



Periodontal Status and Treatment Needs of Mentally Challenged Individuals Attending Special School in Nashik District, Maharashtra, India

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DOI: 10.31080/ASDS.2022.06.1493

Received: August 10, 2022

Published: October 17, 2022

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Abstract

Background: Mentally challenged individuals are faced with many challenges in understanding and maintain their health and are particularly vulnerable to having unmet health care needs. Periodontal status of these individuals has received a very little attention and there is paucity of information about their periodontal status and treatment needs.

Aims: A cross sectional study was conducted to assess the periodontal status and treatment needs of mentally challenged individuals attending special schools in Nasik district, Maharashtra, India.

Subjects and Methods: On the basis of convenient nonprobability sampling technique. All the mentally challenged individuals residing at special school of Nasik district was examined to assess for periodontal status and periodontal needs. A total 272 subjects were examined. Out of that 201 were male subjects and 71 were female subjects. Data was evaluated by using Statistical Package for Social Science version 20. Data comparison was done by applying Chi-square test.

Results: The study subject were divided into two categories i.e. below 15 years (n = 161) and 15 years and above (n = 111). Healthy periodontium was present 51 (18.75%) study subjects. Bleeding on probing and calculus were seen 36 (13.23%), and 174(63.97%) respectively. 11(9.90%) study subjects had shallow pocket. 94(84.68) study subjects had loss of attachment (LOA) 0-3 mm (score 0). LOA of score 1 (4-5 mm), score 2 (6-8 mm), and score 3 (9-11 mm) were seen in 11.71%, 2.70% and 0.90% subjects respectively. LOA of 12 mm or above was not observed in any of the study subjects. There was no statistically significant difference between the scores of LOA between males and females (p > 0.05).

Conclusion: The most prevalent findings of the study is the presence of calculus (63.79%), followed by bleeding on probing. The study reported a smaller number of periodontal pockets as the maximum numbers of subjects were below 15 years. A strong deficit was seen in between the periodontal status and treatment needs.

Keywords: Mentally Challenged; WHO 1997 Methodology; Periodontal Status

Introduction

Periodontal status and treatment needs of mentally challenged individuals requires significant attention as compared to typically developed children. The mentally challenged individuals have generalized sensory problems [1], poor neuromuscular coordination [2], low muscle tone [2,3], and atypical behavior [4]. There is a significant limitations in day to day activities and mainly depends upon the parents or care takers.

The oral challenging task in mentally challenging individuals is low manual dexterity [5], low muscle tone [6] and lack in muscle coordination [6,7] that leads difficulty in maintain the adequate oral hygiene and that could be significant reason of the reason of gingival and periodontal problem. The other factors are preference to soft diet [8,9] retention of the food due to impaired oral functions and lack of salivary stimulation [8-10]. The contributing dental and oral factors are crowding or maligned teeth [11-13], soft and hard tissue anomalies [14].

The past studies highlighted percentage prevalence of periodontal status and periodontal needs in mentally challenged individuals The meta-analysis reported the gingival and periodontal status was more than 69% of mentally challenged individuals had gingivitis and poor periodontal status [15]. The cross-sectional study conducted by Al-Sufyani GA., *et al.* on 101 study population between 6-16 years age group, reported 28.7% subjects had sever gingivitis, 47.5% subject had moderate gingivitis, and 23.85% subjects had mild gingivitis. The overall calculus score (CI) was 0.58 ± 0.61 , plaque score (PI) was 1.54 ± 0.57 , and gingival index score (GI) was 1.54 ± 0.64 present with the study population [16]. In India, the prevalence of periodontitis was 35.7% for down syndrome and 55% for cerebral palsy. Similarly prevalence of gingivitis was found to be 92.9% and 61.3% respectively [17]. Ameer N., *et al.* reported highest plaque index score of 1.3 ± 0.47 for intellectually disabled children [18]. Kumar S., *et al.* reported that poor periodontal health in mentally challenged individuals mainly related to medical diagnosis, IQ, disable sibling, parents level of education and economic status [19]. Vajawata M and deepaka PC reported high prevalence of periodontal diseases in autistic children [20].

