p*-value ≤ 0.05 was considered as significant. Data analysis was done using SPSS-26.

Results: The sagittal malocclusion groups differed significantly in terms of Incisor Mandibular Plane Angle (IMPA) and symphysis size. Because the lower incisor apex in Class III individuals was near the buccal cortex, the value of LA was lower & LH was higher. Because the lower incisor apex of Class II individuals was close to the lingual cortex, their LP value decreased, and their LH value increased.

Conclusion: The sagittal malocclusion groups differed significantly in terms of IMPA and symphysis size. Because the lower incisor apex in Class III individuals was near to buccal cortex, the value of LA was lower & LP was higher. Because the lower incisor apex of Class II patients was close to the lingual cortex, their LP value decreased, and their LH value increased.

Keywords: Lower Incisor Angulation, Mandibular Symphysis, Morphology

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INTRODUCTION

It is evident that the dentofacial composite possesses a compensation system that works to maintain a balanced & proportionate facial structure. The remaining craniofacial tissues react to cover up deviations in either basal bone's typical growth pattern, whether it be maxilla or mandible.[1] In an effort to create a normal incisor relationship, dental compensation conceals Anteroposterior (AP) and vertical basal bone discrepancies.[2,3]

ORIGINAL ARTICLE
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Holdaway (1956) was the first to suggest a compensation mechanism related to the skeletal Class II apical base for an adequate face balance.[4] The relative tilting of the upper & lower incisors results in this relationship. According to Goldsman (1959), the dentofacial complex possesses compensating or balancing property that maintains general synchronization & proportions of facial patterns.[5] To create a normal incisor relationship, Jacobson (1974) suggested that dento-alveolar compensation serves to conceal AP & vertical basal bone anomalies.[6]

The proportions of the alveolus are changed to conceal AP & vertical basal bone differences when either basal bone diverges from its predicted growth pattern.[7] The cortical indices of the alveolus at the incisor apex might be thought of as "orthodontic walls" since they define anatomical boundaries.[8] Which individuals can be effectively treated with therapy alone, who also need surgery, is a question that emerges. In addition to aesthetics, orthodontists must consider whether there is enough room for orthodontic tooth movement to rectify malocclusion with little iatrogenic tissue loss. The orthodontic walls must be considered when designing a treatment plan since they act as a barrier to tooth movement and a potential hotbed for adverse consequences as well. The borderline condition is classified as "orthodontic" or "surgical-orthodontic" if this unfavourable consequence occurs.[9-11]

Our current study's objective was to examine lower incisor dentoalveolar compensation in individuals with Class II & Class III malocclusions using a straightforward, visualized treatment objective. This will enable us to assess whether there is enough alveolar bone for the incisors to move safely and repair anteroposterior skeletal abnormalities.

MATERIALS AND METHODS

This descriptive cross-sectional study was carried out over six months (January 2022 to June 2022) at Hamdard College of Medicine & Dentistry after the approval of the institution's Research Ethics Committee (NO ERC/BDS/016/2022). After obtaining written informed consent, a total of 120 patients with skeletal malocclusion who met the eligibility criteria were enrolled in our study via a non-probability sampling technique. The inclusion criterion was patients aged between the ages of 18 and 30 with a full dentition & no prior orthodontic treatment. Patients with syndromic conditions, prior orthodontic or maxillofacial surgery, craniofacial abnormalities, or root resorption were excluded.

OPENEPI calculator sample was used to calculate the sample size. The sample size was calculated by using the prevalence of malocclusion i.e. 93%[12], 5% margin of error, and 95% confidence interval. The calculated sample size was 101 but we included 120 patients as we were able to collect 120 samples during the study period to further increase the strength of the study.

The included patients' lateral cephalometric X-rays were acquired and examined. Class I, II, & III malocclusion participants provided 30 X-rays each.

Class I, Class II & III Subjects:

For the sagittal classification of malocclusions, an ANB angle was adopted.

Class I (control group): optimum overjet & overbite, ANB $= 2° \pm 2°$.

The subjects for Class II - Class II Div 1 were chosen, ANB $= >4°$

ANB $< 0°$ with edge-to-edge incisor relation for Class III.

All lateral images were taken from the similar digital center to prevent magnification blunder. The same surveyor completed all manual tracings with lead acetate paper & sharp pencil.

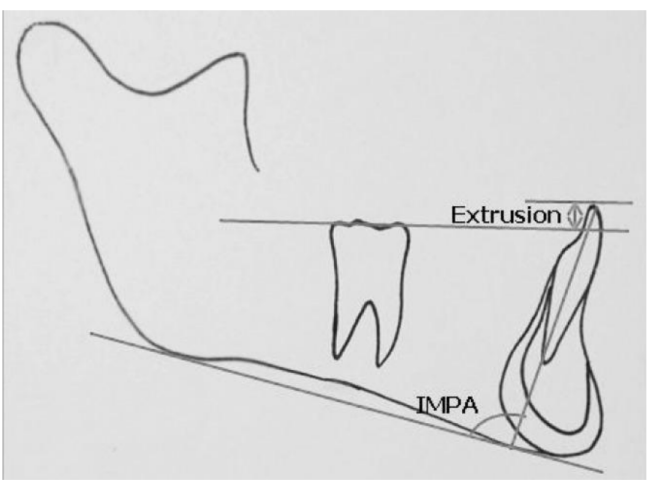

Figure 1: The position of the lower incisor: IMPA and extrusion.

The incisor-mandibular plane angle(IMPA), which is the angle between the lower incisor's long axis & mandibular plane, was calculated.

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Symphysis Dimensions (Figure 2)

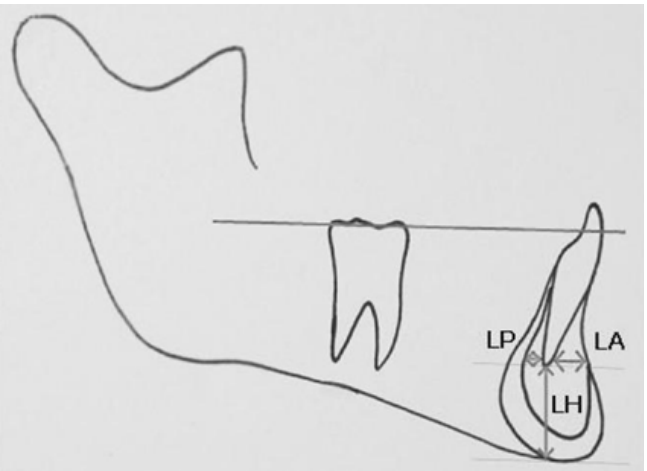

Figure 2: The dimensions of the symphysis: LP, LA, and LH.

LP: Bone that is lingually posterior to mandibular incisor apex. lingual cortical limit to the apex of the mandibular central incisor along the plane parallel to the occlusal plane traced across the apex.

LA: Bone that is front of mandibular incisor apex (labial). A line traced from the apex of the mandibular central incisor along a plane parallel to the occlusal plane extends to the limit of the labial cortex.

LH: inferior mandibular incisor apical bone. The smallest distance that may be traversed by a line perpendicular is drawn to the occlusal plane from the apex of the mandibular incisor to the lowest point of the symphysis.

For intra-rater reliability complete cephalometric analysis were repeated for 20 randomly chosen radiographs. The business was controlled through strict compliance with inclusion/exclusion criteria. The Class II & Class III participants' measurements of specified dimensions were compared to same of Class I individuals who served as a control group. The independent t-test was used to evaluate differences in the mandibular plane, lower incisor location, & symphysis dimensions. P-values between 0.05 & less were considered as important.

RESULTS

Table 1 summarises the comparison of IMPA amongst 3 groups. It demonstrates that class II subjects have an increased IMPA, while class III subjects have lower IMPA. Table 2 compares the dimension of symphysis among all 3 groups & significant differences were found.

Table 1: Mean antero-posterior and vertical skeletal measurements

Parameter	Class-I	Class-II	Class-III	*p*-values		
				Class I versus Class II	Class I versus Class III	Class II versus Class III
IMPA	91±4.1	104±4.2	87.6±3.0	0.000	0.000	0.000

Table 2: The comparison of symphyseal dimensions across three study groups

Parameters	Class-I	Class-II	Class- III	*p*-values		
				Class I versus Class II	Class I versus Class III	Class II versus Class III
LH (mm)	19±0.7	23±0.6	22±0.4	0.000	0.000	0.000
LP (mm)	3.7±0.2	2.2±0.2	4.5±0.4	0.000	0.000	0.000
LA (mm)	3.9±0.1	4.9±0.1	2.9±0.2	0.000	0.000	0.000

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Class II Subjects (Figure 3)

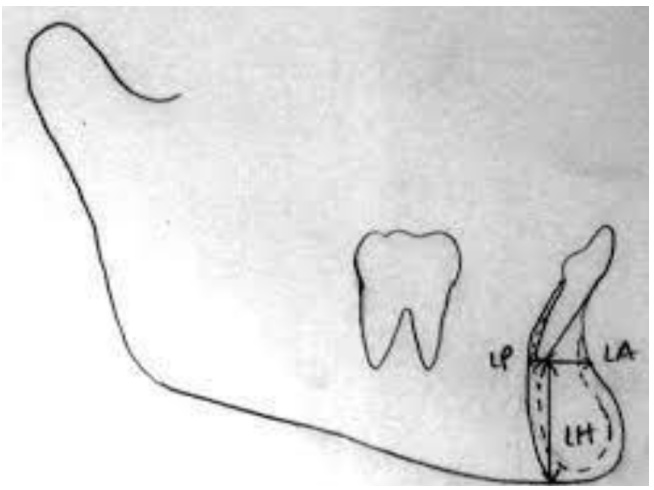

Figure 3: In Class II subjects, with proclined incisor, the apex nears the lingual cortex

Component 1: IMPA & LA, the bone amount among the incisor's apex & buccal cortex increases with incisor proclination. LA's value decreases as the value of IMPA does.

Component 2: IMPA & LP, with increment in IMPA, LP value declined.

Component 3: LH, this changeable concludes extrusion of the incisor. It's greater in Class II individuals in comparison to Class I.

Class III Subjects (Figure 4)

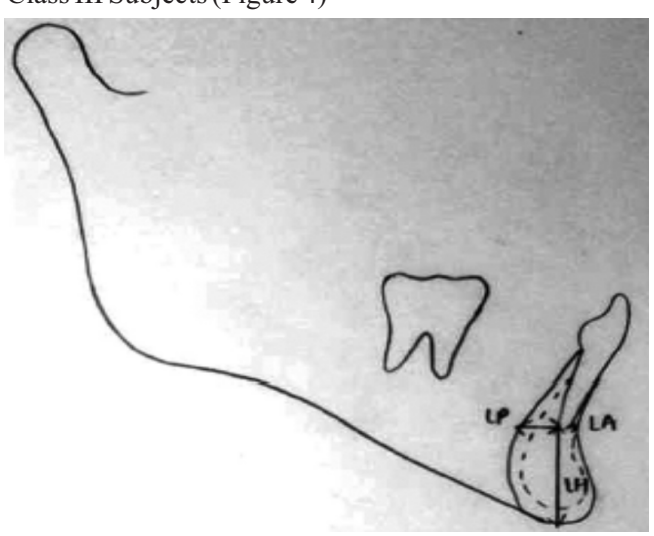

Figure 4. In Class III subjects, with a retrolined incisor, the apex nears the buccal cortex

In Class III subjects, with retroclined incisors, the apex approximates the buccal cortex.

Component 1: IMPA & LA, more ratiocination of incisor, bone amount among apex & buccal cortex.

Component 2: IMPA LP, with the decline of IMPA, LP value increased.

Component 3: LH was greater in Class III individuals in comparison to Class I.

DISCUSSION

Class I, II, & III skeletal malocclusions were studied by Handelman. All individuals with malocclusions & lengthy facial structures as well as Class III with normal features showed a decrease in alveolar width. However, sample sizes were small & heterogeneous[13] when the patients were divided into nine subgroups. The relationship among alveolar bone & movement of incisors with respect to vertical & sagittal skeletal structure has been studied in a few additional studies than Handelman's. Small and varied sample sizes were used.[14–17]

Molina-Berlanga N et all, considered class I and III individuals, also found a negative correlation of LA in Class III similar to our study. Because class III individuals have lower incisor's apex close to the buccal cortex.[9]

In a previous study, it was discovered that the amount of bone in the incisor's apex & buccal cortex increased with incisor proclination in Class II participants. LA's value decreases as the value of IMPA does.[18] The same results were seen in our study.

Except for a study by Maniyar et al., where major variations were discovered about symphyseal dimensions between Class I & Class II samples, Class I & Class III samples, & Class II & Class III samples,[18] Class III subjects had previously been evaluated separately in related publications. These outcomes matched what the present study discovered.

3 Dimension-Cone-Beam Computed Tomography (CBCT) is being used by several studies to investigate how lower incisor proclination affects the morphology of the alveolar bone.[15] Without a doubt, future comparisons between our findings and information gleaned from 3D imaging will be necessary.

CONCLUSION

The sagittal malocclusion groups differed significantly

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in terms of IMPA and symphysis size. Because the lower incisor apex in Class III individuals was near the buccal cortex, the value of LA was lower & LP was higher. Because the lower incisor apex of Class II patients was close to the lingual cortex, their LP value decreased, and their LH value increased.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

ETHICAL STATEMENT

Ethical approval was taken from Research Ethics Committee of Hamdard College of Medicine & Dentistry Karachi (Ref: ERC/BDS/016/2022).

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ORIGINAL ARTICLE

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The Correlation Between Overjet and Sagittal Skeletal Relationships

Hina Siddiqui[1], Syed Sheeraz Hussain[2]

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ABSTRACT

Objectives: To determine the correlation between overjet and sagittal skeletal relationship.

Materials and Methods: This study investigated patients at Orthodontics Department of Karachi Medical and Dental College. This cross-sectional study lasted for six months from August 2019 to Feburary 2020, after due approval of the synopsis. After detailed history and clinical examination patients were included in the research. Measurements were made on pre-treatment dental models for malocclusion class and overjet, and lateral cephalometric x-rays for ANB angle and Wits analysis. All measurements were taken manually by the researcher and documented on a preformed Proforma.

Results: When the class of malocclusion was not considered, overjet had high correlation with ANB angle ($r = 0.789$) and Wits appraisal (0.825) which was statistically significant (p-value < 0.01).

Conclusion: The overjet can be used to predict sagittal malocclusion. When the malocclusion class was not considered, overjet had high correlation with the ANB angle and Wits appraisal and when the class of malocclusion was considered, Class III showed strong correlation between overjet and ANB angle.

Keywords: ANB Angle, Antero-Posterior Discrepancy, Overjet, Sagittal Plane Analysis, Wits Appraisal

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INTRODUCTION

Orthodontic diagnosis and treatment planning necessitates various records which includes dental models, radiographs, intra-oral and extra-oral pictures.[1] Cephalometric analysis is a crucial diagnostic tool in orthodontics. In order to identify and classify a malocclusion, the measured values of cephalometric analysis are compared to normal values in norms of that particular population in two planes; sagittal and vertical. Sagittal plane analyses are used to determine the discrepancies in anteroposterior dimension. There are several different cephalometric analyses consisting of angular and linear measurements to help the orthodontist diagnose.[2] The ANB angle is commonly used to determine discrepancy on the sagittal plane. It describes the extent of discrepancies skeletally, which may vary from 1 to 4 degrees.[3]

An important measurement to find out the skeletal and dental discrepancy between maxillary and mandibular arches is overjet. The variation in overjet can be found

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skeletally, dentally, or both.[4] Despite the fact that a connection exists between overjet and skeletal elements, the difficulty of giving a convincing treatment plan might be overcome by an intensive investigation of the association among dento-skeletal relationships.[4] If the overjet is in excess of 10 mm, treating the case surgically would be a more viable acceptability while choice is between surgical or orthodontic intervention. In any case, overjet is basically a degree of skeletal disharmony which can be represented, it manifests the advantage of being an objective measurement of skeletal problem.[5]

ANB angle has certain restrictions since its value can be altered by the incorrect location of the nasion,[6] an increase or decrease in vertical face height[7] or a change in the SN plane.[8] Wits appraisal, which was developed to address the issues with ANB angle, can be misinterpreted because of inconsistent occlusal planes.[9] The Wits appraisal cannot be considered an analysis rather, it is regarded as a tool for diagnosis to assess the degree of anteroposterior jaw discrepancy on a lateral cephalometric x-ray.[10]

The rationale for conducting this study is to find the correlation between overjet and sagittal skeletal values in Karachi residents, the extent to which overjet can be useful in determining skeletal relationships in anteroposterior dimension by using ANB and Wits Analysis, and to ascertain if the studies done before are applicable to our population.

MATERIALS AND METHODS

This cross-sectional study was done at Orthodontics Department, in KMDC. To determine the size of the sample, non-probability purposive sampling was used. The sample size came out as 78 which was calculated by the correlation sample size calculator, taking stats by Abdul Jabbar [1] for correlation between overjet and wits in class I as 0.317 with a confidence interval of 95 percent. Patients were grouped into class I, II and III malocclusion on the basis of Angle's classification. This research recruited participants of both genders aged 14 to 35 years old, having permanent teeth and no prior history of orthodontic treatment. Patients having orofacial syndromes, cleft lip and palate, prosthetic replacement, facial asymmetry and any incisor-related trauma were all excluded.

After receiving approval from the CPSP research cell (Ref No. CPSP/REU/DSG-2017-174-2127), data from lateral cephalometric x-rays and dental models of patients reported to the Karachi Medical and Dental College's Orthodontics OPD were collected. The researcher took impressions and made plaster casts. The patients' lateral cephalograms were used to calculate the ANB angle (Fig 1) and Wits analysis (Fig 2).

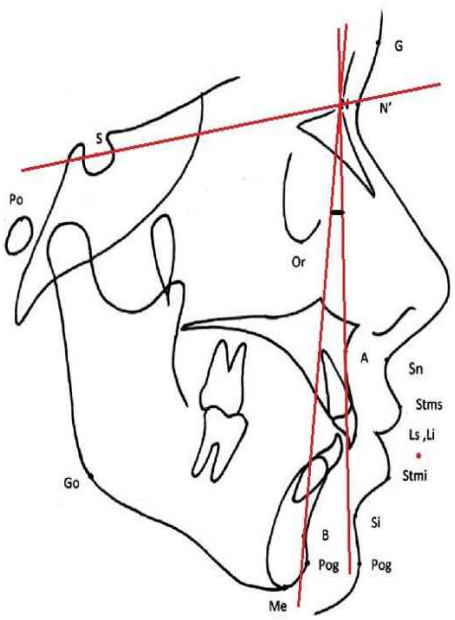

Figure 1: ANB Angle

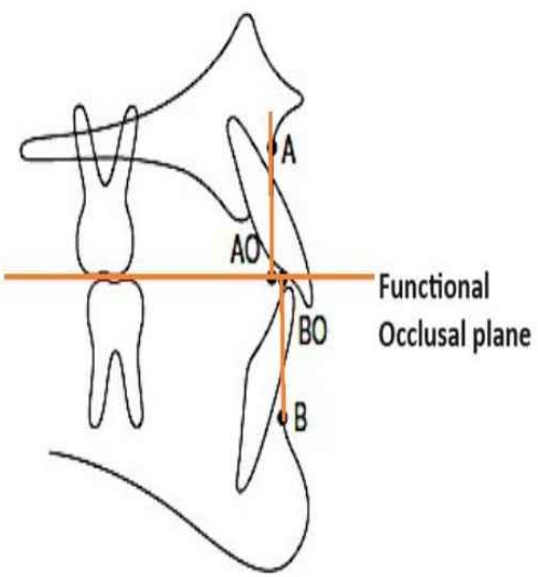

Figure 2: Wits Analysis

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Casts for teeth were used to determine overjet. To reduce inaccuracy, the researcher included and traced every cephalogram herself and lateral cephalometric x-rays were obtained from the same source.

The amount of horizontal (anterior-posterior) overlap between the maxillary and mandibular incisors is known as overjet. The skeletal relationship between two jaws is designated by ANB (A point, nasion, and B point), which was taken as: (a) Skeletal Class I: 2 ± 2 degrees of ANB, (b) Skeletal Class II: greater than 4 degrees of ANB, (c) Skeletal Class III: Negative relationship of ANB. The Wits appraisal evaluates how closely the mandible and maxilla are connected to one another in the sagittal (anteroposterior) plane. Data analysis was done using SPSS version 23. Frequencies and percentages were determined for gender and malocclusion classes. Mean and SD were performed for age and overjet. Using Pearson's correlation, the overjet and skeletal correlations were performed. Through post-stratification, effect modifiers like age and gender were taken into consideration. Statistically significant results were identified by a *p*-value less than or equal to 0.05.

