Diagnosis of Dental Fluorosis Made By Undergraduate Dental Students

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ABSTRACT

***Objective*:** To determine the ability of students to diagnose and decide the correct treatment of fluorosis.
***Study Design*:** Cross-sectional study.
***Place and Duration of Study*:** Tertiary care Dental Hospital, Rawalpindi, from May to Jun 2017.
Methodology: A self-administered questionnaire containing seven pictures of different severity of fluorosis was used to assess the knowledge of students of third-year and final-year BDS.
***Results*:** A total of 88 BDS students were included in the study. As for the question of severity, picture-5 had the correct answer 81 (92%), whereas picture-4 had the least correct answer 6 (6.8%). Picture-5 had the correct answer 77 (87.5%) for the treatment question and picture-4 had the least correct answer 6 (6.8%). Picture-5 only showed a significant difference (p= 0.001) with more correct answers for 3rd-year BDS students.
More than 50% of the students correctly identified only three of the seven pictures. Severe cases were most correctly diagnosed and mild cases were least correctly diagnosed.
***Conclusion*:** Out of the seven lesions shown to the students, only three were correctly diagnosed by more than 50% of the students. Therefore, more lectures and clinical hours for the study of fluorosis are needed.

Keywords: Dean's index, Diagnosis, Flourosis, Undergraduate.

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INTRODUCTION

Dental fluorosis is defined as hypo-mineralisation of enamel resulting from excessive fluoride ingestion (more than 1 ppm) during tooth development. In fluorosis, fluoride disturbs mineralisation by decreasing free calcium ion concentrations in the mineralising matrix, indirectly interfering with the proteinases which degrade matrix proteins during the maturation phase of amelogenesis.[1] Mild to moderate forms of dental fluorosis is often unnoticed by the patients, whereas severe fluorosis presents with dark brown-to-black discolouration of teeth along with enamel pitting and hypoplasia.[2] Excessive fluoride can come from fluoride pollution, inhalation of fluoride dust and fumes from the aluminium industry, heavily fluoridated water, supplements, excessive consumption of tea (prevalent in Pakistan, India, Sri Lanka, Bangladesh and middle-eastern countries) and unjustified use of fluoridated toothpaste. The classical appearance of fluorosis is characterised by banding, following developmental lines of enamel and by substantial symmetry on homologous teeth.[3,4]

In 2009, a survey conducted by the University of Lahore, Dental College Hospital showed a 12% prevalence of dental fluorosis Another study in Jhang showed a prevalence of 23.78%. Dean, in 1942, proposed Dean's fluorosis index that classified fluorosis based on clinical appearance. Dental fluorosis is difficult to distinguish clinically and histologically from other types of hypoplastic and hypomineralised enamel.[5-8]

Undergraduate dental curriculum as laid down by the Pakistan Medical Council commission (PMC) contains information about dental fluorosis regarding aetiology, mechanism, diagnosis and treatment. This is discussed in different subjects such as oral biology and community dentistry. This study was conducted to assess the skill of students who have studied the required subjects and passed the examination in diagnosing the severity of fluorosis. This study helped us discover whether the information regarding fluorosis in the curriculum and the experience gained during clinical rotations is enough to make a proper clinical diagnosis.

METHODOLOGY

This cross sectional study was carried out at the Tertiary Care Dental Hospital, Rawalpindi from May to June 2017. The sample size was calculated using the WHO calculator using the values from reference study with the highest percentage of correct answers as 75%

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for question-1 and the lowest as 14.3% for question-2. The non-probability consecutive was used for data collection. Prior approval from the Ethical Committee was taken.

Inclusion Criteria: All the students of third-year and final-year BDS were included in the study.

Exclusion Criteria: Non-consenting studdents were excluded.

The course work for dental fluorosis is taught in the second year of bachelors in dental surgery (BDS). Therefore, the students of the third and fourth year were included in the study. Forty-eight students were studying the third year and 40 were studying in final year. A self-administered questionnaire was used for data collection. It included seven pictures of teeth with different severity of fluorosis. Two questions were asked, one was to determine the severity of fluorosis and the second was to decide the treatment for that severity of fluorosis.

The severity was judged using the Dean's index of flourosis,[7] and the options were: very mild, mild, moderate, severe and not known. The options for the second question were: no treatment, non-invasive treatment, invasive treatment and not known.

Figure- showed the seven pictures used in this study. Picture-1 showed severe fluorosis and the need for invasive treatment. Picture-2 showed mild fluorosis with no need for treatment. Picture-3 showed moderate fluorosis and the need for non-invasive treatment. Picture-4 showed very mild fluorosis with no need for treatment. Picture-5 showed severe fluorosis with a need for invasive treatment. Picture-6 showed very mild fluorosis and no need for treatment. Picture-7 shows moderate fluorosis with the need for non-invasive treatment.[10,11,12]

Figure: Pictures used for the diagnosis of dental fluorosis: (1) severe flourosis, (2) mild flourosis, (3) moderate flourosis, (4) very mild flourosis, (5) severe flourosis, (6) very mild flourosis, (7) moderate flourosis.

Statistical Package for Social Sciences (SPSS) version 20.0 was used for the data analysis. Frequency and percentages for the correct answers were calculated for the severity of fluorosis and treatment needs for all the seven pictures. Frequency and percentages for the correct answers for third year BDS and final year BDS students were calculated and the Chi-square test was used to find a association between their answers. The p-value of ≤0.05 was considered statistically significant.