It has been observed from the previous studies that periodontal status was poor in mentally challenged individuals. However, there is a little information about contributing factors for the same. Hence, There is need to evaluates the factors that contributes for poor periodontal health, so to establish guidelines for preventive

and corrective program for mentally challenged individuals. On the homogenous line the study was planned to evaluate the periodontal status and treatment needs in mentally challenged individuals attending special school at Nashik district.

Material and Methods

A cross-sectional study following the Strengthening the reporting of observational studies in epidemiology guidelines [21] was conducted to assess periodontal status and treatment needs of mentally challenged individuals in Nashik District.

Ethical clearance

The detailed proposed study protocol was submitted and approved by the ethical committee of Maharashtra university health science (MUHS), Nashik.

Informed consent

Prior to start of the study, a visit to all the special schools for mentally challenged individuals in Nashik District was made. The purpose and procedure of the study was explained to the Head of the institutions and a written permission was taken from concern authorities. All the informed consent was obtained from the heads of the special schools to which the subject belong and or from the parents or guardians. The study was carried out on mutually convenient dates for the institutional authorities and to the investigator.

Source of data

List of all the special school in Nashik district was obtained from social welfare department, Nashik. There are total eight special schools for mentally challenged individuals in Nashik District. The entire study subject in these eight schools was included in the study.

Sampling design and sample selection

Microsoft Office Excel 2018 spreadsheet was used for statistical data processing. The SPSS (V 16 2018) and Graph Pad Prism 5 software was used to determine whether there is a relationship between the characters being compared. Thus, for comparison tests of positive isolates of each patient group, we used the Student T test, and the Fischer's test for lower number series. $P < 0.05$ was considered statistically significant. Based on convenient nonprobability sampling technique, all the mentally challenged individuals present in the special schools of Nashik District who were present at the time of examination and who full filled the selection criteria were examined. A survey was systemically scheduled to spread

over a period of 5 months. A detailed monthly and weekly schedule was prepared well in advance by informing and obtaining consent from authorities of respective schools. Twelve to fifteen study subjects were examined per day to avoid the examiner fatigue as these subjects needed more time compared to the general population for examination.

Inclusion criteria

All the mentally challenged individuals are attending special school in Nashik district. There are total nine special schools for mentally challenged individuals in Nashik District, of which eight special schools were included in the study as permission was not granted to conduct the study in one of the special schools. All study subjects in these eight special schools were included in the study.

Exclusion criteria

- Study subjects who are contraindicated for examination
- Study subjects with previous history of obnoxious behaviour as informed by the school authority
- Study subjects for whom permission was not granted by the authorities

Sample size

There were total 296 study subjects in eight special schools in Nashik district. Out of these, 24 were excluded from the examination not being present on the day of examination or not able to come to the examination room as per exclusion criteria. Remaining 272 subjects were examined using WHO 1997 methodology. Out of 272 study subjects, 201 (73.89%) were males and 71 (26.10%) were females.

Clinical examination

The oral examination was carried out using basic Oral Health Surveys. WHO 1997 criteria [22] using artificial light, WHO, Oral Health Assessment forms were used to record the data 13-3015. The examination was carried out by single examiner, trained and calibrated prior to the study and recorded by a trained recording clerk.

The periodontal status was recorded by using Community Periodontal Index (CPI) [23]. The CPI consisted of a specially designed lightweight probe with a 0.5 mm ball tip was used, with a black band between 3.5 and 5.5 mm and rings at 8.5 mm and 11.5 mm from the ball tip. It is known as a CPI probe. The index teeth were two molars in the posterior sextant and one incisor in the ante-

rior sextant, in both upper and lower arch were recorded for the subjects above 20 years. The subject below the 20 years then only one molar in the posterior sextant and one incisor in the anterior sextant were recorded. However, if the index tooth is missing or extracted then next tooth with highest score was recorded for the periodontal status. The score of the index teeth are: 0 = Healthy, 1 = Bleeding observed, directly or by using a mouth mirror, after probing, 2 = calculus detected during probing, 3 = pocket 4-5 mm, 4 = pocket 6 mm or above, X = excluded sextant (less than two teeth present), and 9 = Not recorded. The loss of attachment code for index teeth are: 0- loss of attachment 0-3 mm, 1- loss of attachment 4-5 mm, 2- loss of attachment 6-8 mm, 3- loss of attachment 9-11 mm, 4- loss of attachment 12 mm or more, X- excluded sextant, and 9 - not recorded.