RESULTS

Data were grouped by malocclusion which incorporates; 27 (34.6%) class I, 28 (35.9%) class II div 1 and 23 (29.5 %) class III cases. Patients with ages of 15 to 29 years with a mean of 20.84±4.01 were included. Class I patients had a mean age of 19.66±3.43 years (aged 15 to 26), Class II div I patients had a mean age of 21.57±3.79 years (aged 16 to 28), and Class III cases had a mean age of 21.34±4.70 years (aged 15 to 29). In total, data consisted of 30 males (38.5%) and 48 females (61.5%). With mean values of 3.57± 3.727 mm, it was discovered that the lowest recorded overjet was -4 mm and the highest was 12 mm. The mean value of overjet for the class I group was 3.018±1.631 mm, ranging from 0.00 to 8.00 mm; for the class II division I group was 7.321±3.795 mm, ranging from 1 to 12 mm; and the for the class III group mean value for overjet was -0.326±1.556 mm, ranging from -4 to 2 mm.

The ANB angle had a mean value of 3.60 degrees and a range of -5 degrees to 11 degrees. In class I, the mean ANB value was 4.15±2.214, ranging from -1 to 8 degrees; in class II, division 1, the mean was 6.86± 2.039, ranging from -5 to 2 degrees.

Wits analysis similarly displayed a distribution with a mean value of 2.217±3.960 mm and ranging from -8 mm to 10 mm. The class III group had the mean value of -2.521±3.083 mm ranging from -8 to 3 mm. Class II division 1 showed a mean of 5.446±2.024 mm ranging from 1 to 10 mm, while class I had a mean of 2.907± 1.599 mm ranging from -0.50 to 7 mm as shown in Table 1.

Table 1: Distribution of overjet (mm), ANB, and Wits Appraisal with respect to different malocclusion groups

Malocclusion Group	N	Overjet Mean and Sd	ANB Mean and Sd	Witts Appraisal Mean and Sd
Class I	27	3.018+1.63	4.15+2.214	2.907+1.59
Class II	28	7.321+3.79	6.86+2.49	5.446+2.02
Class III	23	-0.326+1.55	-1.00+2.039	-2.521+3.08

Pearson's correlation was applied which showed overjet exhibited a high correlation with ANB angle (r = 0.789) and Wits (0.808), which was statistically significant (*p*-value 0.01) when the malocclusion class was not taken into account as shown in Table 2.

In class I malocclusion, a very weak positive correlation between ANB and Overjet (r = 0.191, *p*-value > 0.05) was found, which is statistically insignificant. However, for class II groups, there was a weak correlation of overjet with ANB angle with "r" value of 0.399. (*p*-value 0.05), and only for class III malocclusions there is a significant strong correlation between ANB and overjet (r = 0.716, *p*-value 0.01) as shown in Table 2. The Pearson's correlation between overjet and Wits appraisal in class I is strong and significant, for class II and III was moderate and statistically significant having "r" value of 0.605, r = 0.495 and r = 0.484. (*p*-value < 0.01) as shown in Table 2.

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Table 2: Correlation between overjet with ANB angle and Wits appraisal in Class I, II and III

Correlation between overjet with ANB angle					
	Correlation	**Overall Sample**	**Class-I**	**Class-II**	**Class-III**
Overjet	**Pearson's Correlation**	0.789**	0.191	0.399*	0.716**
	Sig. (2-tailed)	0.000	0.340	0.035	0.000
	N	78	27	28	23
Correlation of overjet with Wits appraisal					
	Correlation	**Overall Sample**	**Class-I**	**Class-II**	**Class-III**
Overjet	**Pearson's Correlation**	0.808**	0.605**	0.495**	0.484*
	Sig. 2-tailed)	0.000	0.001	0.007	0.019
	N	78	27	28	23

DISCUSSION

One of the significant factors in the diagnosis and treatment planning process is the anteroposterior relationship among the two jaws.[11] The objective of our research was to determine whether there was a correlation between the overjet values and cephalometric analysis that evaluate the cranio-facial structures anteroposteriorly.

Given that they both indicate the anteroposterior relationship of the jaws, overjet and ANB were expected to be positively correlated. However, overjet is influenced by the incisor's inclination, while ANB is influenced by the nasion's position anteriorly and laterally, as well as by the orientation of the sella-nasion plane and maxilla. When measuring ANB, one has to consider deviations from nature.[11] Dentoskeletal overjet has been proposed by Al- Hammad et al. as a measurement of sagittal discrepancies.[12] In a research by Abdul Jabbar, they discovered a statistically significant but weak correlation between overjet and Wits assessment in class I and class II cases, as well as a significant correlation between overjet and Wits appraisal in class III cases,[3] however, the results of our study, which discovered a strong correlation between ANB and overjet only in class III cases, agrees with Abdul Jabbar's study's finding.

Similar results to ours were obtained in different research. If the malocclusion class was disregarded, overjet showed favorable relationship with ANB angle and Wits evaluation regardless of the reference planes employed to acquire it. Among all classes of malocclusion, only class III malocclusion exhibits a high correlation. Using linear regression analysis, overjet was also demonstrated to be a valid predictor of anteroposterior skeletal discrepancies.[2]

When compared to those of Zupanc, their research confirmed overjet is not a reliable method in interpreting anteroposterior skeletal relationships in Class I and III cases. Overjet was discovered to be a significant predictor in Class II division 1 cases, whereas our study showed class III cases have strong significant correlations and weak correlation with class I and II.[4]

Likewise, the findings found in Farah Naz's study, where it is shown that overjet can be used to determine anteroposterior relationships but was not found to be the determinant of vertical patterns.[11] Thayer's study produced conflicting findings by establishing a weaker correlation between overjet and Wits, however, we revealed a strong correlation between overjet and Wits values.[13]

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Ghulam Rasool obtained contradictory results by conducting a correlational analysis of overjet and ANB angle, which revealed a weak correlation in all malocclusion groups. Overjet cannot be used to better estimate sagittal jaw discrepancy because it is not a reliable determinant of anteroposterior skeletal relationship, according to their research. The conclusions drawn from their research showed there is a weak correlation between overjet and ANB. This could be caused by the influence of the incisor's inclination, but ANB is unaffected. However, ANB can also deviate due to the aberrant location of the nasion, SN plane, and inclination of maxilla and mandible.[6]

Hasan et al assessed relationships among dento-skeletal features including overjet and ANB in Class II cases. In contrast to our study, his study showed a positive correlation, whereas our findings suggested a weak correlation for class I and II malocclusions,[14] The findings of a research conducted by Luca Lombardo showed that overjet could be a reliable interpreter of ANB and the U1-bi-spinal plane. However, when skeletal class I and II were taken into account separately, different findings were achieved.[15]

CONCLUSION

We can draw multiple conclusions from our research without considering the malocclusion classes, there was a high correlation between overjet and ANB angle and Wits analysis. Class III cases showed a strong correlation, class II; a weak correlation, and class I; a very weak correlation between overjet and ANB angle. A statistically significant and strong positive correlation between overjet and Wits appraisal in Class I individuals and moderate correlations were found in Class II and III malocclusion.

In class III cases, overjet is highly correlated with ANB angle which represents skeletal discrepancy. However, because of the increased variability, dental measurements other than overjet should also be taken into account, and the sagittal relationship should also take into account jaw rotations. For this reason, further research is required.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

ETHICAL STATEMENT

The ethical approval is provided Research Ethics Committee of the College of Physicians and Surgeons Pakistan (REU) granted ethical approval for this study (Ref No. CPSP/REU/DSG-2017-174-2127).

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AUTHORS CONTRIBUTION

Conception and design of the study: H. Siddiqui, S.S. Hussain

Acquisition of data: H. Siddiqui

Analysis and interpretation of data: H. Siddiqui

Drafting of the manuscript: H. Siddiqui

Critical review of the manuscript: S.S. Hussain

Approval of the final version of the manuscript to be published: H. Siddiqui, S.S. Hussain

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ORIGINAL ARTICLE

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To Compare Bone Formation in Terms of Mean-gray Scale Histographic Values After Surgical Removal of Bilaterally Impacted Mandibular Third Molars in Patients Treated with and without Simvastatin: A Split-mouth Randomized Controlled Trial

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ABSTRACT

Objectives: To compare bone formation in terms of mean-gray scale histographic values after surgical removal of bilaterally impacted mandibular third molars in patients treated with and without simvastatin.

Materials and Methods: This randomized, split mouth clinical study was conducted in the Oral and Maxillofacial Surgery Department, Dental Section, Allied Hospital, Faisalabad from November 2021 to May 2022. Thirty consecutive patients (30 extraction sockets per group) selected randomly, met the inclusion criteria and were included for study. Each patient underwent two surgical sessions, extracting one third molar during each session. The mouth was divided into study and control sides using the lottery method. After standard surgical removal, the study side received gel-foam soaked in simvastatin, while the control side received gel-foam soaked in normal saline. The study spanned 3 months, with bone formation assessment at the 12th post-operative week using digitalized intra-oral peri-apical radiographs and histogram analysis.

Results: A total of 30 patients participated in the study out of which 70% (n=21) cases categorized within 18-30 years age group whereas 30% (n=9) were aged between 31 to 35 years, with a mean age of 27.9 ± 4.33 years. Sixty percent (n=18) patients were male, while the remaining 40% (n=12) were female. Comparison of mean bone density on both sides showed a mean-gray scale histographic value of 107.83±3.99 on the study side and 97.40±4.42 on the control side, with a statistically significant *p*-value of 0.0001.

Conclusion: There is a significant difference in bone reformation in patients treated with simvastatin as compared to those without simvastatin application.

Keywords: Molars, Osteogenesis, Simvastatin

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INTRODUCTION

Third molars exhibit the highest rate of impaction, with a global prevalence of 24%.[1] Mandibular impaction is more prevalent, accounting for 58.5% of all cases,[2] with mesioangular impaction being the most common subtype (49.2%).[3] The highest number of impactions are seen between the ages of 25 and 45 years, with a female preponderance i.e., 56.6% of all cases.[4] The primary indications for the removal of mandibular third molar impaction are recurrent pericoronitis (62.9%), dental caries (11.7%), resorption of adjacent tooth (9.4%), periapical pathology (6.3%), diseases of the follicle including cysts and tumors (3.9%), tooth fracture (2.1%) and chronic periodontitis (1.8%).[5] Healing of the socket post-extraction occurs phase-wise and encompasses coagulation/hemostasis, inflammation, proliferation, and modelling/remodelling.[6] Improper healing leads to the formation of a dry socket, affecting 2.47% of all tooth extractions.[7]

Bone formation is based on the synthesis of newly formed matrices by specialized cells called osteoblasts, followed by mineralization. Growth factors, such as bone morphogenetic proteins (BMPs), play an essential role in inducing the differentiation of multipotent stem cells into cells with osteoblast-like characteristics.[8] Modalities thought to enhance bone formation after tooth extraction include platelet-rich plasma, platelet-rich fibrin, bone substitutions, collagen plugs with isocyanoacrylate sealing, dense polytetrafluoroethylene membranes, and allografts of freeze-dried bone in conjunction with collagen wound dressings, however, there is no clear consensus on which method is the most suitable and effective.[9,10] Simvastatin is a reversible inhibitor of 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase, which is involved in conversion of HMG-CoA to mevalonate, an early rate limiting step in synthesis of cholesterol in liver.[11,12] It also upregulates the gene expression of bone morphogenetic protein-2 (BMP-2) and vascular endothelial growth factor (VEGF), promoting the differentiation of osteoblastic cells for new bone formation. Additionally, it inhibits bone resorption by down-regulating the expression of thrombin receptor activating peptide (TRAP) and cathepsin K, impeding the fusion of osteoclast precursors, thereby decreasing the number of active osteoclasts.[11,12] An important consideration is that this drug is relatively cheap and has a good safety profile.[13]

This study aims to investigate the efficacy of topically applied simvastatin in promoting bone formation subsequent to the surgical extraction of impacted mandibular third molars. The simplicity of its application and the potential for cost-effectiveness make simvastatin an appealing drug for expediting bone regeneration post-tooth extraction, However, its use has not been incorporated in clinical practice. Till date, no such study has been conducted in Pakistani population to the best of our knowledge. The outcomes of this study will provide useful data on the utilization of simvastatin for patients undergoing tooth extraction in our setups.

MATERIALS AND METHODS

This randomized, split-mouth clinical study was conducted in the Department of Oral and Maxillofacial Surgery, Dental Section, Allied Hospital, Faisalabad from November 2021 to May 2022. The Institutional Review Board granted ethical approval prior to the start of study [No.F.48-ERC/2020-21/PHRC/FMU/22]. A total of 30 eligible patients were enrolled based on predefined inclusion criteria, using non-probability consecutive sampling. The sample size calculation utilized the WHO sample size calculator for two means, with an anticipated population mean of 110.46, a test value of the population mean of 99.94, a pooled standard deviation of 5.73, and a study power of 90%. Inclusion criteria encompassed both male and female patients aged 18-35 years requiring bilateral extraction of mandibular third molars. Patients with medical conditions impacting bone metabolism such as osteoporosis, vitamin D deficiency, and/or parathyroid disease were excluded from the study. Additionally, teeth with radiographically evident extensive periapical changes (abscess, granuloma, or cyst formation), individuals on prolonged antibiotic or steroid therapy, those unwilling to commit to an extended follow-up period, pregnant women, smokers, and individuals with a history of drug or substance abuse were also excluded. All patients included in the research provided written informed consent for participation.

A comprehensive case history was obtained, together with standard haematological tests (complete blood counts, prothrombin time, international normalized ratio, activated partial thromboplastin time and viral serologies for screening) and intraoral periapical radiographs (IOPARs). In each patient, we split the mouth into two halves using the lottery method, with

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one half being the study side and the other being the control side. Extraction of the third molars was conducted in two separate surgical sessions. Under local anesthesia (lignocaine 2% with adrenaline 1:100,000) and aseptic measures, an envelope incision was made and full thickness mucoperiosteal flap was raised with a periosteal elevator to expose the bone. Bone was removed on the buccal and occlusal aspect with the help of a slow speed hand-piece and round surgical bur. The tooth was then sectioned with a straight fissure bur and delivered with a straight elevator. The socket was then irrigated with normal saline. Immediately after extraction, the sockets on the study side were filled with a gel foam soaked in a mixture of a crushed 10 mg simvastatin tablet and 2 ml normal saline, whereas the sockets on the control side were filled with gel-foam soaked in normal saline alone. A black braided silk 3-0 suture was used for surgical site closure. Patients were directed to exert gentle pressure on the gauze pack over the operated site for 30 minutes. For the initial postoperative week, chemical plaque control was performed using a 0.2% chlorhexidine gluconate solution, applied for one minute three times a day, starting twenty-four hours after the procedure along with amoxicillin clavulanate 625 mg and naproxen sodium 550 mg twice daily for three to five days. IOPARs were taken at the end of the twelfth week to measure bone density of both sides. The radiographs were acquired utilizing the paralleling technique to ensure reproducibility. Adobe Photoshop CS6 was used to analyze the IOPARs for gray-scale histographic values, which represent bone densities. Guided by the pre-operative radiographs, the extracted socket area was delineated using the Magnetic Lasso Tool to precisely measure the socket area and, subsequently, the Histogram Tool was used to measure the mean grayscale values of the extracted sockets, as shown in Figure 1.

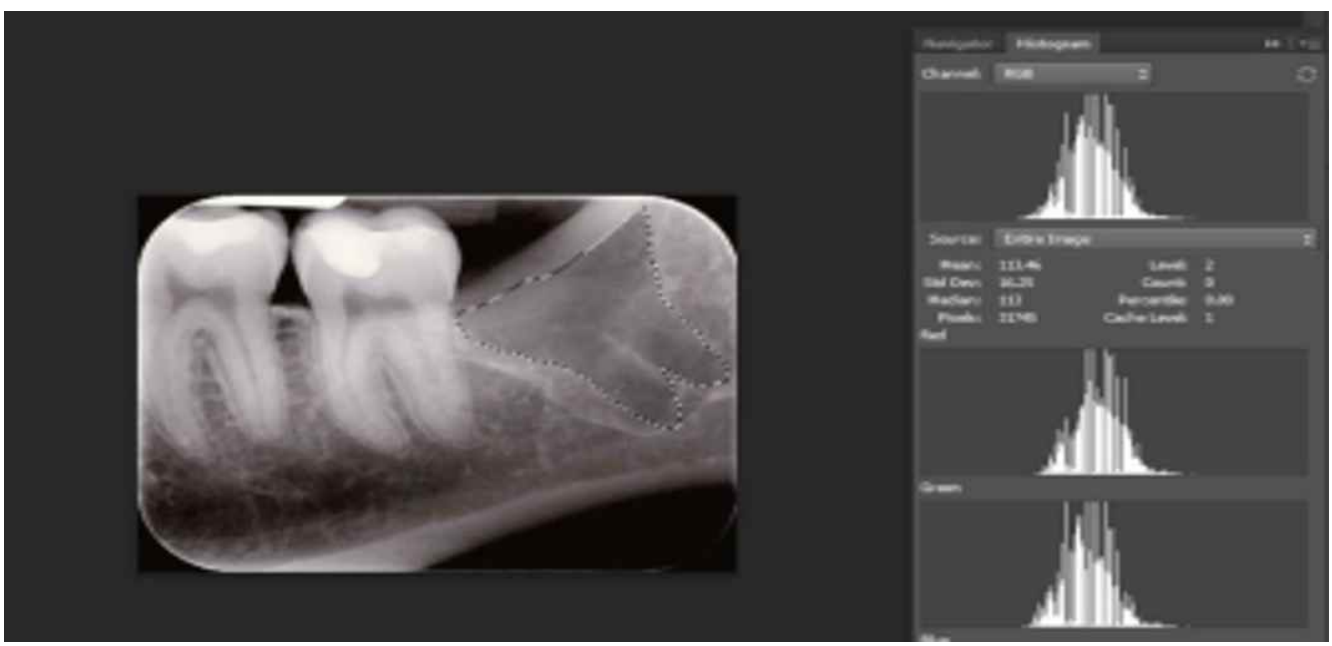

Figure 1: Assessment of digitalized intra-oral peri-apical radiograph using Adobe Photoshop CS6 for gray-scale histographic values. Dotted line points to a marked area being measured and the histogram shows the mean gray-scale value of the marked area

Data was analyzed using the Statistical Package for the Social Sciences version 23.0. Quantitative variables like age and the bone density measurement of the study and control socket at the 12th week were presented as means and standard deviations, and the independent sample *t*-test was applied for comparison. Qualitative variables like gender were calculated as frequencies and percentages. Confounding variables like age and gender were controlled through stratification. Post stratification independent samples *t*-test was applied and a *p*-value of ≤ 0.05 was taken as significant.

RESULTS

A total of 30 patients (30 mandibular extractions in each

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group) were enrolled in the study. The participants had a mean age of 27.9 ± 4.33 years, of whom 21 (70%) cases fell within the 18-30 years age group, while 9 (30%) were 31-35 years of age. Gender analysis showed that males were in majority in our study sample, accounting for 18 (60%) cases.

The mean bone density was 107.83 ± 3.99 in study group while it was 97.40 ± 4.42 in control arm, (p=0.0001), (Table I). The data was stratified for age, with the 18-30 years age group demonstrating a mean bone density of 108.14 ± 3.93 on the study side and 96.38 ± 4.01 on the control side, (p=0.0001). The 31-35 years age group showed a mean bone density of 107.11 ± 4.28 on study side and 99.78 ± 4.66 on the control side, (p=0.003). The data was also stratified for gender, it showed that male patients had a mean bone density of 107.78 ± 3.26 on the study side and 98.50 ± 4.15 in control arm, (p=0.0001). Similarly, females showed a mean bone density of 107.92 ± 5.05 in the study arm and 95.75 ± 4.47 in the control arm, (p=0.0001).