RESULTS

A total of 88 students were included in the study, of which 48 (54.5%) were in third-year BDS whereas 40 (45.5%) students were in fourth-year BDS. Out of the 88 students, 43 (48.8%) were female students, whereas 45 (51.1%) were male students. The mean age of the students was 21.8 ± 1.8 years.

Table-I showed the frequency and percentage of correct answers for each picture. As for the question of severity, picture-5 had the correct answer 81 (92%), whereas picture-4 had the least correct answer 6 (6.8%). Picture-5 had the correct answer 77 (87.5%) for the treatment question and picture-4 had the least correct answer 6 (6.8%).

Table-I: Descriptive analysis of the correct answers for individual pictures (Dean's index of fluorosis).

Pictures	Correct Answers % (n)			
	Severity		Treatment	
1	Severe	46 (52.3%)	Invasive	45 (51.1%)
2	Mild	43 (48.9%)	No treatment	19 (21.6%)
3	Moderate	32 (36.4%)	Non invasive	67 (76.1%)
4	Very mild	6 (6.8%)	No treatment	6 (6.8%)
5	Severe	81 (92%)	Invasive	77 (87.5%)
6	Very mild	70 (79.5%)	No treatment	71 (80.7%)
7	Moderate	43 (48.9%)	Non invasive	74 (84.1%)

The comparison of correct answers between 3rd year and 4th year BDS students for the question of severity were shown in Table-II. Pictures 1, 3 and 4 showed a significant difference (p<0.05) between the 3rd year and 4th year BDS students with more correct answers for 4th year BDS students. Table-III showed the comparison of correct answers between 3rd year and 4th year BDS students for the treatment question. Picture 5 only showed a significant difference (p=0.001) with more correct answers for 3rd year BDS srudents.

Table-II: Comparison of correct answers for individual picture between 3rd year and 4th year BDS students for the severity of fluorosis.

Pictures	Severity Correct Answers n (%)			
	Correct Answers	3rd Year BDS Students (n=48)	4th Year BDS Students (n=40)	*p*-value
1	Severe	13 (27%)	24 (60%)	0.019
2	Mild	21 (43.8%)	22 (55%)	0.527
3	Moderate	10 (20.8%)	22 (55%)	0.004
4	Very mild	1 (2%)	5 (12.5%)	0.038
5	Severe	48 (100%)	33 (82.5%)	0.058
6	Very mild	37 (77%)	33 (82.5)	0.770
7	Moderate	27 (56.3%)	16 (40%)	0.170

Table-III: Comparison of correct answers for individual picture between 3rd year and 4th year BDS students for the treatment of fluorosis.

Pictures	Treatment Correct Answers n (%)			
	Correct Answers	3rd Year BDS Students (n=48)	4th Year BDS Students (n=40)	*p*-value
1	Invasive	22 (45.8%)	23 (57.5%)	0.284
2	No treatment	14 (29.2%)	5 (12.5%)	0.084
3	Non invasive	40 (83.3%)	27 (67.5%)	0.118
4	No treatment	2 (4.1%)	4 (1%)	0.676
5	Invasive	48 (100%)	29 (72.5%)	0.001
6	No treatment	38 (79.2%)	33 (82.5)	0.800
7	Non invasive	38 (79.2%)	36 (90%)	0.418

DISCUSSION

Fluorosis is a common dental problem in Pakistan. The most affected areas are of lower Punjab and Sindh. A prevalence of 12% and 23.78% in Punjab and 53.33% in Karachi has been reported previously.[13,14] This demands that the dentists be given adequate knowledge and clinical experience to deal with these cases during their student life.[15] This study evaluates the ability of the students to diagnose and decide treatment options, thus determining the adequacy of the curriculum.

In our study, the most correctly diagnosed lesion was the type of severity. At the same time, the least correctly diagnosed lesions were mild types. This result was similar to the study by Rigo *et al*. This was due to the confusing natural enamel developmental features with a mild type of fluorosis.[9]

The least correctly diagnosed lesion was in picture-4 in our study. The picture showed a case of very mild fluorosis, but most of the students answered it as severe fluorosis. This was due to the natural yellow hue of the teeth, which the students mistook for fluorosis. Whereas, Baldani *et al*, showed that all types of fluorosis were identified by their study groups.[11]

While comparing the results of students of the first semester; at the start of the semester and after six months, no significant difference was found in the correct diagnosis in a study conducted at the Universidade de Guarulhos, Brazil.[12] This showed that an extended period of study time is required for the students to learn enough about fluorosis to diagnose successfully. Successful diagnosis is very important and the treatment differs with the severity of fluorosis. Secondly, other dental treatments are also affected due to fluorosis.[16,17]

The low number of students could correctly identify the severity of lesions and provide correct treatment options in our study. With the high percentage of prevalence of fluorosis in Pakistan, all the students must correctly diagnose and determine the best treatment option. Secondly, the presentation of fluorosis, especially the mild cases, is similar to other dental pathologies like enamel hypoplasia and hyper-mineralization.[18] There is a need for better theoretical education and more clinical demonstrations with direct involvement of students to help them identify the correct pathology. Further studies in different institutes are required to determine whether the curriculum laid down PMC is deficient, or the institutes cannot fulfil the criteria given by PMC.

CONCLUSION

Out of the seven lesions shown to the students, only three were correctly diagnosed by more than 50% of the students. Therefore, more lectures and clinical hours for the study of fluorosis are needed.

Conflict of Interest: None.

Authors' Contribution

HAM: Literrture Review, study designe, article writing, SA: Article writing, SS: Data collection.

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