Results

The number and percentage of subjects with healthy periodontium, bleeding on probing, calculus, shallow and deep pocket has been shown in table 1 and figure 1: the periodontal status was recorded for the subjects six years and above. Since shallow and deep pocket (score 3 and 4 of CPI) are recorded only for subject 15 years and above, the study subject were divided into two categories i.e. below 15 years (n = 161) and 15 years and above (n = 111). Healthy periodontium was present 51 (18.75%) study subjects. Bleeding on probing and calculus were seen 36 (13.23%), 174(63.97%) respectively. 11(9.90%) study subjects had shallow pocket, whereas deep pockets were not recorded in any of the study subject. The percentage of the subjects with healthy periodontium was higher in the age group below 15 years compared to that in the age group of a 15 years and above and this difference was significant statistically (p = 0.014).

The mean number of sextant with healthy periodontium, bleeding on probing, calculus and shallow pockets, deep pockets and excluded sextant mentioned with table 2: the mean number healthy sextant per subject were 3.14 ± 2.20 and mean number of sextant per subject with bleeding on probing and calculus were 0.44 ± 0.89 , 2.33 ± 2.25 respectively. Mean number of sextant per subject with shallow pockets were 0.17 ± 0.60 . mean number of sextant with healthy periodontium was more in the study subjects below 15 years of age compared to those in the age group 15 years and above. The difference was statistically significant (p = 0.00). A statistically significant difference (p = 0.00) was observed between the mean number of sextant with calculus among the study subjects of below 15 years age and those 15 years and above. None of the study subject had deep pocket or excluded sextant.

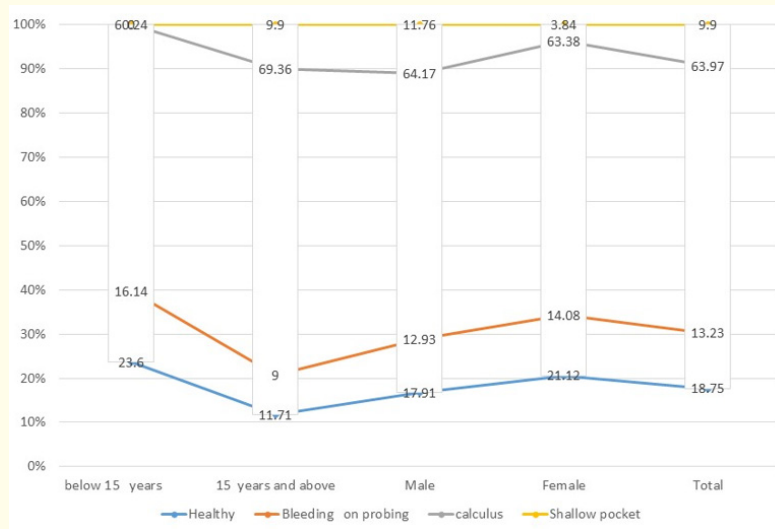


Figure 1: Distribution of study subject as per highest score.

Age Group	Healthy Periodontium		Bleeding on probing		Calculus		Pocket 4-5 mm		Pocket>6 mm	
	N(%)	$\chi^2 = 6.098$ df = 1 p = 0.014	N(%)	$\chi^2 = 2.197$ df = 1 p = 0.088	N(%)	$\chi^2 = 2.371$ df = 1 p = 0.124	N(%)	No statistics can be compared	N(%)	No statistics can be compared
Below 15 N = 161	38 (23.60)	S	26 (16.14)	NS	26 (16.14)	NS	NA	No statistics can be compared	NA	No statistics can be compared
15 and above N = 111	13 (11.71)		10 (9.00)		77 (69.36)		11 (9.90)		0	
Gender										
Male N = 201	36 (17.91)	$\chi^2 = 0.380$ df = 1 p = 0.538 NS	26 (12.93)	$\chi^2 = 0.069$ df = 1 p = 0.793 NS	129 (64.17)	$\chi^2 = 0.004$ df = 1 p = 0.949 NS	10 (11.76)	No statistics can be compared	0	No statistics can be compared
Female	15 (21.12)		10 (14.08)		45 (63.38)		1 (3.84)		0	
Total	51 (18.75)		36 (13.23)		174 (63.97)		11 (9.90)		0	

Table 1: Number and percentage of subjects with healthy periodontium, bleeding on probing, calculus, shallow pockets and deep pockets.