Table 1: Comparison of mean bone density on both sides (n=60)

Bone density	Study side (n=30)		Control side (n=30)		*p*-value
	Mean	SD	Mean	SD	0.001
	107.83	3.99	97.40	4.42	

DISCUSSION

The goal of modern surgery is to enhance clinical healing while minimizing invasiveness. Regenerative surgery has emerged to restore both hard and soft tissues.[14,15] Bone regeneration requires morphogenetic signals, scaffold matrices, and responsive host cells, as well as growth factors like BMPs, a subset of transforming growth factor-beta (TGF-β), which induce osteogenesis.[16] After tooth removal, various methods have been proposed to promote bone regeneration, however, the optimal method remains debated.[17,18] Non-invasive, cost-effective options like statins activate endogenous bone growth factors, and this study demonstrates that simvastatin may have a role in promoting bone formation post-surgical extraction of mandibular third molars.

Local application of simvastatin has an enhancing effect on bone formation post-tooth extraction, as demonstrated by the current study. Animal trials using simvastatin have demonstrated that the local application of this drug not only results in increased bone regeneration in rat models but also resulted in significant reduction in inflammation due to its anti-inflammatory properties.[19,20] Human clinical studies have explored the effectiveness of simvastatin in treating defects in periodontium, cystic defect in periapical region, extraction site sockets of premolar teeth, and osteoporotic bone disease in women.[21,22] Degala et al reported that there was a significant increase in the mean gray-scale histographic values within extraction sockets with the use of simvastatin as opposed to the use of a placebo, with consistent benefit seen at one, four, eight and twelve weeks post-extraction.[23] Harsha et al, in addition to noting an increase in bone regeneration based on mean gray-scale histographic values at one, four, eight and twelve weeks post-extraction, noted that the benefit in terms of bone regeneration was also visualised on cone-beam computed tomography when compared to placebo.[24] These results were in agreement with other studies on the subject such as Saifi et al and Gupta et al, both of whom compared simvastatin to placebo.[8,25]

It is pertinent to note here that not only does simvastatin demonstrate significant benefit versus placebo, but also maintains efficacy when compared to other modalities used to improve bone regeneration, both individually and in combination. Mathur et al compared simvastatin to platelet-rich fibrin for bone regeneration in extracted tooth sockets and noted that there was no difference between the two with regards to degree of bone regeneration, with both resulting in significantly increased regeneration.[26] Sezavar et al compared the use of simvastatin in combination with collagen versus collagen alone in sockets of extracted teeth and noted that while there was no difference in degree of bone regeneration between the two groups, the use of simvastatin was associated with higher levels of vital, amorphous, and trabecular bone, and lower proportions of dead and non-osteoblastic bone, indicating better healing.[27] Cruz et al compared simvastatin with polypropylene membranes versus polypropylene membranes alone in the same setting and noted that the

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former resulted in a significant reduction in dimensional changes in tooth sockets, post-extraction but had no effect on soft tissue healing or postoperative pain.[28] Conversely, Deshpande et al reported that while simvastatin was associated with an increase in bone regeneration in tooth sockets post-extraction, it was also associated with an increase in pain and swelling, at least within the first week of extraction, when compared to placebo.[29]

The current study was limited by its comparatively small sample size as well as it being conducted in a single-center, limiting its generalizability to the general population. Additionally, radiography with software assessment has limited utility in assessing early bone changes when compared to other modalities such as dual-energy x-ray absorptiometry, which may be used to perform more accurate assessments but are limited in their use by their expense and the increased dose of radiation. Lastly, invasive methods such as a biopsy with histological evaluation would be the most accurate modality for evaluating degree and type of bone healing, however, this was not done in our study due to practical, ethical and economic considerations. Future research should focus on comparing simvastatin to other modalities which enhance bone regeneration and compare cost-effectiveness of these methods.

CONCLUSION

The local application of simvastatin in promoting bone regeneration within the sockets of extracted mandibular third molars is efficacious. Notably, its affordability renders it a promising option for widespread use, particularly in resource-limited settings such as in Pakistan. By harnessing the therapeutic potential of simvastatin, we can significantly enhance post-extraction healing outcomes while addressing economic constraints, thus advancing dental care accessibility in developing countries.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

ETHICAL STATEMENT

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ORIGINAL ARTICLE

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Assessing Patient Awareness and Attitude towards Prosthodontic Options for Missing Teeth: A Study Conducted at a Tertiary Care Dental Hospital in Islamabad

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ABSTRACT

Objectives: The aim of the study was to determine the knowledge gap and the level of awareness about tooth replacement options, among patients visiting a Tertiary Care Dental Hospital.

Materials and Methods: This cross-sectional study was conducted on 170 patients with missing teeth at the Prosthodontic Department of a private Dental College in Islamabad from 10th April 2023 to 10th September 2023, by using convenience non-probability sampling. Upon obtaining informed consent from the participants, a comprehensive medical history was acquired, accompanied by a thorough examination of the oral cavity. Data collection involved querying the participants through a questionnaire designed for this study. SPSS version 23.0 was used to analyze data.

Results: Half of the patients were knowledgeable about acrylic partial dentures and fixed partial dentures, while only 10% were aware about complete denture therapy. Awareness of dental implants was noted in only 5% of the patients, and awareness of cast removable partial dentures was as low as 1.8%. None of the patients had knowledge about immediate dentures and overdenture therapy.

Conclusions: Patients visiting the dental college have a low level of awareness about prosthodontic treatment options.

Keywords: Complete Denture, Fixed Partial Denture, Implants, Removable Partial Denture

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INTRODUCTION

The importance of oral health is such that it can disrupt a person's daily life and work routine. One of the most important factors causing discomfort and at times devastating effects on a person's quality of life is tooth loss.[1] Loss of teeth can significantly impair one's masticatory efficiency and oral functions, which as a result declines oral health quality of life. The major causes of missing teeth include periodontal problems and dental caries. Other may be congenitally missing teeth or tooth loss due to trauma.[2]

The repercussions of missing teeth include esthetic concerns, deficient mastication, lack of facial support, bone loss, and speech issues. If the teeth are left unreplaced they can lead to drifting of adjacent teeth and supra eruption of opposing teeth which results in more complications during treatment.[3] Therefore, to overcome these problems, the missing teeth should be replaced as soon as possible.

Generally, two options are available to replace the missing teeth which are removable prosthesis and fixed prosthesis. Fixed prosthesis may be tooth supported fixed partial denture or implant supported prosthesis.[4] However, there are several factors affecting the need of missing natural teeth which include age, gender, socioeconomic status and educational level etc. Even if the replacement of the missing teeth is strongly indicated, most patients do not get the treatment done just due to the lack of awareness about the prosthodontic treatment options available.[5] Moreover, financial issues are also a greater determinant for patients seeking treatment and selecting a specific prosthodontic treatment option.[4] In a similar study conducted by Ali et. al in Pakistan, revealed that the primary reason for not choosing dental implants as a prosthesis (35.2%) was found to be their high cost.[6]

Therefore, improved awareness and knowledge about the different treatment options available for the replacement of missing teeth can help patients make more appropriate decisions.[4] In a study conducted in India, 65.1% of the general population showed awareness about prosthodontic treatment and awareness of different treatment options available for tooth replacement.[13] Likewise, in a similar study conducted in Pakistan showed that 65% of the general population had medium level awareness while only 13.9% had low level of awareness regarding different treatment options available for missing teeth.[2] While in a Norwegian study conducted in 2001, the report shows the dental awareness level was about 70%.[2] The higher level of awareness in western countries reflects better dental awareness due to high level of literacy rate. Studies show that most of the patients consider replacement of anterior teeth more important than posterior teeth, and aesthetics is given more importance than function.[10] The loss of teeth occurs slowly with time; therefore, some individuals adapt to this change and do not feel the need to replace the teeth. Hence, prior to the start of treatment, the prosthodontist should inform and educate the patient. This ensures realistic outcomes.[11]

This study aimed to evaluate the levels of awareness among patients regarding the treatment options available for replacing missing teeth who were visiting Islamic International Dental College, as well as contribute to the existing literature on this topic in Pakistan where there is scarcity of such research. This would also help determine the knowledge gap between the treatment choice and the amount of awareness, as well as help educate the prosthodontic and dental community thereby leading to more informed counselling.

MATERIALS AND METHODS

This cross-sectional study was conducted in the outpatient department of Prosthodontics at Islamic International Dental College, Islamabad. The duration of the study was five months extending from 10th April 2023 to 10th September 2023. The objective was to determine the knowledge gap and the level of awareness among patients visiting a private dental college. The ethical approval was obtained from the institutional committee. The study used a convenience non-probability sampling method to select 170 patients. The sample size calculation for this study was based on the World Health Organization (WHO) sample size calculator. The confidence level was kept at 95% with a margin error of 5% to determine the sample size.

A self-designed questionnaire was made in both Urdu and English language to cater to patients of varying educational backgrounds. Its validity was established through reference to existing literature, consultation with language experts, and input from the expert prosthodontists. The questionnaire had two parts. The first part asked about the participants' demographic and dental information, such as gender, age, marital status,

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education, and edentulous period. The second part measured their awareness of various aspects of tooth replacement, such as the types of dental prostheses and the issues caused by tooth loss. The study included male and female patients aged 20 to 80 years who had no previous prosthodontic treatment and at least one missing tooth (except the 3rd molars) and patients who provided informed consent and who filled out the questionnaire completely. The study excluded completely edentulous patients, partially edentulous patients with compromised remaining natural teeth that needed extraction due to periodontal reasons, patients with mental or physical disabilities or dentoalveolar defects, as well as who did not provide informed consent and who failed to fill out the questionnaire completely.

This study recruited patients with missing teeth who visited the Prosthodontic department's OPD. After obtaining informed consent, the researcher conducted a comprehensive oral examination and collected the patients' medical history. The inclusion and exclusion criteria were then applied to screen the eligible patients. The patients answered the questionnaire about their awareness of prosthodontic treatment options for replacing natural teeth. The questionnaire was filled through face-to-face interviews with patients conducted by a designated trained researcher. This approach ensures clarity of questions, the anonymity of the patient data, and helps in addressing any concerns or queries raised by the participants.

The analysis of the collected data was done using a Statistical Package for Social Sciences version 23.0. The quantitative variable, age, was intended to be represented using the mean, while the qualitative variable, gender, was to be presented as frequency percentages.

RESULTS

A total of 170 patients were part of the study to determine the level of awareness about prosthodontic treatment among patients visiting IIDC, Islamabad. Patients ranged in age from 20-80 years with mean age of 62.01 with S.D. of ± 10.21 years. Out of them, 85 (50%) were males and 85 (50%) were females.

Table 1 shows the patients' awareness of different prosthodontics treatment within the total sample of 170. Out of the selected patients, 84 (50%) knew about acrylic partial denture, 3 (1.8%) about cast removable partial dentures, 50 (29%) about fixed partial dentures (FPD), 11 (6.5%) about dental implants (DI), and 10 (5.8%) about complete denture treatment. No one was aware of immediate denture or over denture. Only 1 (0.6%) knew about flexible denture.

Table No 1: Awareness level of patient regarding different prosthodontics treatment options

Sr. No	Treatment Modality	Yes (Frequency)	No (Frequency)
1	Acrylic Partial Denture	84(49.4)	86 (50.6)
2	Cast Partial Denture	3(1.8)	167(98.2)
3	Complete denture	10(5.8)	160(94.1)
4	Over Denture	0(0)	170(100)
5	Immediate Denture	0(0)	170(100)
6	Dental Implants	11(6.5)	159(93.5)
7	Flexible denture	1(0.6)	169(99.4)
8	Fixed partial denture	50(29)	120(70)

Table 2 outlines the factors contributing to the need for tooth replacement within the total sample of 170. Among the respondents, 124 (72%) mentioned replacing missing teeth due to chewing difficulties, while 72 (42%) were motivated solely by aesthetic concerns. Additionally, 58 (34%) of the reported cases expressed both aesthetic and chewing concerns as reasons for tooth replacement.

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Table 2: Reasons for tooth replacement

Sr. No	Reason for tooth replacement	Yes Number (%)	No Number (%)
1	Chewing difficulty	124(72.9)	46 (27.1)
2	Aesthetic concern	72(42.4)	98(57.6)
3	Both	58(34.1)	112(65.9)

Whereas table 3 shows the various factors that prevented the patients from getting their teeth replaced within the total sample of 170. Out of them, 41% (71) could not afford it, 85.3% (144) did not have enough information, and 71.3% (122) were unaware of the benefits.

Table 3: Reasons for delay in tooth replacement

Sr. No	Reason for Not Replacing	Yes Number (%)	No Number (%)
1	Lack of knowledge	145(85.3)	25 (14.7)
2	Lack of awareness	122(71.8)	48(28.2)
3	Lack of financial recourses	71(41.8)	99(58.2)

DISCUSSION

Currently, our nation is facing the challenges of a low literacy rate and poor socioeconomic conditions. An initiative was undertaken to understand the level of awareness among the population visiting our department about prosthodontic treatments for missing teeth. This initiative involved conducting a study to gain insights into patients' awareness of tooth replacement options. By administering a questionnaire and analyzing responses, the aim was to assess patients' knowledge and understanding of dental prosthesis, which can influence their treatment choices. It's been observed that most patients don't seek help from a prosthodontics clinic until they experience issues with mastication and aesthetics. In Pakistan, there is a lack of comprehensive epidemiological data on patients' attitudes towards tooth replacement. Hence, this study was conducted at the Islamic International Dental College, Islamabad, to gain insights into patients' awareness on replacing missing teeth.

The knowledge patients have about dental prosthesis plays a crucial role in their choice of a specific dental prosthesis. There are many ways to determine a patient's knowledge and awareness. In this research, a self-designed questionnaire was utilized, while Meer Rownaq Ali et al. employed a structured questionnaire via Google Forms. He also disseminated the questionnaires in public areas and advertised them on social media for anonymous responses.[7]

Various factors, such as age, gender, educational background, socioeconomic status, geographical location, and the extent of tooth loss, play crucial roles in determining awareness levels regarding various dental prosthesis. Alalawi et al. observed a correlation between age and the number of teeth missing in participants, suggesting that as people get older, they may lose more teeth and consequently need more prosthetic replacements due to their advanced age.[8] Al-Fareh et al. also discovered that one of the contributing factors was dental phobia, along with the duration required for the treatment procedure especially for implants.[9]

The research by Siddique et al. showed that dental implants were known by most (93.4%) of the patients, who were mainly in the age group of 26–45 years.[10] This was close to the finding of Alajlan et al, who reported that 91.5% of the respondents had heard about implants.[14] Abdulhadi et al. also found a high percentage (49%) of awareness for dental implants among the patients who visited Al Iraqia University-college of dentistry.[16] These results are different from this study, where only a few patients (6.5%) had heard of dental implant as a possibility. This disparity could possibly be linked to the fact that their study was focused on implant-supported rehabilitation, whereas ours was aimed to raise awareness about all available prosthodontic choices. The increased awareness level and the literacy rate in the parts of the country where this research was conducted could be a major reason for this

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remarkable difference.

Nevertheless, our study closely aligns with another local research, such as Baqar et al, which reported a 9.8% awareness of implant-supported prostheses.[11] A comparable investigation by Khan et al. demonstrated a 26% awareness of dental implants among the participants.[19] Similar results were observed in the international surveys done by Sharan et al. (11.4%)[12], Gupta et al. (15.6%)[13], Gupta et al. (21%).[15]

The study done by Gupta et al. revealed that 71.5% of the surveyed population had awareness for Fixed Partial Denture and 66.5% for removable partial denture (RPD's). Awareness regarding complete denture therapy was found to be 64.5% which is very high compared to this study's finding where only 10% are aware of Complete Denture.[15] This disparity in results can be due to the socio-economic factors and access to healthcare resources, along with higher education levels in developed countries.

Another finding of this study was that the reason for replacement of missing teeth in a great majority of patients was due to difficulty in chewing function that is (72.9%) which is confirmed by the study done by Aslan et al. in which 92% of the participants stated difficulty in chewing to be the main reason for tooth replacement.[17] One possible reason for the difference in results could be attributed to variations in the oral hygiene practices among participants which can influence the prevalence of chewing difficulties and the perceived need for tooth replacement.

Patients were unable to opt for a treatment because they were unaware of the numerous prosthodontic treatment alternatives. According to a study by Menezes et al, dental camps and prosthodontic outreach programs are possible alternatives for changing attitudes, spreading awareness, and providing knowledge regarding methods and means of prosthetic tooth replacement.[18]

In general, the results obtained in this study revealed that awareness of patients about different dental prosthesis is very low. There is an immense need to improve awareness of the patients. It is because of awareness, which helps the patients to have early replacement of missing teeth. The timely provision of adequate dental prosthesis will help the patients to achieve a better quality of life.[19]

This study has certain limitations. It used a small sample size and non-probability sampling technique which may have influenced the representativeness of the findings. Furthermore, conducting the study in only one center may have introduced site-specific biases. The small sample size in comparison to other cited studies could have impacted the statistical power and precision of the results as well. These limitations affect the applicability of the results to the local population.

CONCLUSION

Within the confines of this study, it became evident that individuals seeking services at the private dental hospital possess a relatively low level of awareness concerning the available prosthodontic treatment options. Consequently, it is imperative to address this knowledge gap by implementing strategies to educate and inform patients about the diverse range of dental prosthesis alternatives. Enhancing patient awareness in regard to available treatment options available for missing teeth is crucial for fostering informed decision-making and ensuring that individuals are well-informed about the various treatment choices at their disposal. Therefore, there is a pressing need to integrate educational initiatives within the dental healthcare setting to empower patients with comprehensive information about prosthodontic treatments.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

ETHICAL STATEMENT

The Ethical approval was provided by the Ethical Review Committee at Islamic International Dental College, Islamabad IIDC/IRC/2023/03/13.

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Role of Social Media Addiction and Emotional Regulation on Mental Health of Medical and Dental Students

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ABSTRACT

Objective: The use of social media has increased exponentially in the last 2 decades, especially among young adults. This study aimed to investigate the role of social media addiction and emotional regulation on mental health among medical and dental students in Pakistan.

Materials and Methods: This cross-sectional quantitative research was conducted from January to May 2023. A convenient sample of 503 students (345 females, 158 males) was taken from different private and government universities in Pakistan. A self-developed demographic sheet was administered along with the Bergen Social Media Addiction Scale (BSMAS), emotional regulation questionnaire, and Depression Anxiety Stress Scale-21 (DASS).

Results: There was a significant positive relationship between social media addiction with DASS subscales scores (r = 0.39, r = 0.38, r = 0.37, p<0.01) and a positive correlation with emotional regulation (r = 0.21, p<0.01). Cohen's d value for social media addiction was 0.33 (<0.50) which indicated moderate effect size, showing significant mean differences among gender (p<0.05). Cohen's d values for mental health problems were 0.60 (>0.50) and 0.80 (>0.50), showing significant mean differences among marital status and gender respectively (p<0.05), which represents a large effect size.

Conclusion: There is a significant role of social media addiction in the mental health of students. This research illustrates new insights for research by presenting empirical support for its incidence among medical and dental students in Pakistan.

Keywords: Adult, Emotions, Mental Health, Social Control, Social Media

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INTRODUCTION

Social media has its benefits as it is the source of updated information, but it can easily lead to an addiction which is demarcated by its excessive use that disrupts daily life both personally and socially.[1] The younger generation is less cautious about the adverse outcomes of social media addiction in comparison to their parents' generation. Studies show that different generations not only perceive social media differently, but they also have different reactions to the use and misuse of social websites as well.[2] Emotional regulation can be referred to as the inherent underlying process which has a vital role in assessing and adjusting emotional responses. Emotional regulation is a significant part of self-regulation to develop the sense of individual differences in temperament and societal effectiveness.[3]

People of all ages experience emotions differently, they adapt the emotional regulation strategies to face all the stressful events and life challenges accordingly.[4] Mental health can be explicated as the absence of mental disease. The ability to cope with daily life challenges reflects the fundamental meaning of mental health as this includes the strategy of performing intellectually, emotionally and spiritually with the sense of constructive personality- insight, feelings of self-worth as well as physical fitness.[5]

Medical and dental students are under a lot of stress due to the high difficulty level of the curriculum. In addition, the use of social media as a coping mechanism enhances their chances of addiction making them prone to concurrent behavior issues.

Previous studies reveal that a meaningful connection between social media addiction (SMA), emotional regulation strategies and mental health exists. Research conducted on Chinese college students examined the association between SMA and mental health revealed that SMA was negatively related to mental health whereas, self-esteem signified an underlying process of relation between social media addiction and student's mental health.[1] A cross-sectional study unveiled the negative role of SMA, gaming and smartphones on mental health whereby, social media addiction triggered psychological distress (such as depression, anxiety and stress) among Chinese schoolchildren.[6] A study conducted in Turkey has demonstrated a 6.8% rise in use of social media addiction in the last five years where males experienced more stress, anxiety and depression than females.[7]

There is a dearth of literature available on the subject in Pakistan thus the current study aims to pave its way to contemporary literature, by contributing to providing a fundamental framework of data regarding the role of social media addiction and emotional regulation strategies on the mental health of medical and dental students to assist future researches. The present research intends to determine an association between social media addiction and emotional regulation strategies, examine the relationship between social media addiction and mental health, and explore the incidence of mental health problems (depression, stress, anxiety) in medical and dental students of Pakistan.

MATERIALS AND METHODS

A cross-sectional quantitative research design was used in the current study to inspect the association between social media addiction, emotional regulation strategies and mental health of medical and dental students, and that included a methodological approach to analysis. Convenient sampling was used for participant selection.

The sample was collected from the medical and dental students at The University of Lahore, Superior University, Khyber University, University of Health Sciences and Shifa Tameer-e-Millat University. An online questionnaire was developed on Google Forms to be distributed to the students via WhatsApp groups and official email IDs. Data was also collected physically on paper.

The questionnaire consisted of four parts: the first part describes the aim of the study and inquires about the demographic information including age, gender, socioeconomic status, year of study and field of study. This part also entailed voluntary consent from all participants. The rest of the questionnaire was only presented to those who signed the voluntary consent form. The second part consisted of a pre-validated questionnaire called the Bergen Social Media Addiction Scale (BSMAS).[8] All 6 items are responded to on a 5-point scale (never to always). The scoring of BSMAS is precise as the 6 items were supposed to be measured on a 5-point Likert scale. Then, the score of each item consists of the sum of all item's scores and the total score ranges from 6-30. When an individual scores more than 3 for 4 out of 6, this indicates the addiction. The

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Cronbach's alpha value of the translated Scale was 0.85 signifying good reliability of the tool.

The third part consisted of a pre-validated emotional regulation questionnaire developed by Gross and John (ERQ).[9] The scale comprised of 10 items was intended to quantify the tendency of respondents to control their sentiments in two ways: (1) Cognitive Reappraisal and (2) Expressive Suppression. Participants response to individual items on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). The final score consisted of the the sum of all scores in the subscale of cognitive reappraisal and expressive suppression respectively. The greater the score, the higher the usage of that specific emotion regulation strategy, contrarywise low scores depict less recurrent use. Cognitive reappraisal consisted of 6 items (1,3,5,7,8,10) and the remaining 4 items (2,4,6,9) were of expressive suppression with the possible range of 6-42 and 4-28 correspondingly. This questionnaire has no reversed scoring item. The value of Cronbach's α of ERQ whole scores and sub-scores is satisfactory (0.73 ~ 0.82), signifying that ERQ is a consistent measure of emotion regulation.

The last part consisted of the Depression, Anxiety and Stress Scale (DASS-21) with 21 items.[10] The is consisted of three subscales premeditated to measure the level of depression, anxiety and stress. These three DASS-21 scales encompass 7 items. Scores on this scale were a multiplier of 2 to get the closing score. Scores of stress, anxiety and depression are measured separately by adding the scores of each item. Mild-severe range of three subscale scores was 0- 42. DASS-21 has good reliability which showed that it has Cronbach's alpha 0.81, 0.89 and 0.78 for the subscales of depression, anxiety and stress respectively. It is reliable, valid and easy to administer.

The research was conducted in accordance with the declaration of Helsinki and was approved by the institutional ethical review board, ref no: UCD/UOL/DRC/02/16. Participants' willingness was taken into account and informed consent was attained from all participants during the research data collection. Participants first learned about the purpose, benefits and risks involved in the study. Once they decided to be part of the study by giving their consent, a questionnaire was shared to gather personal demographic information and other tools to measure Social Media Addiction, Emotional Regulation, Strategies and Mental Health. clear instructions were given to participants clearly on the form at the top of the section on how to complete the list of questions. Each participant was informed that their data was used for research purposes only. The anonymity of participants was maintained by not collecting their names, roll numbers or any other identifiable information. All codes of conduct had been applied throughout the study and onwards.

After collecting the data, data was inserted and afterwards evaluated on Statistical Package for Social Sciences (SPSS) version 23. The gathered information was screened for any incomplete or missing information. In order to find the relationship between variables, Pearson Product Moment Coefficient of correlation analysis was used. For assessing mean comparison, t-test was applied.

RESULTS

This part grants the core statistical results and interpretations of the existing data. In order to analyze the data, Pearson Product Moment Coefficient of correlation and independent sample t-test method were used in SPSS V.23. Percentages, means and statistical deviations of demographic variables and characteristics were calculated by using descriptive statistics. A sample of total 503 adults with age range of 18 - 25 years participated in the study of which 31.4% were male and 68.6% were female (Table 1). Table 1 reveals that maximum participants were with age range of 18 – 20 years (n =279, 55.5%). More number of female adults (n = 345, 68.6%) participated in the study. Higher number of adults from urban areas (n = 323, 64.2%) were participants. Majority of the participants were in 2nd year of study (n = 230, 45.7%). Participants with upper Socioeconomic status were greater in number (n = 307, 61%). Unmarried adults participated maximumly (n = 387, 76.9%). Parental marital status of most of the participants was married (n = 359, 71.4%). The most preferred social app was WhatsApp (n = 208, 41.4%), followed by Instagram (n = 126, 25.0%) and YouTube (n = 110, 21.9%).

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Table 1: Sociodemographic Characteristics of Participants

Characteristics	Frequency (*n*)	Percentage (*%*)
Gender		
Men	158	31.4
Women	345	68.6
Age Groups		
18-20	279	55.5
21-23	166	33.0
>24	58	11.5
Area of living		
Rural	180	35.8
Urban	323	64.2
Year of Study		
1st Year	161	32.0
2nd Year	230	45.7
3rd Year	90	17.9
4th Year	16	3.2
5th Year	6	1.2
Socioeconomic status		
Upper	307	61.0
Middle	193	38.4
Lower	3	.6
Marital status		
Married	116	23.1
Unmarried	387	76.9
Field of Study		
MBBS	352	70.0
BDS	151	30.0
Family monthly income		
20,000-40,000	116	23.1
40,000-60,000	118	23.5
60,000-80,000	108	21.5
80,000- above	161	32.0
Parental Marital status		
Married	359	71.4
Separated	106	21.1
Divorced	37	7.4
Social App Preference		
Facebook	22	4.4
WhatsApp	208	41.4
Instagram	126	25.0
YouTube	110	21.9
Twitter	6	1.2
Snapchat	12	2.4
TikTok	19	3.8

Note. (N=503)

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Table 2 suggests that a significant positive correlation between SMA and depression, anxiety and stress has been detected. Social media addiction has a strong positive correlation with anxiety (r= 0.39, p < 0.01), depression (r= 0.38, p < 0.01), and stress (r= 0.37, p<0.01).

Table 2: Correlations for Study Variables

Variables	*1*	*2*	*3*	*4*
Depression	–			
Anxiety	0.78**	–		
Stress	0.80**	0.78**	–	
Social media addiction	0.38**	0.39**	0.37**	–

***p<0.01*

The Pearson correlation reveals that social media addiction has a significant moderate positive relationship with Cognitive Appraisal (r= .21, p < 0.01) and expressive suppression (r= .19, p < 0.01) (Table 3).

Table 3: Additional Correlations for Study Variables

Variables	*1*	*2*	*3*
Cognitive appraisal	–		
Expressive suppression	0.73**2	–	
Social media addiction	0.21**	0.19**	–

DISCUSSION

In the present research, findings have illuminated the role of social media addiction and emotion regulation strategies on the medical and dental students of Pakistan. This study was designed to quantitatively analyze the relationship of emotion regulation strategies and mental health with social media addiction.

Present results have revealed that an increase in SMA leads to a decrease in mental health. These findings are consistent with past literature in which researchers found that social media addiction was negatively associated with mental health which depicted that an individual with higher social media addiction will have poor mental health thus, consistency lies in the positive relationship of social media addiction and depression, anxiety and stress.[11]

Findings reveal the association of SMA with mental health problems in such a way that the higher the social media addiction a person has, the higher he/she would have poor mental health means that if a person is addicted to social media he/she may have the more incidence of stress, anxiety and depression. The reason for this might be explained by the constant need for affirmation through social media content in the form of 'likes' and 'followers'. When a person stops receiving such appreciation, it causes anxiety which often leads to depression in chronic cases.[12] Medical and dental students suffer from high academic pressure, they use social media to relax which backfires in the form of a different form of anxiety. That student traps himself in a downward spiral resulting in poor social interaction and poor grades.

Relationship of social media addiction and mental health was statistically noteworthy and consistent with former studies which illustrate that a positive correlation between social media addiction and mental health problems was observed in a cross-sectional study, unveiled the negative effects of social media, gaming and smartphones on mental health whereby, social media addiction triggered psychological distress (depression, anxiety and stress) among Chinese.[13] Another study concluded that internet abuse and social media addiction were correlated to sleep problems and other mental health issues. The findings of that previous study are reliable to present study in such a way that the more a person has an addiction to social media, the more that person will have both physical and psychological health issues which include depression, anxiety and stress.[14]

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A significant positive relationship was detected between social media addiction and cognitive appraisal and expressive suppression regarding present results. This substantiated positive relationship representing that an increase in SMA led to an increase in cognitive appraisal and expressive suppression, meant that those adults who use social media excessively might tend to have high adoption of emotion regulation strategies in this pandemic situation. In constancy to previous literature and Media Dependency Theory, it can be concluded from the current study that the use of social media in the pandemic period might be inducing positive implications in controlling emotions. Therefore, a positive relationship between the constructs indicates the positive influence of social media on emotion regulation strategies. Theory explained the idea of a combination of the media system and social system, depicting the intimacy of social media.[15]

Findings are also consistent with other theories and research such as, according to Mood Management Theory, social media use is determined by the person's desire to self-regulate unpleasant feelings so as to feel more positive emotions. A recent study led among adults during COVID-19 has indicated that higher feelings of loneliness predicted more social media use.[16]

An earlier study conducted in Pakistan indicated that social media use is associated with perceived threat and self-efficacy, which illustrated that emotional and cognitive mechanisms affect the perception of people regarding covid-19 threat and their preventive behaviours with respect to information accessible on social media, indicating the positive relationship of social media usage and emotion regulation in such a way that, if the exposure to social media is increased in pandemic then people would have more awareness about regulating their emotions.[17]

This is a unique study that determines the association between SMA, emotional regulation and depression among medical and dental students of Pakistan. A few limitations should be considered while spotting the results of the current study. Boundaries can be implemented while generalizing the findings that only literate adults were chosen as participants for research. Also, causal inferences cannot be made between variables due to the cross-sectional nature of the study. Having said that, this study paves the way for future studies related to social media addiction in medical and dental students. Future studies can use experimental research design to explore the causal relationship between social media addiction and emotion regulation with mental health. Research could be conducted on various cultures with different age ranges of people. It is also suggested for future research to explore qualitatively as well as quantitatively the differential effects of other variables on the domain of mental health.

CONCLUSION

Data analysis, results and discussion permit a conclusion that finely summarizes the purpose and findings of present research. Social media addiction and emotional regulation are those factors of psychology which are widely being studied in Pakistan and therefore this research illustrates new insights for research by presenting empirical support for its incidence in the medical and dental community of Pakistan. The findings reveal that there is a significant positive strong correlation between social media addiction and depression, anxiety and stress. Moreover, gender differences were significant in social media addiction and mental health problems. Social media addiction has a significant moderate positive relationship with Cognitive Appraisal and expressive suppression.

DISCLAIMER

None.

CONFLICT OF INTEREST

None to declare.

ETHICAL STATEMENT

The Ethical approval was taken from Research Ethics Committee of concerned university (Ref: ANDC/SU/DRC/02/16).

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AUTHORS CONTRIBUTION

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A Correlation Between Socioeconomic Determinants and Dental Caries Risk in Islamabad, Pakistan

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ABSTRACT

Objective: Dental caries is a multifactorial infectious disease that causes demineralization of teeth. Socioeconomic status (SES) and educational level are associative factors in caries development. This study aimed to determine the correlation between socioeconomic determinants and dental caries risk among patients reporting to a tertiary care hospital in Islamabad.

Materials and Methods: This prospective cross-sectional analytical study was conducted at Islamabad Dental Hospital over six months from February 2023 to August 2023. A total of 322 participants were enrolled based on the convenience sampling technique. The participant's SES was assessed using the index score proposed by Oyedeji whereas caries risk status was evaluated using the DMFT index. Data was analyzed for frequency and percentages using SPSS version 22. Bivariate and multinomial regression analyses were performed to check for the association between SES and caries with a $p < 0.05$ considered statistically significant.

Results: Among all the participants, 260 (80.7%) had decayed teeth, 112 (34.7%) had missed and 50 (15.5%) had their teeth restored previously. The mean DMFT±SD score was 5.51±5.453. There was a statistically significant difference in the DMFT, D, M, and F scores between the different levels of SES. Participants with a high socioeconomic score (81.4%) are less likely to exhibit caries risk than those with a low socioeconomic score.

Conclusion: The prevalence of dental caries is higher among people of lower SES. High DMFT scores indicate that dental caries is a highly neglected disease among Pakistani people, particularly among people of low SES.

Keywords: Correlation, Dental Caries, DMF Index, Low Socioeconomic Status, Prevalence

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INTRODUCTION

Dental caries is an infectious disease that causes demineralization of teeth.[1] It has detrimental consequences on quality of life by inflicting pain, early loss of teeth, and hampering the daily routine. Primarily dental caries are implicated by bacteria, fermentable carbohydrates, susceptible tooth surface and time. The secondary modifying factors associated are behavioral aspects (presence of plaque, poor oral hygiene, increasing age, gender, inadequate tooth-brushing habits, frequency of consuming sugar) and an individual's socioeconomic status (SES).[2]

There is a complex relationship between the SES of an individual and dental caries. Socioeconomic status includes educational background, income, and residential area and is one of the strongest determinants of caries. Studies have shown that people with a low socioeconomic status have poorer oral health status and more carious lesions than those with a higher socioeconomic status. It has been stated in the literature that the gross income of the family and educational level has also significant associations with oral diseases. As Schwendicke et al reviewed in their study that people with less education or a financially poor background, were more likely to have a higher risk of caries lesions.[3]

For the assessment of caries risk status, the Decayed, Missing, and Filled Teeth (DMFT) index has been widely used. This is the universally accepted index and measures the total lifetime caries status of an individual. Therefore, the DMFT index quantifies dental caries status.[4]

Many studies conducted all around the world have shown the direct relationship between oral health with socioeconomic status, as the poor possess the most neglected mouths. In Pakistan, the high cost of treatment and low literacy rate in the low socioeconomic class are major barriers to poor oral health.[5]

Over a period, the prevalence and severity of dental caries have declined in developed countries where the socioeconomic status of the population is better. A study conducted in Australia evaluated the shape of the socioeconomic oral health gradient and showed a linear relationship of decreasing prevalence for individual oral conditions across increasing social status.[6] A cross-sectional study conducted in China to evaluate the association between socioeconomic status and dental caries in elderly people reported a high DMFT score in people with low socioeconomic status.[7] On the other hand, Leghari et al in their study on school children in Karachi reported an increase in DMFT score and caries risk with an increase in gross income but with low-level education of parents.[8] This shows that while describing socioeconomic status education and income both should be considered.

It is paramount to know the type of relationship that exists in society between caries and socioeconomic status as a contributing factor in the carious process, as it can be beneficial in understanding and developing better healthcare policies for improving people's social lives. Surayia and Amynah concluded in their study that oral health has a significant impact on an individual's social well-being.[9] Therefore, this study aimed to determine the association of socioeconomic status with dental caries risk among patients reporting to Islamabad Dental Hospital for dental checkups using the DMFT score.

MATERIALS AND METHODS

This prospective cross-sectional analytical study was conducted at the affiliated hospital of Islamabad Medical and Dental College over six months from February 2023 to August 2023. The inclusion criteria include adult male and female patients reporting at the outpatient department of Islamabad Dental Hospital, Barakahu. Children with mixed dentition, patients with retained deciduous tooth/teeth, disabled and physically handicapped adults, patients with learning disability, and patients with a language barrier were excluded from the study.

A convenience sampling technique was used to achieve the estimated sample size of n= 322, which was calculated with a confidence interval of 95% and an anticipated population proportion of 0.30. The study was approved by the institutional review board and ethical committee before commencing the research.

Data was collected through an oral examination and questionnaire after taking the informed consent. Two authors conducted oral examinations after calibration for caries identification according to the International Caries Detection and Assessment System (ICDAS). The patient's teeth were air-dried and then examined with the help of a dental mirror and probe under an artificial light.

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The teeth with an ICDAS score of 2 or above and teeth with evidence of caries on the root were noted as decayed teeth (D). Teeth that were restored with any restorative material without evidence of secondary caries were identified as filled teeth (F). Teeth that were not present in the oral cavity due to any reason were classified as missed teeth (M). Targeted questions were asked of the patient based on profession and education to determine their socioeconomic status.

The participant's caries risk status was evaluated using the DMFT index and its components. The scoring of DMFT was done according to the criteria used by Shirazi and colleagues. A DMFT score of 1 to 4 was regarded as low caries risk, a DMFT score between 5 to 9 was regarded as medium caries risk, and a DMFT score of greater than 9 was regarded as high caries risk.[4]

The socioeconomic status was determined, and the score was assigned to each participant by asking questions using the socioeconomic index score by Oyedeji as shown in Table 1.[10]

Table 1. Socioeconomic Index Score

Parent/Guardian Occupational scale	
Scores	**Criteria**
1	Senior public servants, professionals, business people, large-scale traders, contractors.
2	Intermediate grade public servants, senior school teachers.
3	Junior grade public servants, junior school teachers, artisans, drivers.
4	Petty traders, laborers, Messengers
5	Full-time housewives, unemployed, students, subsistence farmers.
Parent/Guardian Educational scale	
Scores	**Criteria**
1	University graduate or equivalent
2	School certificate holder with teaching or other professional training
3	School certificate holder
4	Primary six certificate holder
5	Illiterate

The sum of the two scores was then divided by 2 to calculate the mean of scores. The final mean score was used to determine the socioeconomic status of the participant. Intermediate values were rounded off to the nearest whole numbers e.g. 3.5 were rounded to 4. The final mean score of 1 was regarded as high socioeconomic status, scores of 2 and 3 were regarded as of middle socioeconomic status, and scores of 4 and 5 were regarded as low socioeconomic status. Data on caries risk gathered by a score of DMFT index and socioeconomic status was noted in a proforma along with other demographic details.

The data was tabulated and analyzed using the Statistical Packages for the Social Sciences Software (version 22.0). Mean, standard deviation, frequency, and percentages were calculated for Decayed, Missing, and Filled Teeth. Bivariate and multinominal regression analyses were performed to check differences among different divisions of society according to their socioeconomic status and the association between caries risk and socioeconomic status.

RESULTS

A total of n=322 patients were assessed; males and females were equally distributed. Most of the participants were young, i.e. 256 patients were below the age of 44 years. Among all patients examined, 260 (80.7%) had decayed teeth, 112 (34.7%) had missed and 50 (15.5%) had their teeth restored previously. The mean DMFT ± SD score was 5.51±5.453 as shown in Table 2.

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Table 2: Descriptive Statistics for Dependent Variables of Decayed, Missed, and Filled Teeth and the overall DMFT Index

		Decayed	Missing	Filled	DMFT
N	**Valid**	322	322	322	322
Frequency and Percentage		260 (80.7%)	112 (34.7%)	50 (15.5%)	-
Mean		3.57	1.50	0.45	5.51
Std. Deviation		3.878	3.678	1.580	5.453

As an individual component of DMFT, the mean value ± SD for the decayed teeth was 3.57±3.878, while that of missing teeth was 1.50±3.678 and filled teeth was 0.45±1.580 (Table 2). About 31 patients (22 males and 9 females) had a DMFT score of 0.

The distribution of DMFT according to different independent variables is shown in Table 3.