Age group years	Healthy periodontium Mean ± SD		Bleeding on Probing Mean ± SD		Calculus Mean ± SD		Pocket 4-5 mm Mean ± SD		Pocket > 6 mm Mean ± SD		Excluded sextant Mean ± SD	
	Below 15 N = 161	3.65 ± 2.05	t = 4.763 df = 270 p = 0.00	0.44 ± 0.81	t = 0.029 df = 270 p = 0.977	1.90 ± 2.09	t = 4.022 df = 270 p = 0.000	NA	No statistics can be compared	NA	No statistics can be compared	0.00
Above 15 N = 111	2.40 ± 2.21	HS	0.45 ± 1.00	NS	2.97 ± 2.25	HS	0.17 ± 0.60		0.00		0.00	
Gender												
Male N = 201	3.02 ± 2.24	t = 1.495 df = 270	0.44 ± 0.91	t = 0.024 df = 270	2.43 ± 2.28	t = 0.981 df = 270	0.21 ± 0.67	t = 1.290 df = 109	0.00	No statistics can be compared	0.00	No statistics can be compared
Female N = 71	3.47 ± 2.06	p = 0.136	0.45 ± 0.86	p = 0.981 NS	2.05 ± 2.05	p = 0.214	0.03 ± 0.19	p = 0.136 NS	0.00		0.00	
Total N = 272	3.14 ± 2.20	NS	0.44 ± 0.89		2.33 ± 2.25	NS	0.17 ± 0.60		0.00		0.00	

Table 2: Mean number of sextant with healthy periodontium, bleeding on probing, calculus, shallow pockets, deep pockets and excluded sextants.

The number and percentage of subject with loss of attachment (LOA), by highest score. Mentioned with table 3a, figure 2. The loss of attachment was recorded for study subjects of age 15 years and above (n = 111). LOA was measured only for four subjects 15 years and above, according to the criteria of the index. 94(84.68) study

subjects had loss of attachment 0-3 mm (score 0). Loss of attachment of score 1 (4-5 mm), score 2 (6-8 mm), and score 3 (9-11 mm) were seen in 11.71%, 2.70% and 0.90% subjects respectively. LOA of 12 mm or above was not observed in any of the study subjects. There was no statistically significant difference between the scores of LOA between males and females (p > 0.05).

Age group	Loss of attachment (0-3 mm)			Loss of attachment (4-5 mm)			Loss of attachment (6-8 mm)			Loss of attachment (9-11 mm)			Loss of attachment (≥12 mm)		
	M (%)	F (%)	N (%)	M (%)	F (%)	N (%)	M (%)	F (%)	N (%)	M (%)	F (%)	N (%)	M (%)	F (%)	N (%)
M = 85 F = 26 N = 111	72 (84.70)	22 (84.61)	94 (84.68)	9 (10.58)	4 (15.38)	13 (11.71)	3 (3.52)	0 (0)	3 (2.70)	1 (1.17)	0 (0)	1 (0.90)	0 (0)	0 (0)	0 (0)

Table 3a: Number and percentage of subjects with loss of attachments (LOA), by highest score.