Table 3: Descriptive Information and Bivariate Analysis (n=322)

Independent variables	N	DMFT>0 N (%)	DMFT (mean±SD	DMFT *p*-value	D *p*-value	M *p*-value	F *p*-value
Gender							
Male	161	139 (47.76)	4.66± 5.28	.00^	.00^	0.480^	0.942^
Female	161	152 (52.23)	6.37± 5.50				
Socioeconomic status							
Low	158	145 (49.82)	7.32± 6.30	0.00*	0.00*	0.012*	0.002*
Medium	129	117 (40.20)	3.86± 3.91				
High	35	29 (9.96)	3.46± 3.15				
Adjusted socioeconomic status							
Low	158	145 (49.82)	7.32± 6.30	0.00^	0.000^	0.023^	0.005^
High	35	29 (9.96)	3.46± 3.15				

^Mann Whitney U-Test
**Kruskal-Wallis Test*

The inequality in the DMFT score distribution was associated with gender and socioeconomic status. Table 3 shows a statistically significant difference in the DMFT, D, M, and F scores between the different levels of socioeconomic status. High socioeconomic patients are 81.4% less likely than low socioeconomic patients to develop high caries risk.

Multinomial regression revealed a statistically significant association between low caries risk and high and medium socioeconomic status. The high socioeconomic group (OR=5.38, 95% CI, 1.44 to 20.07 p=0.012) and medium socioeconomic group (OR=6.31, 95% CI 2.71 to 14.68 p=0.000) both indicated a higher chance of having a low caries risk compared with the low socioeconomic group. The chi-square test showed a statistically significant association between caries risk and socioeconomic status ($p < 0.005$). As shown in Figure 1, the high socioeconomic group had the least cases of high caries risk and high caries risk patients were most common in the low socioeconomic status group.

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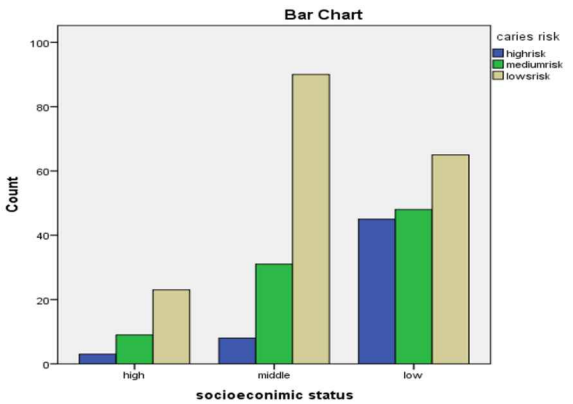

Figure 1: Association of Caries Risk and Socio-economic Status

DISCUSSION

This study highlights how socioeconomic status relates to caries risk in a Pakistani population using a theoretical construct based on education and occupation to gauge the SES. The strong association between high SES and low caries risk, as identified in our study, is similar to studies conducted in developed countries. Yet, it becomes all the more alarming for a developing country like Pakistan.[7,11,12] Previous studies on the Pakistani population have demonstrated a similar trend of association between SES and caries risk.[13,14] These studies however differed in terms of methodology and age of sampled population.

This study found an inverse relationship between SES and caries risk which is in agreement with the findings of a systematic review published by Reisine and the meta-analysis done by Schwendicke F et al.[3,15] However, these findings should be considered with caution as in the present study the proportion of patients with high SES were relatively few compared to low SES. This makes it difficult to make a true comparison of the mean DMFT from patients belonging to each of these strata. Nevertheless, the high cost of dental treatment is an important factor that precludes certain members of society from seeking regular dental care. As reported by Waseem and colleagues while investigating a Pakistani population the cost factor is a huge hurdle in acquiring dental treatment.[5]

The DMFT result of our study is much lower than that reported in elderly Chinese (13.32±9.58) population but comparable to the DMFT in Iranian (7.32±2.85) and Indian (4.0±5.7) populations.[7,16,17] In this study, the number of diseased teeth contributed the most to the overall DMFT score, followed by the missing teeth. The low ratio of diseased to filled teeth in the sample suggests general neglect in seeking dental care among the patients in the study. The disparity between the diseased and the filled could also be attributed to the fact that patients presenting to a hospital are being screened before receiving dental treatment. Hence the difference in the diseased and filled will be reduced following treatment rendering the results to be an overestimation of the difference in population.

While there have been various indexes for gauging the SES, the present study adopted a method proposed by Oyedeji.[10] This method used information regarding education and occupation to assign a socioeconomic status. The validity of these measures of SES is supported by literature.[18]

To assess the caries risk of the patients, a DMFT index was used which indicated a significant difference in the distribution of DMF scores concerning gender and SES. Schwendicke F et al also revealed that while considering SES based on low educational grounds the carious process was more in this portion of society.[3] In our society illiteracy is a menace (i.e. only 68% of males and 40% of females are literate)[19] which leads to poor jobs and low income which makes them unable to visit the doctor in the initial stages of disease which deteriorates the oral problem further and so does the DMFT score rises. It's a vicious cycle that goes on. It can be seen in the graph (Fig 1) that the greatest number of high and medium-risk patients were in the low SES.

A study by Harchandani and colleagues in 2012 reported that DMFT was 1.38 in 2004 in Pakistan which was 0.9 in 1999, while it is 5.5 in this study, though this study is limited in its locality still the DMFT score has risen.[19] The value of filled teeth has improved from 0.08 in 2004 to 0.45 at present but it still shows a very low amount of treatment being done.

Although the gender proportion was equal in the current study, the DMFT score was higher in females than males i.e. 4.66±5.28 in males and 6.37±5.50 in females. This finding is consistent with other studies conducted in Karachi, Lahore, India, Saudia Arabia, and the Philippines. However, Khairpur, Peshawar, and Qatar studies reported caries were more prevalent in females.[20]

In this study, we analyzed that low SES had the highest

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DMFT score of 7.32± 6.30 and high SES had a score of 3.46±3.15 but it is in contrast to the study done by Leghari MA, Tanwir F, Ali H in 2014 where they discussed that higher the SES higher were the decayed and filled teeth present.[8] They attributed this anomaly to their dietary habits and usage of high sugar intake and having the perception to go to the dentist as they could afford it.

The reasons for missing teeth were not identified in the present study making it difficult to establish whether the teeth were lost due to advancement in the caries process or periodontal disease. Also, caries is a multifactorial process and SES is one of the factors, and that too is dependent on various aspects. Still, we only investigated the income and education measures for SES. The results are only representative of the patients reporting to the Islamabad Dental Hospital Barakahu and any generalizations should be carefully drawn.

Since the patients were enrolled and examined after approval of the research proposal it allowed calibration of the examiners identifying caries. However, the cross-sectional nature makes it difficult to establish a cause-and-effect relationship between socioeconomic status and caries risk.

CONCLUSION

Within the limitations of the study and considering the DMFT score we got from our study it can be concluded that there is a significant association between the SES and caries risk. Also, the high DMFT scores indicate that dental caries is a highly neglected disease among Pakistani people, particularly among people of low SES.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

ETHICAL STATEMENT

Ethical approval was provided by the Ethical Review Committee at Islamabad Medical and Dental College. (Ref no IMDC/DS/IRB/304)

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AUTHORS CONTRIBUTION

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ORIGINAL ARTICLE

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Assessing the Obstacles Encountered by Dental College Faculty in Punjab During Online Instructive Sessions

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ABSTRACT

Objectives: This study aimed to assess the challenges faced by faculty of different institutes in Punjab while they were delivering content online during COVID-19.

Materials and Methods: This multicenter cross-sectional study was conducted in different Dental Colleges of Punjab and spanned over 3 months. Ethical approval was sought from ERB at Dental College HITEC-IMS. A validated questionnaire was formed using the FROCT Scale and was checked for it's content and face validity. A pilot study was conducted, and reliability was checked using the test re-test method.

Results: The majority of the faculty found it difficult to plan, design, and conduct these online sessions as a mode of information transfer. As low as 38% of faculty members faced no problem related to online teaching. 33% were already familiar with this mode and only 35% more were willing to learn these e-teaching techniques. Internet connectivity, student, engagement, and their response to assignments were found to be major issues.

Conclusion: This study concluded that the faculty of dental colleges in Punjab is neither equipped with the knowledge of e-teaching nor they are ready to adapt to the changes in medical education. COVID-19 has altered the way that we learn and forced us to adjust to these more modern methods. Additionally, to keep up with the world, development, and coordination with the IT sector are now essential.

Keywords: COVID-19 Pandemic, Developing Countries, Distance Education, Emergency Online Teaching

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INTRODUCTION

The COVID-19 pandemic affected the financial, social, and educational activities of more than 200 countries of the world.[1,2] This health crisis, caused by coronavirus SARS-CoV-2, emerged in late 2019 in China and spread rapidly worldwide profoundly affecting the society and daily life. The constant shift in the global dynamic during the lockdown had a significant impact on the educational sector of third-world countries and compelled teachers and educators to adopt online teaching from a traditional instructional approach.[3-7] The pandemic led to the closure of institutions and the collapse of the educational system.[2,8-10]

For developed countries this situation was not that bad and challenging as they were running several online courses but for underdeveloped countries like Pakistan resources were not appropriate to run medical program effectively via online platform.[2,11-13] Medical teachers never thought of educating medical students through an online approach. They lacked the necessary expertise and formal technology training to successfully run an online learning program.[1,11,14] Although deficient in institutional support for e-learning, various medical institutes were obligated by HEC to adopt this mode during lockdown.[2] As medical curriculum is quite complex and not only deals with the knowledge component, but also has other outcomes and objectives to serve the community. For this, the medical students must acquire several clinical competencies and skills to be good medical and dental professionals with hands-on experience and patient dealing.[15]

Numerous other educational fields are already conducting E-learning programs and their faculty is experienced in online teaching, but this mode is newer for medical and dental colleges.[1] Hence, the faculty encountered difficulties as a result of this abrupt change in tactics because the majority of them lacked knowledge of how to use online programs and applications. Some found it difficult to gain students attention and conduct reliable assessments.[3] They also found this mode unsuitable for conducting practical and teaching skills. As a result, a review of online teaching was required to determine the challenges faced by teachers during online teaching and assessment.

Pakistan's medical and dental schools also had a lot of difficulties carrying out efficient online instructions due to the nation's underdeveloped status.[16] The aim of this study was to assess the readiness of dental college faculty of Punjab to adopt online instructive mode of teaching using the FROCT scale. This evaluation allowed us to identify the problems faced by the faculty and plan strategies for teachers' professional development that could improve instructions in the online environment in dental colleges of Punjab, Pakistan.

MATERIALS AND METHOD

This was an online survey-based cross-sectional, multicenter quantitative study on a validated questionnaire to identify the challenges faced by faculty during online teaching during COVID-19. The Ethical Review Board of Dental College HITEC Institute of Medical Sciences granted ethical approval for this study. (Approval number: Dental/HITEC/IRB/21). Informed consent was obtained from all participants at the start of the study.

A close-ended questionnaire for online assessment evaluation was prepared using the Faculty Readiness for Online Crisis Teaching (FROCT) scale.[17,18] A 13-item questionnaire was constructed to evaluate the challenges faced by the faculty of medical and dental colleges.[8] The questionnaire was checked for its face and content validity by experienced medical educationists. A pilot study was conducted on 15 participants to check the feasibility and acceptability of the questionnaire. The test-retest method was administered to check the reliability of the questionnaire.

The questionnaire was prepared on Google Forms and WhatsApp was used for dissemination to the faculty of different dental institutes of Punjab.[8] Google Docs data was retrieved in Microsoft Excel sheets for further analysis through SPSS version 26. The respondents were selected through a total enumeration technique (census). Selection criteria included group members who were Assistant Professors and above from various medical and dental colleges of Punjab and were involved in conducting online sessions during the COVID-19 pandemic for more than one year. The third criteria were their willingness to participate in the study. We selected this group as they have extensive experience and understanding ability to provide a better insight about the difficulties to respond to this study. Junior faculty and faculty with no experience or less

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than one year of online teaching experience were excluded from the study.

RESULTS

Out of 230 total respondents, the response rate was 83%. The majority of the faculty who took part in the study were female (90%). Equal participation of senior and junior faculty was seen. 45% of faculty held CHPE and 7% did MHPE in the past.

When faculty were asked about their experience of planning and ease in designing online sessions, the majority (77% and 58%) answered in negative. Only 38% of faculty members reported that they were able to manage interactions during lectures successfully via online mode of teaching. 61% of the educators reported that they managed to respond whenever students asked for guidance through online modes but at the same time, they did not feel this exercise comfortable (62%). As low as 33% of instructors were familiar with the online teaching platforms and only 35% were willing to learn these methods along with the online assessment tools. Out of the 230 participants, 66% believed that conducting assessment through online platforms does not provide true insight of students' learning and understanding. 70 % faculty reported that online assessments are difficult to conduct as preparing them is a time-consuming task. Only 20% of educators deemed Internet connectivity questionable but 63% thought students' engagement in online mode was unsatisfactory. 78% of teachers thought students' responses to assignments were unfair.

Table 1: Issues faced by the faculty of medical colleges in conducting successful online teaching

S.No	Questionnaire	Yes (%)	No (%)
1.	Prior experience of an online session	23%	77%
2.	Ease of designing the online interactive session	42%	58%
3.	Easy manageability of interactive learning activities	38%	62%
5.	Comfortability in communicating through online modes	41%	59%
6.	Eager to respond to communication requests from students and colleagues on time.	61%	39%
7.	Familiarity with at least one synchronous online teaching platform.	33%	67%
8.	Willing to use the learning management system or other online ass essment tools to evaluate student performance.	35%	65%
9.	Online assessments were difficult and time-consuming	70%	30%
10.	Online assessment gives an insight of students' knowledge	44%	66%
11.	Unsatisfactory Internet connectivity of students	20%	80%
12.	Unsatisfactory students' engagement in online mode	63%	37%
13.	Student's unfair responses to assignments	78%	22%

DISCUSSION

COVID-19 was a unique circumstance that arose out of the blue.[19] To maintain the online education system, Pakistani educational institutions had to incorporate e-learning technology. The pandemic has forced many institutes to shift from traditional face-to-face instruction to online teaching.[20] The beneficial influence of information technology on various aspects of our lives today has massive consequences, and society cannot deny the role of advanced technologies. Its growing popularity and use in the educational sector cannot be dismissed.

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When confronted with the new technology, students and instructors may either adopt it or ignore it.[21] Thus, technical skills can be a barrier making it more difficult for the medical faculty to maintain their digital literacy.

This study adds to the scant body of knowledge on dental teachers' readiness for online learning, particularly in the setting of a low-tech nation like Pakistan. In our literature search, we found a bulk of research literature studying the challenges faced by dental students during the COVID-19 period across Pakistan.[22] However, this study highlights the perspectives of the faculty regarding the challenges faced. Therefore, this study forms a basic foundation for future research based on methods to overcome these challenges such as hybrid teaching methodologies and institutional support. This study's multicentric design is one of its advantages. Various institutes of Punjab were included for generalizability.

In our study, a very low percentage of participants were comfortable with using the e-learning management systems. A study also seconds our findings stating that their faculty expressed their concern on lack with of skills of using gadgets during online teaching.[26] Our nation is lagging in many aspects of life, one of which is the formation and implementation of medical educational strategies to improve the quality of education and uplift this deteriorating sector.[23] Most studies back this up, citing difficulties caused by a lack of faculty training, internet connectivity, and faculty familiarity with online teaching platforms such as Zoom and Microsoft.[8,24] A study conducted in Philippines supported the concerns that were expressed by the faculty of our study regarding technology issues.[26] Our study revealed faculty disdain for using online evaluation modes to assess student performance. Institutes using primordial modes to assess learning in students are now changing, though at a slow pace. Approx 60% of our faculty faced problems in designing online sessions and managing interactions during the online sessions. A study conducted in Algeria also stated that their faculty found it quite challenging to plan appropriate strategies to keep student engaged during interactive session which supported our finding.[24] Similar to this study, our study results also show 63% of our faculty found it challenging to engage students during online teaching.

Our study showed that faculty faced difficulty in managing time to respond to students request and guidance. Similar findings were reported in a study published by T. Abid et al. stating that their faculty found it difficult to maintain work life balance during online teaching.[11]

Our 67 % faculty reported that they were not familiar with at least one synchronous online teaching platform that could be a reason for the difficulty they were facing in engaging and assessing student.59 % of our faculty was uncomfortable in communicating through online modes and 65% was not willing to use the learning management system or other online assessment tools to evaluate student performance. Similar challenges were reported in a study conducted at Ziauddin University stating that their faculty had reservation in using online platform as they were unfamiliar of this online platform of teaching.[2] Our results showed around 60% to 70% of the faculty does not find online platform appropriate for evaluating students learning as it was difficult to decide which tool is appropriate and preparing online assessment was quite challenging and time-consuming effort for them. A study by Saleh on online assessment also state the same concerns in their study regarding removing dishonesty during assessments and showing requirement of improved innovative strategies that can reflect true insight of students learning.[24]

One of the challenges faculty reported in our study was unsatisfactory internet connectivity of students. 80% of our faculty faced this connectivity issue while conducting online session. A study conducted Farooq has also reported internet connectivity to be one of the biggest challenges during online teaching in an underdeveloped country like Pakistan.[8] Another study conducted in Bangladesh showed internet connectivity as a major issue faced by teacher and students for successful conduction of online teaching sessions.[7]

Since the transition to online education, many challenges and barriers have been identified, for students, trainers, and institutions. According to our literature review, one of the key limitations found in the literature is the barriers to maintaining academic integrity during online sessions.[21] Teachers especially could not maintain the standards of teaching as they normally do in face-to-face sessions.[25] To overcome these challenges, various needs and necessities are discussed in the literature, such as the need for innovative medical education after the COVID-19

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epidemic. For instance, the use of pedagogical innovations, simulation-based training, and the integration of technology with traditional teaching modalities.[17] Other relevant studies have similar findings regarding justifications for the use of e-learning in medical education.[23] Since teachers currently perceive online learning to be uncomfortable, current literature justifies the need for future research on ways to make it more effective.[16] The COVID-19 pandemic has led to a shake-up in medical school norms that, while disruptive, may expose institutions to cutting-edge teaching and assessment methods that could ultimately enhance medical education in the future. A promising area for further research is how the faculty's impressions of online learning during COVID-19 are influenced by negative psychological elements including stress, worry, and uncertainty.

Pakistani medical educators must get additional training and support to make them more prepared for online instruction to address these issues. This might entail having access to online learning resources and teaching tools, as well as having the chance to interact with other medical educators to exchange best practices and teaching methods. Furthermore, it would be interesting to study how familiarization with e-learning software and the promotion of their regular use may improve teacher's comfort level with e-learning. Limited sample size is not generalizable to a large population therefore a nationwide survey is required. Finally, differences between the faculty with previous MHPE and CHPE can affect the results and can be studied in detail for future studies.

CONCLUSION

Since the transition to online education, there has been observed a sense of discomfort with online teaching in dental institutes. The nature of teaching makes it even more challenging. Moreover, online education was first introduced as "emergency remote learning" and in Pakistan, it is still in its infancy, especially in dental colleges. Faculty needs to be trained on how to use online modalities and create lesson plans with more interactivity and less cognitive strain. A change in culture through improvement in online teaching would not only help with improving the current state of perceived discomfort of teachers with online learning, but also it may increase student engagement.

DISCLAIMER

None.

CONFLICT OF INTEREST

None to declare.

ETHICAL STATEMENT

The Ethical Review Board of Dental College HITEC Institute of Medical Sciences granted ethical approval for this study. (Approval number: Dental/HITEC/IRB/21)

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ORIGINAL ARTICLE

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A Comparative Study of Gingival Health of Orthodontic Patients with Bands and Buccal Tubes on First Molars

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ABSTRACT

Objectives: To calculate the gingival index of molars with bands before, and at a duration of 3 and 6 months of orthodontic treatment and to compare the scores with the other group which has buccal tubes on the molars.

Materials and Methods: 30 patients each in two groups (A and B) by using the random sampling technique. Group A had bands cemented on the first molars while Group B had buccal tubes. The variable of gingival Index was then quantified and noted for comparison and analysis.

Results: In the banded group when the gingival index was recorded before the start of the orthodontic treatment (T0), the values were low as compared to the index at 3 and 6 months (designated as T1 and T2, respectively). The recorded variable however, gave a decreased value in the bonded group. Banded teeth provided a greater surface for bacterial and foreign body accumulation and lesser surface for maintenance of oral hygiene thus resulting in inflammation around the tooth.

Conclusion: When a good oral hygiene is maintained by the patient throughout the fixed orthodontic treatment a better Gingival index with time is seen when buccal tubes are used rather than bands.

Keywords: Gingival Health, Oral Hygiene, Orthodontic Bands, Orthodontic Buccal Tubes

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INTRODUCTION

With the awareness of esthetic concerns more adults are now opting to get fixed orthodontic treatment. This increases the apprehension for periodontal health particularly in those patients who have a deprived oral hygiene. The tooth supporting structures consist of cementum, alveolar bone, periodontal ligaments and gingiva. When orthodontic appliances are inserted in the mouth, they become retentive areas for plaque accumulation. This leads to multiplication of bacterial colonies, and inflammation results affecting the periodontium. It becomes necessary to give appropriate oral hygiene directives to the patients and then stress upon them throughout the treatment or else a deterioration of the periodontal health is seen.

Inflammation of the gingiva is termed as gingivitis. After plaque accumulation it takes about 4 to 7 days for gingivitis to occur with poor oral hygiene.[1] However gingivitis is a reversible process but when converted to periodontitis, the renewal of the attachment unit is not predictable. The periodontium loses its attachment and thus results in the destruction of the ligament fibers of periodontium.

Gingivitis is more common in children and it has been defined as a lesion confined to the marginal gingiva. After two to three weeks of development of gingivitis an increase of plasma cells occurs within the lesion. This lesion becomes established depending on dietary factor and whether oral hygiene measures are taken or not, before becoming aggressive and then advancing to advanced lesions.[2,3,4] Thus the differentiating point between gingivitis and periodontitis is that plaque induced gingivitis is the inflammation of the tissues without any attachment loss[1,5] whereas periodontitis is the occurrence of gingival attachment at positions where there has been a previous pathological separation of the collagen fibers from the cementum and there is apical migration of the junctional epithelium.[1]

There is a close relationship between orthodontics and periodontal tissues since the process involves implication of direct or indirect forces on the teeth and if the oral hygiene practices are not properly adapted by the patients during the progression of the treatment, worsening in the periodontal wellbeing will be obvious in the first few months. Since the treatment of straightening the teeth requires attachments, wires, bands and brackets, these can act as sites for plaque retention and can make cleaning of the teeth more difficult.[1-6,7] This would eventually result in inflammation of the tissues surrounding the teeth. Due to esthetic concerns and awareness more adult patients are undergoing orthodontic treatment hence more stress should be implied on the cleaning measures in these patients.[8,9]

Efficient tooth movement requires the placement of properly controlled forces which would bring about the tooth movement without causing any harm to the supporting structures of the tooth. The pressure tension theory is widely accepted in this regard. When pressure is applied on a tooth there is compression of the periodontal ligament and changes in the local blood flow levels occur[1,8,10] and ultimately pressure and tension sides are formed. Resorption of bone occurs on the compression side and consequently the strain side is seen with deposition of the bone until the normal biological width of the PDL is regained.[8,11,12]

Under normal conditions of chewing and phonetics the tooth is in a neutral zone of equilibrium and no movement results. A minimum force of 5 to 10 g/cm2 is required to bring tooth movement and to move the tooth out of equilibrium.[9,13] Excessive forces produce compression of the blood vessels resulting in hypoxia and release of prostaglandins and cytokines. These mediators result in the osteoblast-osteoclast activation, with excessive forces resulting in the hyalinization as a result of necrotic tissue. There will be only small amounts of bone apposition and this will result in slow tooth movement.[8,14] As soon as the molar band is cemented to the first molars there is an alteration in the oral environment of the tooth. Being in close contact to the gingiva, an orthodontic band discloses more external area for the accrual of fragments and plaque, and thus in order to preserve the cleanliness around a banded tooth vigorous cleaning measures are required throughout the stretch of treatment.[11,15] On the other hand bonding of buccal tubes show better results in terms of preservation of the periodontal standing. Despite being a not as much of a common practice the bonding of teeth with buccal tubes exposes decreased number of retentive sites for plaque accumulation resulting in lesser or no inflammation around the tooth. The purpose of this study was comparability of bands to bonded add-ons on first molars in relationship to inflammation around the concerned tooth that would unswervingly

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disturb the periodontal standing of the teeth involved.

MATERIALS AND METHODS

This comparative analytical study was carried out for a period of 2 years. The Institutional Review Board of Islamabad Dental Hospital gave the ethical approval (Ref.No.F.2/11/ AS&RB-57/2019) for this study. The WHO sample size calculator was used to calculate the sample size of sixty patients for this study. Thirty patients each were randomly placed in the two groups A and B by using the Computerized Lottery Method. Inclusion criteria for this study was good oral cleanliness, having completely erupted upper and lower first and second molars. Exclusion criteria included patients with a past orthodontic treatment, occurrence of long-lasting medical ailment or an infection that could affect their periodontium. Patients with Class II and V fillings or fixed prosthetic device on the posterior teeth, patients having a traumatic bite and bruxism and those whose orthodontic treatment plan included orthodontic appliances were as well omitted from this study.

Patients in Group A had cementation of orthodontic bands on their first four molars with glass ionomer cement. Patients in Group B had buccal tubes etched using 37% phosphoric acid and cured on the four first molars. Ora hygiene instructions were given to patients in both groups at the start of the study and also at every follow up.

The gingival index was assessed for each tooth on the basis of Löe and Silness Scale according to the following classification:

0= absence of inflammation

1= mild inflammation with slight change in color and texture

2= moderate inflammation with reddish appearance, mild edema and hypertrophy and bleeding on probing

3= severe inflammation, with marked reddish appearance and hypertrophy, ulceration and tendency to spontaneous bleeding

The gingival index was measured at three points in time for every patient. Every first molar under study in the two groups was examined and the gingival index measured before the start of treatment (T0), after 3 months (T1) and 6 months (T2) to be recorded in a proforma. All the four surfaces (mesial, distal, buccal and lingual) were examined and a score of 0-3 was given to the gingival tissue of each side, giving the GI for that particular area. The scores from these 4 portions of the tooth were added and divided by four to give the GI for the tooth. For entering the reading, the highest value was taken for the GI of the patient at that period of time. All measurements recorded by the same researcher were rounded off to the nearest millimeter. For statistical comparison Mann Whitney U test was applied for comparability of gingival index in both groups at T0, T1 and T2. Paired sample- t test was used for the pre- and post-comparison within one group.

RESULTS

Sixty patients were selected as the sample size for this study with random distribution of 30 patients each in both groups. Figure 1 shows the age wise distribution of the sample, giving the average age of 18 years with maximum and minimum ages of 27 and 12 years respectively.

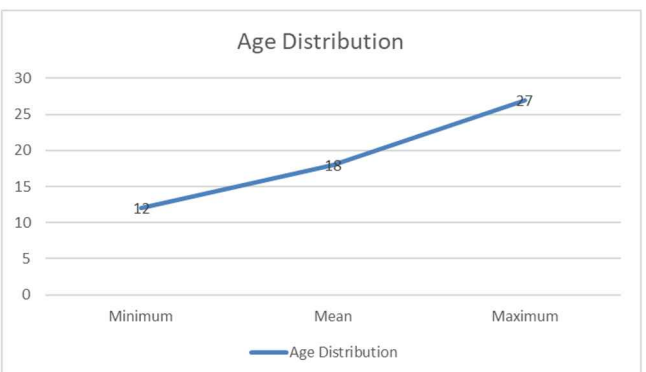

Figure 1: Age wise distribution in both groups

Gender wise distribution of patients in Group A with bands gave percentages of 67% and 33% for females and males respectively. While in group B with buccal tubes 60% females and 40% males were randomly distributed as shown in Figure 2.

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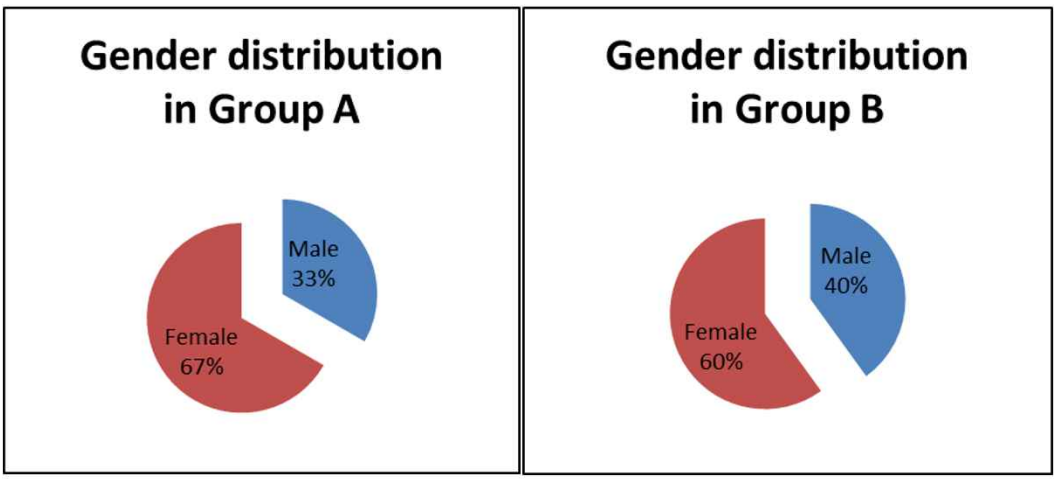

Figure 2: Gender wise distribution of both groups

Table I demonstrates the comparison of group A at three periods of time when the periodontal status was assessed with regard to the Gingival Index by means of the Paired-sample T test.

Table I: Gingival Index at T0, T1 and T2 of Group A (Bands) and Group B (Buccal tubes)

		Gingival Index (Bands)		Gingival Index (Buccal Tubes)	
N=30		Mean ±Std. Deviation	*p*-value	Mean ±Std. Deviation	*p*-value
Pair 1	**T0**	0.97±.556		0.97±0.669	0.403
	T1	1.17±.379	0.110	0.83±0.592	
Pair 2	**T1**	1.17±.379	0.001	0.83±0.592	0.255
	T2	1.53±.681		0.70±0.702	
Pair 3	**T0**	0.97±.556	0.000	0.97±0.669	0.147
	T2	1.53± .681		0.70±0.702	

In this group first molars had bands cemented on them. When the GI scores before treatment was compared with the GI scores at 3 months after treatment the results were insignificant. Comparison of the GI scores at T1 and T0 gave significant results with a mean value and standard of deviation of 1.1.7±379 and 1.53±681 respectively, thus showing an increase in the GI scores as the treatment proceeds in patients having molar bands. The results of Table 1 gave insignificant values when the other group with buccal tubes was compared at different times using the paired-sample T test. GI scores before treatment compared to GI scores at T1 did not give a significant change. Same results appeared when the GI scores at T1 were compared with the scores at T2. These results showed that GI scores decreased with time as seen from the mean values in the table above but this change is insignificant during the first 6 months of treatment.

Comparing both groups amongst themselves significant change was seen after applying Mann- Whitney U test, from T0 to T2 as shown in Table 2. GI scores in the banded group changed from the start of the treatment to T1 and a further increase was seen when the GI was recorded at T2 in this group. When the banded group was compared to the buccal tubes a significant difference was seen at T2 (*p*-value 0.000).

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Table 2: Comparison of GI before, at T0, T1 and T2 between Group A and B

Gingival Index – prior treatment			
Groups	**Mean ± SD**	**Mann-Whitney U**	***p*-value**
Band	0.97 ± 0.610	449.000	0.986
Buccal Tube	1.50 ± 0.504		
Gingival Index - 3 months later			
Groups	**Mean ± SD**	**Mann-Whitney U**	***p*-value**
Band	1.00 ± 0.521	320.000	0.013
Buccal Tu be	1.50 ± 0.504		
Gingival Index - 6 months later			
Groups	**Mean ± SD**	**Mann-Whitney U**	***p*-value**
Band	1.12 ± 0.804	186.500	0.000
Buccal Tube	1.50 ± 0.504		

DISCUSSION

Inflammation of the gingiva is termed as gingivitis. After plaque accumulation it takes about 4 to 7 days for gingivitis to occur with poor oral hygiene.[1] However gingivitis is a reversible process but when converted to periodontitis, the rejuvenation of the attachment tissue is not predictable. The periodontium loses its attachment and obliteration of the periodontal tissues result. Gingivitis becomes established depending on dietary factor and whether oral hygiene measures are taken or not, before becoming destructive.[2-4] There is no attachment loss with plaque induced gingivitis but the inflammation is there.[1,5] Periodontitis however results in destruction of the collagen fibers from the cementum and the junctional epithelium has migrated apically.[1]

An increase in perio-pathogenic bacteria is seen after start of the orthodontic treatment and there is a shift of aerobic to anerobic bacteria. These changes in the composition of bacteria are found within 12 days of treatment where by larger quantity of motile rods and cocci are seen. There is an increase seen in the motile spirochetes and rods within 6 weeks and a subsequent decrease in the cocci. Red and orange complexes of bacteria are established by 3 months. The placement of orthodontic bands sub gingivally itself induces gingivitis, altering the surrounding oral environment and development of red complexes of bacteria takes place.[1,6,9,10]

The significant risk factors for raised gingival index are plaque, subgingival cervical margins of the bands, increased probing penetration, and extent of fixed orthodontic treatment.[18] Taking the first risk factors into account, an inequity between the plaque elements and the defense mechanism of the host would result in periodontal breakdown.[13-15] Placing bands that impinge into the sulcus i.e. sub-gingivally augment the likelihood for developing inflammation. If the cervical margins of the bands are prevented from invading the subgingival areas of the molars it would be more advantageous.[12,14,15,17,18]

The change of gingiva from the normal stippled appearance into an inflamed tissue with bleeding and swelling involves many variables of periodontal health to change from their normal. Thus, more studies are required to record and analyze the periodontal variables in detail and to compare them at different time periods during the treatment so that the use of bonded attachments on molars can be more strongly promoted for long term benefits to the periodontal health. The responsibility of an orthodontist increases to two-folds as soon as the treatment is started. Complete oral hygiene upkeep proprieties for home must be ensured and also scrutinizing on every visit if the directions given are being acted upon or not.[7,19]

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The fact that patients in our surroundings are very careless towards their oral health. Flossing of teeth aside, patients do not even brush their teeth properly and regularly resulting in plaque accumulation around the teeth especially in the interproximal areas. Since cementation of a bands results in covering of all the surfaces of the tooth, the margins of the band and the wire slots and hooks provide additional retentive positions for plaque. This results in increased probabilities for the bacteria to stick to and colonize at the proximal sites as depicted in our study. After some time if the plaque is not removed from around the tooth especially from the interdental areas, there is inflammation of the gingiva, as revealed by the increased gingival index in this study. This detail was also perceived in other studies.[7,19] When patients have fixed appliances in their oral cavity after any restorative or esthetic procedure there are more chances of interdental areas being affected since cleanliness becomes more difficult in these areas, as suggested by Feu D in their study.[20] Singla et al. in their research stated the fact that inflammation of the gingiva is initiated by improper location of the band.[21] Other studies have also stated the similar factor that impingement of cervical circumference of the band into the gingival sulcus will definitely increase the occurrence of inflammation i.e. gingivitis.[1,12,16] An additional imperative fact is that a loose band during the progression of the treatment creates an addition site for plaque by providing space for bacterial and debris accumulation.

When group A was compared with group B, the GI was seen to decrease a little as an improved compliance to oral hygiene procedures were observed in patients with buccal tubes, since a larger surface of the tooth was available for them to clean. As a result of greater salivary flow around the tubes and more area available for cleaning the amount of plaque accumulated around the first molars of group B was less (Table I and II). This resulted in lower values of the gingival index and a declining pattern of index change was observed. This fact is reinforced by the research done by Amir et al.[22] On the other hand, the band covers the tooth surfaces from every side, increasing the retentive locations for plaque. Also, after cementation of the bands if the dentist is careless in removing the excess cement from around the band circumference, tubes and hook, and from the tooth surface, additional plaque retentive sites will be formed making it extra tough for the patients to clean. Cleaning becomes easier when buccal tubes are bonded on the tooth as retentive sites are eliminated or reduced. These results of the present study have also been supported by Amir et al. and Sharab et al., who stated that more plaque retention and eventually greater values of GI were found on banded teeth.[22,23] Mandibular molars with bonded tubes gave an increased GI when compared to the maxillary molars.[23] Tonetti 8 in his study on one or two variables of periodontal status, stated the fact that gingival index calculated in a patients teeth gave statistically significant results for bands and statistically insignificant results for bonds evaluated at different times during the orthodontic treatment. Same results have been reported by the present study in which all the variables important for evaluating the periodontal status have been studied together in the population of the area representing patients with a moderate sense of oral hygiene maintenance.

CONCLUSION

It was concluded that Gingival Index (GI) scores increased for both the banded and bonded groups. Also, as the treatment progressed, an increase in the accumulation of plaque was seen with bands especially after 6 months of treatment. More longitudinal studies are required to evaluate the periodontal health in patients undergoing fixed orthodontic treatment. There is a need for histological studies to disclose exact tissue alterations at different time zones during treatment with respect to periodontal wellbeing.

Variable of age and gender can be a factor of bias in this study. There was no equal distribution of all age groups and gender as randomization was done. Further evaluation is required to study the effects of age and gender on periodontal health.

DISCLAIMER

None.

CONFLICT OF INTEREST

None to declare.

ETHICAL STATEMENT

The Institutional Review Board of Islamabad Dental Hospital gave the ethical approval (Ref.No.F.2/11/AS&RB-57/2019) for this study.

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ORIGINAL ARTICLE

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Comparison Between the Efficacy of Clobetasol Ointment and Tacrolimus Ointment for the Treatment of Oral Lichen Planus

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ABSTRACT

Objectives: To evaluate the effectiveness of topical Tacrolimus 0.1% versus Clobetasol 0.05% in treating symptomatic oral lichen planus in terms of clinical score and visual analogue scale.

Materials and Methods: A one year randomized, comparative research of 60 patients with clinically and histologically proven Oral Lichen Planus was carried out. The patients were divided into two groups and given topical Tacrolimus or Clobetasol for a period of six weeks. The Data analysis was undertaken using SPSS Version 20.0.

Results: The mean Visual Analogue Scale (VAS) score in the Tacrolimus group decreased from 8.1± 1.1 to 1.4± 0.5 at the end of treatment at 6 weeks while in the Clobetasol group, mean VAS score declined from 8.9±0.9 to 1.5±0.5. Similarly, the clinical score in terms of the lesion size decreased from 3.8±0.8 to 1.0±0.6 in the Tacrolimus group and from 4.2±0.9 to 0.9±0.8 in the Clobetasol group. Overall, despite a significant drop in mean lesion size from baseline, the two groups showed comparable mean sizes at the end of the trial period. (*p*-value, 0.61).

Conclusion: It was found Topical Tacrolimus is equally efficacious as Clobetasol in the treatment of symptomatic Oral Lichen Planus.

Keywords: Clobetasol, Data Analysis, Humans, Oral Lichen Planus,Tacrolimus, Visual Analogue Scale

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INTRODUCTION

Oral Lichen Planus (OLP) is a debilitating condition affecting the oral cavity of unknown etiology requiring long-term management and clinical surveillance. Lichen planus (LP) was initially described as a chronic inflammatory disease that affects the skin, scalp, nails, and mucosa, with the potential for malignant transformation, by English dermatologist Erasmus Wilson in 1869. [1] OLP affects people from all ethnic backgrounds and is more common in women. It

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constitutes 9% of all white lesions affecting the oral cavity. While around 25% of all LP patients have solitary oral lesions, roughly 50% of patients with cutaneous lesions also have oral lesions. In contrast, only 15% of patients with Oral Lichen Planus acquire cutaneous lesions. OLP is designated as a potentially malignant condition with a malignant transformation rate from 0.4 to 12.5% .[2]

OLP is chronic in nature with periods of quiescence alternating with periods of exacerbations. Signs and symptoms of OLP are reduced during periods of inactivity. Precipitating factors similar to Koebner phenomenon such as sharp cusps, dental procedures, rough dental restorations, irritation from tobacco products, para functional habits like lip biting or cheek biting and ill-fitting dental prosthesis can all act as potential triggers and aggravate the lesions during the active phase of the disease.[1]

Though the precise etiological agent is unknown, it is hypothesized that the CD8 +T cell-driven immunological response is a key mediator in the pathogenesis of OLP.[4]

The bilateral buccal mucosa is the most commonly involved location. [5]. The spectrum of clinical manifestations ranges from asymptomatic lesions to incapacitating pain and burning sensation along with intolerance to hot and spicy foods that adversely affects the quality of life.