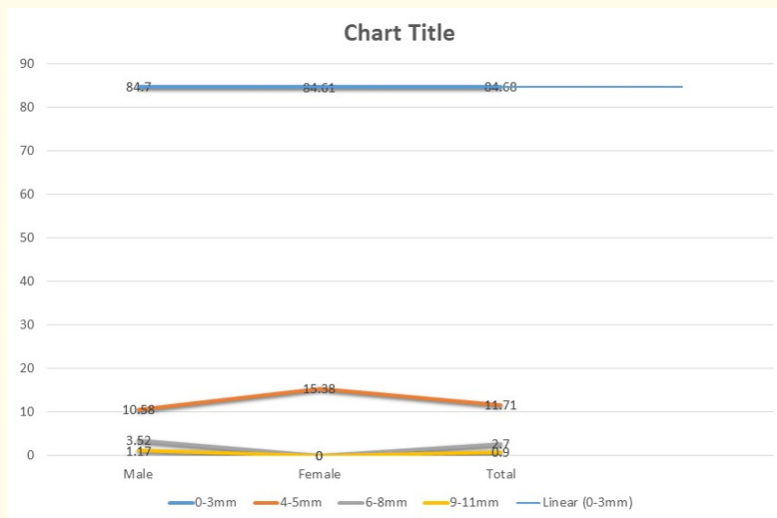


Figure 2: Distribution of study subjects as per highest LOA score

The mean number of sextant with loss of attachment by score is mentioned with table 3b. Mean number of sextant with no LOA (0-3mm) was 5.65 ± 1.15 . mean number of sextant with 4-5 mm LOA was 0.29 ± 0.99 , 6-8 mm was 0.03 ± 0.18 and with 9-11 mm

LOA was 0.01 ± 0.09 . there was no sextant with LOA > 12 mm or excluded from examination. No statically significant difference was observed between the scores of LOA between males and females ($p > 0.05$).

Age group	Loss of attachment (0-3 mm) Mean \pm SD			Loss of attachment (4-5 mm) Mean \pm SD			Loss of attachment (6-8 mm) Mean \pm SD			Loss of attachment (9-11 mm) Mean \pm SD		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
	5.60 \pm 1.30	5.84 \pm 0.36	5.65 \pm 1.15	0.34 \pm 1.12	0.15 \pm 0.27	0.29 \pm 0.99	0.04 \pm 0.21	0.00 \pm 0.00	0.03 \pm 0.18	0.01 \pm 0.10	0.00 \pm 0.00	0.01 \pm 0.09
	t = 0.943, df = 109 p = 0.348, NS			t = 0.838, df = 109 p = 0.404, NS			t = 1,123, df = 109 p = 0.264, NS			No statistics' can be compute		

Table 3b: Mean number sextants with loss of attachment (LOA), by score.

Discussion

The present study undertaken with the intention of assessing the periodontal status and treatment needs of mentally challenged individuals attending special at Nasik District. Periodontal examination study subjects in the age range of 4-30 years was carried out using WHO 1997 criteria [22].

CPI was recorded for the study subjects 6 years and above. CPI scores 3 and 4 (shallow and deep pocket) were recorded for the age group of 15 years and above. For the CPI, study subjects were divided into two categories i.e. below 15 years and 15 years and above.

Healthy periodontium was seen in 18.75% of the study subjects. Most prevalent findings was calculus which was seen in 63.97% of the study subjects. Bleeding on probing and shallow pockets were present in 13.23% and 9.90% of the study subjects respectively.

Similar findings were reported by Bhavsar JP and Damle SG [24], Denloye OO [25], and Donnel., *et al.* [26]. studies conducted by Desai M., *et al.* [27], Forceberg H., *et al.* [28] and Vigilid M [29] have reported similar prevalence of healthy periodontium and shallow pockets. Palin T [30] reported healthy gingiva in 16% of mentally challenged study subjects which was in agreement with the present study.

The higher prevalence of calculus observed in the present study may be due to: 1) Higher consumption of soft diet, that may lead to plaque and calculus formation and lack of surface cleansing action [8,9,31]. 2) Impaired oral function which may cause retention of food, low manual dexterity from lips and tongue 3) Poor oral hygiene status which has been documented by many other authors, due to inability to comprehend and thus comply with the oral hygiene measures, joint laxity and lack of comprehension due to mental difficulties [30-35]. 4) Maligned teeth which make plaque control difficult [31] and may promote periodontal diseases. Malocclusion present in more than half of the studies [27]. 5) local factors like macroglossia, tooth morphology, lack of masticatory functions etc. 6) tooth cleansing may cause problems for many parents and caretakers due to lack of cooperation.

Similar interpretation were suggested by Storhaug K [36], Bhowate R and Dubay A [37], Oreadugba FA [35], Desai M [27], and Vigilid M [29].

Ajami BA [38] Attributed periodontal diseases to local factors such as malocclusion, lack of masticatory functions, and attrition due to bruxism which more prevalent in those with sever disabilities.