The diagnosis of oral lichen planus is based on a combination of clinical and histological characteristics, as proposed by Van der Meij and van der Waal in the 2003 updated World Health Organization Criteria.[6]

The treatment's primary purpose is to alleviate symptoms and extend periods of remission. Traditionally, corticosteroids have been the time-honored therapy for Oral Lichen Planus. Depending on the severity of the lesions and the degree of systemic involvement, they can be administered topically or systemically. Other treatment modalities include topical and systemic retinoids, steroid-sparing agents like Sirolimus and Mycophenolate mofetil (MMF), topical immune modulators like tacrolimus, pimecrolimus, levamisole, antimalarials, azathioprin, thalidomide, photo-chemotherapy, laser treatments, and surgery.[7]

Corticosteroids reduce inflammation by reducing leukocyte exudation and forming soluble inflammatory mediators, while maintaining cell membrane integrity by inhibiting phagocytosis, releasing lysozymes, and stabilizing lysosome membranes.The efficiency of corticosteroid therapy in OLP patients varies between 30-75% for moderate to highly efficient Corticosteroids and 56-75% for clobetasol propionate.[8]

Tacrolimus (FK-506 or fujimycin) is a macrolide immunosuppressive agent belonging to the category of calcineurin inhibitors. Streptomyces tsukabaensis, a bacteria identified in the soil near Tsukuba, Japan, is responsible for its production.

Tacrolimus reverses OLP pathogenesis by binding to FK506-binding proteins, impairing the calcium-dependent signal transduction pathway required for T lymphocyte activation. It inhibits mast cells as well as pro-inflammatory mediators including interleukin-8 (IL-8). It also suppresses T lymphocyte IL-2 synthesis by decreasing calcineurin phosphatase, which then inhibits nuclear gene transcription of IL-2 cytokines alongside other pro-inflammatory cytokines such as IL-4 and IL-5. As a result, activation and differentiation of inflammatory cells such as T lymphocytes, eosinophils or neutrophils is suppressed.[9]

The US Food and Drug Administration (FDA) authorized Tacrolimus in the year 2000 for the management of moderate to severe atopic dermatitis in individuals older than two years. It is approximately 100 times more potent than cyclosporine and having a lower molecular weight compared to cyclosporine, it has a greater mucosal penetration which makes it suitable for topical use.[10]

Tacrolimus 0.1% ointment is an efficient and well-accepted topical treatment for OLP with minor local adverse effects.[11] Topical Tacrolimus has been proposed for OLP treatment since 1999.

Clobetasol, a synthetic corticosteroid analogue of prednisolone, is recognized as an extremely powerful halogenated topical steroid, with a reported rate of complete remission ranging from 47% to 75%. It works by stopping inflammatory processes such edema, fibrin deposition, vasodilation, and phagocytic activity.[12]

Previous research and clinical trials have compared topical steroids including Triamcinolone to Tacrolimus. However, only three clinical studies that directly compared tacrolimus with Clobetasol have been

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conducted so far, according to a systematic review and meta-analysis by Chamani et al.[13] Tacrolimus was found to be more effective presumably according to two investigations, although Radfar et al. found no discernible change.[14] A similar investigation comparing an ultra -potent corticosteroid with an immunosuppressive has not been carried out previously in Pakistan. Thus, the present investigation sought to examine the effectiveness of topically applied tacrolimus 0.1% and clobetasol 0.05% for the treatment of symptomatic OLP in a randomized clinical trial.

MATERIALS AND METHOD

To evaluate the effectiveness of topical Clobetasol 0.05% and Tacrolimus 0.1% in terms of Clinical Score and Visual Analogue Scale as the primary outcomes for the treatment of symptomatic Oral Lichen Planus, a randomized controlled trial was carried out in the department of Oral and Maxillofacial Surgery at PIMS. Sample size calculation was done using the WHO sample size calculator at the significance level of 5% which turned out to be 60 patients with 30 patients in each group. All in all 60 patients from either gender in the age range between 30 to 70 years were recruited with clinically and histologically proven OLP based on the 2003 modified WHO criteria. Pregnant and lactating women, patients with systemic and multi-focal disease involvement having concomitant skin and genital lesions, patients with suspected or known hypersensitivity to the used medicaments, and patients with histologically proven dysplastic lesions were excluded from the study.

A formal approval from the Ethical Review Board (ERB) was obtained. Informed verbal and written consent given by all the participants in the study. A total of sixty patients were recruited in the study. A comprehensive clinical evaluation was conducted on the screening day for OLP, followed by a diagnosis and histopathological confirmation through a biopsy under local anesthesia. Study participants were randomly allocated to the two interventional groups, Group A and Group B. Group A patients received 0.1% Tacrolimus ointment while Group B patients received 0.05% Clobetasol ointment. Following screening, all participants were subjected to a washout period of 2 weeks during which they received no treatment. After the washout period, the patients were directed to apply 0.1% Tacrolimus ointment or 0.05% Clobetasol ointment (depending on the group) three times per day with their finger on dried lesions for a total of six weeks. They were instructed to refrain from eating, smoking, or drinking for half an hour after application to permit prolonged adherence of the medication with the oral mucosa. To gauge their adherence to the prescribed regimen, it was advised to maintain a diary throughout the research period. During the research, no rescue medications were permitted. Performa-based evaluations were carried out during the three consecutive visits after commencing treatment at four-time points i.e. at baseline (before starting treatment) and on the 1st, 4th, and 6th week. Using a visual analog scale (VAS) with pain scores ranging from 0 (no pain) to 10 (the most severe pain experienced), patients were asked to rate their level of pain at each visit. Objective recording of the lesion in terms of the target lesion size and the surface extent of the atrophic, erosive, or striated lesion area was performed using a meter ruler utilizing the five-tiered scoring system devised by Thongprason et al. in 1992 and photographs were taken simultaneously with the rule in place. The Thongprasom Classification (TC) classifies white striae based on their erosive area, atrophic area, mild white striae without an erythematous area, and normal mucosa, with scores ranging from 0 to 5. The aforementioned protocol has been summarised in Figure 1.

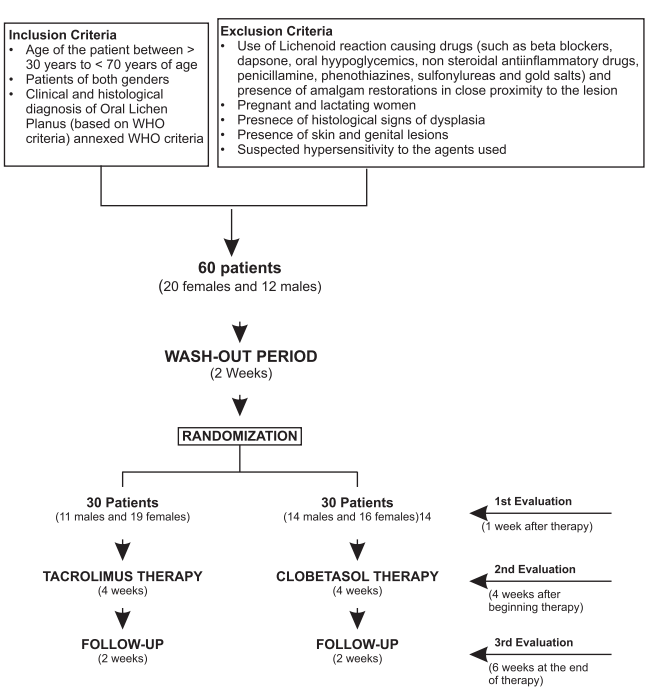

Figure 1:Trial diagram

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The data was analyzed by using SPSS version 20.0. For quantitative variables including the patient's age, the Clinical Score for determining the size of the lesion, the duration of the lesion, and the VAS score for pain. Mean and standard deviation were determined. For qualitative elements including the patient's gender and the type of oral lichen planus, frequency and percentage were calculated. The mean lesion size and VAS were compared between the two interventions using independent samples t-test. The mean lesion size was stratified according to sex, age, and lichen planus variant using t-test and ANOVA test.

Chi-square test was used to test the proportion of Clinical Score and Efficacy between the two groups. Post-stratification chi-square test was applied. For stratification, duration of effect modifiers such as lesion duration and type of oral lichen planus was used. A *p*-value of < 0.05 was denoted as significant

RESULTS

All patients experienced burning sensations, intolerance to hot and spicy foods and had bilateral Wickham's striations on clinical presentation. Pain was comparable between both groups with a slight predominance in the clobetasol group i.e. 22(73.3%) compared to 19(63.3%) in the Tacrolimus group.

Regarding the evaluation of the primary outcomes, at baseline the mean VAS was 8.1 ± 1.1 in Group A compared to 8.9 ± 0.9 in Group B and this difference was found significant. At the interim assessment following one and four weeks after commencing treatment, the difference in the mean VAS scores turned out to be statistically significant (*p*-value, <0.001) in Group A as opposed to Group B i.e. 6.1 ± 1.3 vs 7.6 ± 1.1 in Group B after 1 week and 3.9±0.9 vs 4.8±0.8 four weeks after commencing treatment. However, at the end of the treatment after 6 weeks, the difference in the mean VAS scores between the two study groups was found to be insignificant with the *p*-value being 0.62. These findings have been summarized in Table 1.

Table I: Mean VAS comparison between the two groups

	Group A (0.1% Tacrolimus) (n=30)	**Group B (0.05% Clobetasol) (n=30)**	***p*-value**
Pain score VAS (mean ± SD)			
At baseline (pre treatment)	8.1 ± 1.1	8.9 ± 0.9	0.001
At 1 week	6.1 ± 1.3	7.6 ± 1.1	<0.001
At 4 weeks	3.9 ± 0.9	4.8 ± 0.8	<0.001
At 6 weeks	1.4 ± 0.5	1.5 ± 0.5	0.62

The mean lesion size according to the Clinical Score (CS) was 3.8 ± 0.8 cm^2 in tacrolimus group and 4.2 ± 0.9 cm^2 in clobetasol group at baseline. After one week of therapy, there was a statistically significant decrease in the mean lesion size in both interventional groups, with Tacrolimus 2.8 ± 0.6 cm^2 and Clobetasol 3.5 ± 0.5 cm^2 respectively. Similarly, after 4 weeks of initiation of therapy the mean lesion size was 1.8 ± 0.4 cm^2 in the Tacrolimus group as compared to 2.2 ± 0.4 cm^2 in the Clobetasol group, and this difference was also found to be significant as clinically evident in Figure 2 and 3.

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Figure 2: Clinical photographs before and after application of topical tacrolimus 0.1%

Figure 3: Clinical photographs before and after application of topical clobetasol 0.05%

Towards the end of the treatment, although the mean lesion size showed a significant reduction from the baseline in both groups, the cumulative reduction was found to be insignificant i.e. 1 ± 0.6 (Tacrolimus) vs 0.9 ±0.8(Clobetasol) as shown in Table II with the p-value being 0.61.

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Table 2: Comparison of mean lesion size according to clinical score between the two groups

	Group A (0.1% Tacrolimus) (n=30)	Group B (0.05% Clobetasol) (n=30)	*p*-value
Lesion size per clinical score (mean ± SD)			
At baseline (pre- treatment)	3.8 ± 0.8	4.2 ± 0.9	0.08
At 1 week	2.8 ± 0.6	3.5 ± 0.5	<0.001
At 4 weeks	1.8 ± 0.4	2.2 ± 0.4	<0.001
At 6 weeks	1.0 ± 0.6	0.9 ± 0.8	0.61

DISCUSSION

The treatment of Oral Lichen Planus presents a unique challenge to both the treating doctors and affected patients alike as it is a chronic, debilitating, immune mediated condition and no single treatment modality till date has been effective in offering a radical cure. While steroids are considered as a gold standard in the treatment of Oral Lichen Planus, side effects like candidiasis, xerostomia, sore throat, hirsutism and adrenal insufficiency leading to Cushing disease preclude their long- term usage. [15]

Alternatively immune suppressive agents like calcineurin inhibitors that directly intercept the causative pathways in OLP are being explored. Tacrolimus, commonly known as FK506, is a macrolide immunosuppressive drug that was first authorized for the treatment of atopic dermatitis and works by preventing the generation of IL-2 by T lymphocytes. [16]

The patients who participated in our study shared demographic traits with studies of a similar nature. OLP shows a female predilection with females being twice as commonly affected[17], and in our study the percentage of females was 58% with 35 females and 25 males in both interventional groups. This can be attributed to the fact that OLP has an auto immune pathogenesis and hence is more prevalent in females. Our patients had both erosive and reticular OLP, whereas most prior reports focused on erosive OLP alone. In addition, the most common sub-site for OLP was buccal mucosa in our study which was in line with the established findings.

Our observation indicates that the mean VAS in the Tacrolimus group exhibited a greater initial improvement compared to Clobetasol i.e. from 8.1±0.9 to 6.1±1.3 after 1 week of treatment. A similar result was observed in the study conducted by Hettiarachchi et al who also compared mean VAS scores on both sides of the oral cavity.[18] The mean VAS dropped from 1.91±0.87 to 0.71±0.76 on right side and from 1.85±0.78 to 0.32±0.73 on the left side three weeks after commencing treatment. A complementary study by Vente et al. have also demonstrated promising initial therapeutic results of topical tacrolimus in patients suffering from severe recalcitrant erosive mucosal LP.[19]

Regarding subjective assessment, the Clinical Score in terms of lesion size decreased from 3.8±0.8cm^2 to 1.8±0.4 cm^2 in the Tacrolimus group and from 4.2±0.9 cm^2 to 2.2±0.4 cm^2 in the Clobetasol group four weeks after starting treatment. In the study by Hettiarchchi et al. the mean lesion size decreased from a baseline value of 2.71 to 1.53 on the right side and from 2.56 to 1.56 on the left side in the Tacrolimus group. In the clobetasol group a reduction from 2 to 1.5 on the right and from 2 to 1.74 on the left side was observed respectively.

In our study, at the end of the treatment i.e. six weeks, though the mean lesion size decreased significantly from the pretreatment values, the difference in the lesion size was found to be comparable between the two groups with the p value of 0.61. This observation was paralleled to the randomized double-blind study conducted by Radfar et al. comparing tacrolimus 0.1%

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ointment with clobetasol 0.05% ointment who concluded that although tacrolimus induced a better initial therapeutic response than clobetasol, mean lesion sizes and mean pain measures did not differ significantly between the two treatment groups post treatment.

The main limitations of this study include its small sample size, lack of placebo and lack of assessment of plasma levels of tacrolimus. However, small sample sizes and short observation periods have also been found to be limitations in all the previously reported trials. Although many patients in the present study were followed up beyond the 6-week study period, a significant proportion of patients failed to report for review beyond 8 weeks on average, and thus, further meaningful analysis of the outcome was not realistic for the reasons stated earlier. Nevertheless, this limitation does not invalidate the results already obtained. However, future studies should focus on achieving larger sample sizes and longer follow-up periods.

CONCLUSION

Our clinical investigation's results showed that topical Tacrolimus 0.1% was just as successful in treating symptomatic OLP as Clobetasol 0.05%. Although topical Tacrolimus exhibited a better initial therapeutic response compared to Clobetasol, cumulatively the overall response at the end of the treatment period was similar. Topical Tacrolimus can be considered as an alternative to steroids in patients having recalcitrant OLP not responsive to potent corticosteroids and patients at risk of developing candidiasis.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

ETHICAL STATEMENT

This study was conducted and submitted for publication after taking approval from ethical review board of Shaheed ZulfqarAli Bhutto Medical University Islamabad, ERB No.F-1/2015/ERB/SZABMU/177

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ORIGINAL ARTICLE

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Perception of the Effectiveness of Self-directed Learning in Small Groups Among Final-year Dental Students at Watim Dental College

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ABSTRACT

Objectives: With the passage of time, various teaching methods have been introduced to increase the efficiency of learning process. There is an evolution from the teacher directed learning to self-directed learning in process worldwide, in all fields including medical education. The objective of this study is to assess the perception of final year BDS students regarding self- directed learning in the form of small group presentations at Watim Dental College.

Materials and Methods: It was a cross-sectional study. Sample size (50) was calculated using WHO calculator. The duration of the study was one month. The data was collected from the students of Final year BDS at Watim Dental College. Structured questionnaire was used to assess the student's perspective. Data was entered and analyzed on SPSS version 20 and Microsoft PowerPoint excel.

Results: Results showed that about 60% students agreed that small group presentations were interactive, friendly and innovative, built interaction between teacher and student. Small group discussion increased their thought process and helped them in better communication. 42% strongly agreed and 54% agreed regarding awareness about the presentation schedule, topic and its objectives. 48% agreed that their presentation was attention seeking. 44%, 48% and 50 % agreed that this activity enhanced their learning, improving their computer and communication skills respectively. 46% and 58% agreed about getting the positive peer review and constructed feedback from the teacher respectively.

Conclusion: Our research findings indicate that students acknowledge the benefits of self-directed learning, particularly through small group discussions. An instructional strategy highlighted here is the introduction to self-directed learning, which serves to bridge the gap between teachers and students, ultimately enhancing communication skills among students.

Keywords: Dental Students, Perception, Self-Directed Learning, Small Group Discussion

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INTRODUCTION

Complex problems in different aspects of life including learning difficulties, can be well managed by cumulative information of various individuals.[1] Woolley et al revealed that the presence of a 'collective intelligence factor' is indicative of groups activities across a wide diversity of chores.

In the subject of learning, this suggested that learning should aid in maturity, authenticity and freedom of an individual.[1,2] During the process of decision making or finding solution of complex problems, groups of people should find the best one from group. Occasionally, they can perform better than the specialist of the concerned subject. Collective achievement like this is frequently practiced through direct man to man group discussions. Discussion of knowledge and plans between different individuals lead to precise collaborative solutions.[3] Controlled experimental settings have demonstrated that generally groups can select an individual in multitasking, for example in detection of lies, recreate rowdy signals, set up a medical diagnosis, and in different tasks.[3,4]

Self directed learning refers to the capacity to learn new information ,time management, evaluation of the literature resources and evaluation of the student's own skills.[5] It allows health professionals to continuously amplify and process their knowledge . This will improve their clinical intervention, patient care and well-being .[6,7]

Kerr and coworkers carried out research and analysis on small group performance and decision taking. For continuous response distributions and group information processing, small group discussion and group decision making is the preferred method.[5]

There are some factors that enhance the efficiency of small group tasks. An effective facilitator or small group tutor plays a vital role in the success of a small-group discussion.[6] Small group teaching or discussion can fulfil various tasks such as problem-solving, role play, brain storming, discussions, and case based learning. It helps in deep knowledge and more retention. The small group discussion and presentations are encouraging, confidence building, and address the gap between the teacher and student.[5,8] In small group teaching, brainstorming is an effectual teaching learning method that can be employed through the participants to reach towards a conclusion by giving various solutions.[9] Self-directed learning is a major factor for small group activities. This concept shifts the learning responsibility to the students, and they take on an active role in developing and initiating actions necessary to achieve their learning goals.[10]

According to a study by Mehboob et al. the overall average motivation mean score was 82.18%, self-monitoring mean score was 69.23% and inter-personal communication mean score was 70.75%. This study encourages carrying out more research on self-directed learning and small group discussion so that this can be incorporated as an effective tool in under-graduate curriculum.

This study is conducted with an aim to assess the perception of final year BDS students regarding self-directed learning with small group presentations.

MATERIALS AND METHOD

This study was conducted in Department of Prosthodontics, Watim Dental College, Rawalpindi. The participants of this study were the students of final year BDS. Sample size was calculated using WHO calculator formula 1.1. Confidence level was 90% and anticipated population proportion was 0.048. Sample size was 50.[11] Students were divided in 9 different small groups as per their mutual concern and convenience. All groups were assigned their topics to prepare proper PowerPoint presentations and to present their presentations in class in front of their fellows and faculty members

After completion of presentations of all groups a structured questionnaire was distributed to all the participants to get their feedback regarding this activity(SDLI described by Shen et al).[12] A five-point Likert scale was used ranging from strongly agree to strongly disagree. Data was collected and analyzed by using SPSS version 20 and Microsoft Excel. Duration of study was about one month including making of questionnaire, data collection and analysis.

RESULTS

Table 1 shows the questions as well as results of the study. 42% students strongly agreed, 54% agreed, 2 % were not sure and 2 % disagreed on question regarding timely information of presentation schedule. Regarding awareness about the topic and its objectives, 38% students strongly agreed, 58% agreed, 4 % were not

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sure. In response to question,regarding the interesting and attention seeking nature of the presentations, 16% strongly agreed, 48% agreed, 16 % were not sure and 20 % disagreed. While asking about their comfort level along with their group members, 42% students strongly agreed, 20% agreed, 14 % were not sure, 10 % disagreed and 14% strongly disagreed about their comfort level with other members of their group. 12% students strongly agreed, 44% agreed, 32 % were not sure, 8 % disagreed and 4% strongly disagreed about the question regarding enhancement of learning experience. While answering about improvement in computer skills, 14% students strongly agreed, 48% agreed, 16 % were not sure, 4 % disagreed and 18% strongly disagreed. Regarding increase in communication skills and confidence after delivering of presentation, 28% students strongly agreed, 50% agreed, 12 % were not sure, 10 % disagreed. While asking about the peer review, 16% students strongly agreed, 46% agreed, 18 % were not sure, 12 % disagree, 8% strongly disagreed. While answering about getting appropriate constructive feedback from the teacher, 12% strongly agreed, 58% agreed, 26 % were not sure, 2 % disagree, 2% strongly disagreed. Regarding clarification of complicated topics by the teacher at the end of session, 16% strongly agreed, 58% agreed, 14 % were not sure, 2 % disagree,10% strongly disagreed.

Table 1: Percentages are given in the table below regarding student's perception towards their presentations

		Strongly Agree (%)	Agree (%)	Ambivalent (%)	Disagree (%)	Strongly Disagree (%)
1.	I was informed timely about the presentation schedule.	42	54	2	2	0
2.	I was aware of the presentation topic and its objectives.	38	58	4	0	0
3.	The presentation of our group was interesting and attention seeking.	16	48	16	20	0
4.	I was comfortable working along my group members.	42	20	14	10	14
5.	This group activity helped us in exploring new ideas and enhanced my learning.	12	44	32	8	4
6.	The making of PowerPoint presentation enhanced my skill s in computer usage and programs.	14	48	16	4	18
7.	Delivering presentation to the class boosted my confidence and improved my communication skills.	28	50	12	10	0
8.	At the end of presentation my class fellows gave me both positive and negative constructive feedback.	16	46	18	12	8
9.	At the end of the presentation my teacher gave appropriate constructive feedback on individual as well as group-based performance.	12	58	26	2	2
10.	At the end of the session, my teacher clarified the confusing and complicated points in the topic.	16	58	14	2	10

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DISCUSSION

Malcolm Knowles explained that learners with self-learning habit were found to be more motivated to implement this strategy and took liability of their own learning.[13, 14]Small group discussions facilitate learners to explore complete knowledge of designated topic, improve communication skill of students and provide a good opportunity to the leader to found perceptive of all participants.[15]To achieve educational goals, the tutor sets learning goals and forms small groups. The groups then receive the scenarios, which they must find their own ways to resolve.[16]This study showed that small group presentations provided opportunities for students to speak in front of others and to receive feedback from teachers and peers. In our study, 60% students agreed that small group presentations were interactive, friendly and innovative, built interaction between teacher and student. Small group discussion increased their thought process and helped them in better communication.[17,18] Sharmila SR et alreported that studying in small groups can be an effective learning activity in which students learn from their teachers and interaction with each other.[15] In our study about 52% students were of the opinion that their learning skills were enhanced in this activity. Similar results were found by Mehboob at al where 51% of students agreed on proactively establishing learning goals.There is similarity between the studies due to the same culture, educational environment and curriculum based medical education system.[12] It was also observed in our study that a group discussion and making of a presentation not only improved performance of students but also increased active participation of students, making environment more friendly than traditional teaching methods. Similar results were found by Zia et al where significant difference was observed in the student's performance after an additional session of SDL in the physiology topics.[19,20]

A major comparison in students' performance has been observed after conducting session for Self-directed learning. It has shown that this learning strategy is fruitful for students to get deep knowledge and helps to score good marks.[21] Results of the study showed that around 60% students agreed that self-directed learning in the form of small group presentations is an effective way of learning and improving teaching skills as showed in previous study.[22] Similar results were found by Hua et al where 74% students were satisfied with self-directed learning methods.[5]Since the topics were assigned 2 weeks before the presentations, and reference books and other resource materials were also shared, the students got ample time for preparation. About 58% students agreed that they were completely prepared for the topic. Similar results were found by Jeon et al where they had 68% students showing self-efficacy.These findings indicate that self-directed learning improve medical students self-efficacy, thereby positively influencing their academic performance.[23]

This study recommends that facilitators should incorporate self-directed learning among students. Students should have proper guidance to ameliorate their self-management skills to take responsibility of their learning, particularly with respect of various learning strategies, duration and with all resources included in curriculum.[24]It is a common observationthat little attention is paid to explicitly encouraging self-directed learning in our teaching institutes**.** For example most students lack metacognitive skills to self-regulate learning and find it difficult to reflect on and navigate their learning process to ensure progress in respective field.[25] In order to transform learners from dependent to self-directed, the teachers should be knowledgeable about teaching approaches that are effective in this manner.[26] For advancing self-directed learning, Cognitive education holds a pivotal role as it underscores the cultivation of critical thinking skills, including categorization, appraisal, drawing inferences, annotation, and meta-cognitive self-regulation.[27] Moreover, it fosters the development of essential dispositions such as perseverance, curiosity, inquisitiveness, questioning, and systematic working methods, all recognized as foundational traits of self-directed learners. These critical thinking abilities and dispositions form the bedrock for achieving both academic success and personal wellbeing. Furthermore, cognitive education facilitates the gradual advancement of self-directedness and autonomy, enabling learners to experience positive emotions, heightened interest, and active engagement in their educational pursuits. Additionally, it equips individuals with the capacity to discern purpose and meaning in their academic endeavors, fostering positive peer relationships, and nurturing personal attributes such as self-determination, vitality, resilience, optimism, and self-esteem. Ultimately, this holistic

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approach not only enhances personal wellbeing but also contributes to greater academic accomplishments.[26-28] Saurabh and Agrawal described that various learning strategies for example clinical orientations, problem-based learning, case base learning, group discussions and tutorials must include in curriculum to improve student's performance in exams and to develop their personality towards more self-directed.[25,29,30]

SDL is an important aspect of lifelong learning. For future implications, various strategies for SDL should be included in curriculum, so that learners can polish and improve their learning skills. In addition, access to various educational materials through digital technology and artificial intelligence is also of great assistance for self-learning in medical education.

The limitation of this study is small sample size and involvement of one professional class. It should be practiced on different academic sessions and response should be noticed along with the academic performance. Another limitation is that study was based on a self-reported questionnaire that explored student abilities of SDL and, therefore, is not a direct measure of their SDL abilities. This can be improved by exploring new tools for SDL evaluation.

CONCLUSION

Our research findings indicate that students acknowledge the benefits of self-directed learning, particularly through small group discussions. An instructional strategy highlighted here is the introduction to self-directed learning, which serves to bridge the gap between teachers and students, ultimately enhancing communication skills among students.

Various factors play a crucial role in the development and progress of each country, with universities occupying a prominent position. The roles of universities hinge on factors such as the academic quality of faculty, student welfare, and available facilities. Additionally, efforts aimed at enhancing teaching methods and educational offerings are imperative. Moreover, student motivation stands as a vital prerequisite for both learning and achieving success.

Furthermore, initiatives aimed at bolstering student satisfaction and fostering conducive learning environments are paramount. This includes improvements in the social and educational aspects of educational institutions, as well as enhancing the quality of services provided by administrative staff.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

ETHICAL STATEMENT

The Ethical Review Committee of WMCR granted ethical approval for this study. (Approval number:WMDCR/ERB/2023/38)

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AUTHORS CONTRIBUTION

Conception and design of the study: A. Khalil, Q. Iqbal, Z. Afreen

Acquisition of data: A. Afreen, J. Afzal, A. Malik

Analysis and interpretation of data: A. Khalil, J. Afzal

Drafting of the manuscript: A. Khalil, Q. Iqbal, Z. Afreen

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Approval of the final version of the manuscript to be published: A. Khalil, Q. Iqbal, Z. Afreen, A. Afreen, J. Afzal, A. Malik

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Evaluating Cardiopulmonary Resuscitation Skills and Knowledge in Medical and Dental Students of Islamabad and Abbottabad, Pakistan

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ABSTRACT

Objectives: Cardiopulmonary Arrest, a medical emergency is considered as leading cause of sudden death throughout the globe. It is an unpredicted, sudden stoppage of breathing and/ or circulation of a person due to certain causes. Cardiopulmonary Resuscitation (CPR) is a technique for reviving of those heart failure individuals and it involves competence of operator, the condition of victim and present resources at that time of emergency. All individuals, specially medical and dental persons must be well learned and ready to deal such health related emergencies at anytime and anywhere. Present study was aimed to assess the level of information and practical ability to do CPR in medical emergency among the medical and dental students.

Materials and Methods: This Cross-sectional study was carried out to assess the level of information and practical ability to do CPR in medical emergency among the students of medical and dental institutes of Islamabad and Abbottabad, Pakistan, during January to March 2024. 280 Students (123 male and 157 female students) from 4th and final year of BDS and MBBS were chosen randomly. Information about CPR was collected by objective type paper of 30 questions (20 true false and 10 MCQ's). Each question carried equal one mark with 50% passing marks. Practical ability was evaluated checking performance on the SimMan simulator (the high-fidelity simulator).

Results: Level of assessment comprised of two parts theory paper and practical ability test. In initial paper based theory assessment, out of 280 participants**,** 197 (70%) students secured less than 50% marks and failed. When practical abilities assessed, 80.7% students could not perform correctly and failed. In practical abilities test, students were unsuccessful due to compression rate error (199), ventilation rate error (196) and failed of wrong hand positioning (213) when asked to perform CPR practically.

Conclusion: Medical emergencies are inevitable and require adequate information and skills to save life. The level of the knowledge and practical abilities among the medical and dental students to do CPR in case of emergency is below the requirements. It is therefore utmost important to plan regular training sessions and dissemination of information to medical and dental students to recover deficiency, improve weakness and enhance their confidence and clinical skills while dealing such emergency.

Keywords: Cardio-pulmonary Arrest, CPR, Heart Failure, Medical Emergencies, Sudden Death

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INTRODUCTION

Cardiopulmonary Arrest, a medical emergency is considered as leading cause of sudden death throughout the globe. It is an unpredicted, sudden arrest of breathing and/ or circulation of a person, occurs following various causes.[1-5,7] Every individual including, common man, medical and dental students and specialists must be prepared and trained properly to handle such emergency any time at any place. Life saving actions like Cardiopulmonary resuscitation (CPR) is one of the most evolving and much needed areas of today's medicine contributing towards life saving as well as increasing the survival rates after cardiopulmonary arrest.[6,9,10] Cardiopulmonary resuscitation remarkably increase the probability of patient's recovery from cardiac arrest. [11] Although proper technique of CPR depends on the person attempting it, the patient, and resources present at the scene, but early recognition of arrest and quick action in the form of effective CPR are very crucial at that moment and can be achieved by following Guidelines for CPR and ECC (Emergency Cardiovascular Care) by American Heart Association (AHA) 201.[12]

For nearly half of the century, it has been seen that early provisions of CPR and prompt clinical care have saved several lives in the world, highlighting the importance of the CPR and its timely practice in various hospitals and clinics.[13] Considering such situation, humanity and professionalism, every medical and dental student and doctor must be well trained and confident enough to deal such emergency and perform effective CPR without hesitation[7]. CPR has been categorized as comprising of Advanced Cardiac Life Support (ACLS) and vital or Basic Life Support (BLS) under current directions clearly indicating that along with basic knowledge of resuscitation methods like mouth to mouth ventilation and observing cardiac pressure during CPR, the medical students must have skills to perform other supportive rather life saving procedures like use of laryngoscope, an oropharyngeal tube, an Ambu mask, an oxygen-balloon, and certain drugs such as an epinephrine and lidocaine.[14]

A Medical Emergency (ME) can arise any time in medical centers, dental centers or at any place. Cases of medical emergencies like syncope, hypertensive and hypovolemic shock etc. in old patients having some other clinical problems, has increased. Although cardiac arrest are uncommon, instances were observed many times during medical or dental visits of patients. The health professionals including medical and dental students and Practioners have to be ready for such emergencies.[5,9]

CPR skills like other clinical or non-clinical trainings are compulsory and must to know skills for each person specially medical and dental students and doctors. But in routine we experience that most of them don't have proper awareness, knowledge and skills of effective cardio-pulmonary resuscitation.[15]

Aim of our study was to assess knowledge and practical skills of CPR among the medical and dental students and highlight their deficiencies in such a vital life saving part of training.

MATERIALS AND METHOD

American Heart Association (AHA) has provided clear guidelines for CPR which are followed throughout the globe and these are “In case of the cardiac arrest to patient with neither breathing nor pulse, the rescuer must commence with thirty compressions of the rib cage followed by 2 breaths”.[13]

This was a cross-sectional prospective study, conducted among the students of medical and dental colleges of Islamabad and Abbottabad from January 2024 to March 2024. 280 Students (123 male and 157 female students) were randomly selected from 4th year BDS and 4th and

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final year MBBS. All of the selected students have already attended hands on CPR training workshops organized by their colleges during 3rd and 4th years of their course and were aware of both theoretical as well as practical aspects of effective CPR. An objective type paper of 25 minutes, consisting of 30 questions (20 true false and 10 MCQ's) each carrying one mark with 50% passing score, was used to check the awareness and information of students about CPR (Table 1). The practical abilities and techniques for effective CPR were assessed by the SimMan (the high-fidelity simulator) applied test focusing on primary assessment, the rate plus volume, ventilation, force applied, the rhythm and the compression rate following the standard principles of CPR by the American Heart Association 2015, as given below;

Firstly check for the responsiveness, patient just gasping or absence of normal breathing and no pulse, should be done within or less than 10 seconds. Then both hands should be on smaller half of the sternum. The limit of rate of compression should be of 100-120/min. Compression penetration for the adults should be minimum 5 cm (2 inches) and must not exceed 6 cm. The CPR attempting person must elude inclined on chest in between compressions to allow full recoil of chest wall after each compression. Rescuer must start Trunk compressions beforehand, providing saving breaths (C-A-B as a replacement for A-B-C) to lower the interval to 1st compression. The Single rescuer should attempt CPR with 30 chest compressions followed by the two breaths And where CPR is being attempted in the presence of advanced airline available, the proposed rate of a ventilation is 1 breath / 6 sec (10 breaths/ min).

RESULTS

Total of 280 medical and dental students (123 male and 157 female students) participated in the assessment comprising of theory and practical parts. Test pattern of theory assessment paper (MCQ's) used, is demonstrated in the Table 1. In the initial theory assessment, out of 280 students, only 83 (30%) were pass while 197 (70%) were fail (Table 2). When the practical abilities to perform CPR was assessed, 199 (71%) students got failed in compression rate error, 196 (70%) students failed in ventilation rate error and 213 (76%) students performed wrong hand position and failed (Table 3). And overall results of both theory paper and practical performance are given in Figure 1.

Table 1: Theory Paper Pattern (MCQ's)

Topic	No. of the questions (30)
Theory regarding a CPR	12
Ventilation	6
Managing the fibrillation of ventricle	3
Management of A systole	4
Ventricular extra systole	2
Dosage/Drugs	2
Electro-mechanical dissociation	1

Table 2: Result of Objective Type Theory Paper About CPR

Total No. of Students	PASS (Obtaining 50% or more marks)	FAIL (< 50% marks)
280 (Male=123, Female=157)	83 (30%)	197 (70%)

Table 3: Assessment of Practical activity

Practical Activity	Pass	Fail
Chest compression	81	199
Ventilation rate	84	196
Position during CPR	67	213

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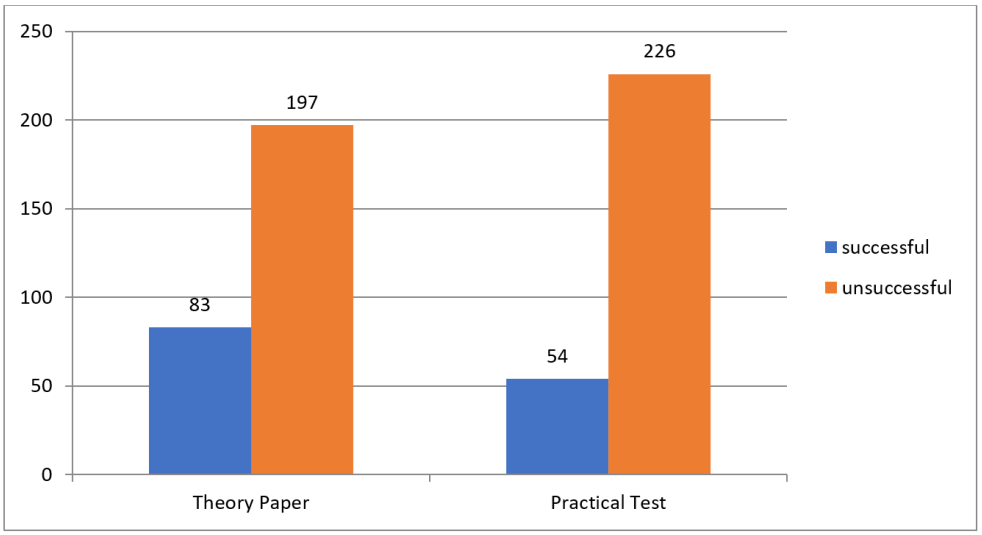

Figure 1: Results of Theory and Practical Assessments

DISCUSSION

Doctor and dental surgeons may face several medical emergencies like syncope, hypertensive crisis, angina pectoris and cardio-pulmonary arrest during their practice.[16] Being an important part of healthcare system, it is obligatory for medical doctors and dentists to have sound awareness, information and abilities to handle such medical emergency.[7,8,15] Every healthcare person should be well informed and well trained for BLS as adequate knowledge and proper techniques are vital for successful resuscitation and saving life in emergency.[17-22] When assessed the basic life care proficiency in students, similar to the findings by Pim A. de Ruijter, our data also shows majority of unsuccessful participants in delivering basic life care information even after getting suitable training and knowledge. [23,24]

In our study it can be seen that only 30% medical and dental students passed theory exam and also majority of them lack required training and practical abilities to deal with emergency, findings are similar to other studies.[14,16] Rescuer's abilities to check the vital signs and start CPR quickly are very important for saving the life of a victim. In our study, most of the students evaluated the vital signs efficiently, but they took longer to start CPR practically and were unsuccessful in preserving required chest compression depth & the ventilation volumes indicating some lacking in hand-on training as seen in other studies.[22-24]

In our research, only about 30% participants succeeded in maintaining the chest compression & the ventilation rate which was similar to the results showed by Mohammed Z (26.7% successful) in a study.[5] According to some researchers, CPR performance may be affected in emergency situation under stress and could be challenging for inexperienced persons like medical and dental students to perform swiftly and accurately as also seen in our research data.[28]

We can identify from our study that there is deficiency among the medical and dental students regarding BLS training program. CPR as a vital tool in emergency, should be included in the curriculum of medical and dental students. Where Regular teaching sessions and hands on training for the BLS / CPR should be provided as part of credit hours and must be properly assessed on annual or biannual intervals for students to recall their information, knowledge and practical skills.[29]

CONCLUSION

Medical emergencies are inevitable and require adequate information and skills to save life. The level of the knowledge and practical abilities among the medical and dental students to do CPR in case of emergency is below the requirements. It is therefore utmost important to plan correctly to recover deficiency and improve weakness.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

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ETHICAL STATEMENT

This study was conducted and submitted for publication after taking approval from ethical review board of HBS Medical & Dental College, EC-31/15/12/2023

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AUTHORS CONTRIBUTION

Conception and design of the study: M. Rizwan, S. Rashid, S. Jadoon

Project administration: N. Parveen, U.F. Khan, S. Rashid, S. Jadoon

Analysis and interpretation of data: M.A. Iqbal, N. Parveen, U.F. Khan, M. Rizwan

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Critical review of the manuscript: M.A. Iqbal, N. Parveen, M. Rizwan

Approval of the final version of the manuscript to be published: N. Parveen, S. Jadoon, M.A. Iqbal, S. Rashid, M. Rizwan, U.F. Khan

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An abstract (no longer than 250 words) and 3-6 relevant keywords (in alphabetical order) are required for the following article categories: Original Articles, Narrative Reviews, Systematic Reviews and Meta-analysis. For Case Reports and Short Communications, an abstract should be no longer than 150 words and 3-6 relevant keywords.

Abstracts for Narrative Reviews, Case Reports, and Short Communications should be unstructured (in one single paragraph with no section headings), and include information on the background/purpose of the report, methods, results (or case report), and conclusions.

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