Bhavsar JP and Damle SG [24] attributed periodontal diseases in mentally subnormal children to malocclusion and oral habits like bruxism etc.

Rao DB., *et al.* [39] equated higher prevalence of calculus, bleeding and shallow pockets in mentally challenged with severity of mental sub normality and presence of large number of Down Syndrome subjects included in the study group.

Desai M [27], forceberg H [28], and vigilid M [29] reported lower prevalence of Calculus and higher prevalence of bleeding on probing compared to the present study.

Lower Prevalence of Calculus recorded in these studies may be due to better oral hygiene observed by the parents or institutional authorities and/or better oral prophylactic service provided to them. Higher prevalence of bleeding on probing/gingivitis, pocket in spite of good oral hygiene in these subjects have been documented and may be attributed to factors like abnormal capillary morphology, disorder of connective tissue, defective cell mediated immunity, anatomical aspect of teeth, impaired peripheral circula-

tion, reduced neutrophilic chemotherapy etc. Similar observations were made by Reuland-Bosma W and Dijk JV [40].

Adenubi JO., *et al.* [41] recorded lower prevalence of calculus to the special preventive program including weekly demonstration of oral hygiene instructions to the children and direct supervision of teachers.

Scott A., *et al.* [42] accounted lower level of calculus, to the presence of 25% of subjects with down syndrome and cleaning and polishing of teeth carried out by 45% study subjects in last 12 months.

Shapira J., *et al.* [43], Scott A., *et al.* [42], and Costello PJ [44] reported higher prevalence of shallow pocket compared our study.

The lower prevalence of pockets in the present study may be because more than half of the study population was below 15 years of age for whom pockets were not recorded. The higher prevalence pockets reported in the other studies may also be due to higher mean age of the study subjects in those studies compared to the present study as the severity of periodontal diseases shows an increasing trend with increase in age [39,45].

There was no statistically significant difference between the scores of CPI and as well as sex ($P > 0.05$).

The mean number of sextant with healthy periodontium was highest ($3.14 \pm$), followed by calculus ($2.33 \pm$), bleeding on probing (0.44 ± 0.89) and shallow pockets (0.17 ± 0.60). There was no subjects with deep pockets or excluded sextant. There was no significant difference in mean number of sextants with healthy periodontium, calculus, bleeding on probing and shallow pockets between male and female subjects ($p > 0.05$).

A higher mean number of healthy sextants observed in the present study may be because of periodontal problems were localized to the lower incisor region rather than being generalized. Similar observations have been reported by Nunn JH [46].

Similar findings related to shallow pockets are reported by Bhavsar JP and Damle SG [24] and periodontal problem were correlated to malocclusion and oral habits like bruxism.

Shaw L., *et al.* [47] reported higher mean number of sextants with calculus and bleeding compared to the present study. Shapira

J., *et al.* [43] reported higher mean number of sextants with shallow pockets and correlated it to poor oral hygiene, mouth dryness associated with medication, less frequent and effective periodontal maintenance therapy etc.

Variation in number of sextants with periodontal problems may be due to the difference in the institutional status, age, preventive and prophylactic services provided by institutional authorities, severity and type of mental sub normality etc. Similar observations were made by Palin T, *et al.* [30].

The mean number of sextant with healthy periodontium were more in the age group below 15 years ($p = 0.000$) whereas mean number of sextants with calculus was more in the age group above 15 years ($p = 0.000$). This difference was significant statically. This shows increase prevalence of periodontal problem with age. Similar observation was made by Rao DB [39] and Donnel DO, *et al.* [26].

Loss of attachment was measured only for studies 15 years and above as per the criteria. Majority of the study subjects (84.68%) had low LOA of 0-3 mm (score 0). LOA score 1 (4-5 mm), Score 2 (6-8 mm) and score 3 (9-11 mm) were seen in 11.71%, 2.70%, and 0.90% subjects respectively. LOA of 12 mm or above was not recorded in any of the study subjects. There was no statistically significant difference between the scores of LOA and sex ($p > 0.05$).

Mean number of sextants without any LOA (0-3 mm) was 5.65 ± 1.15 . mean number of sextants with 4-5 mm LOA was 0.29 ± 0.99 , 6-8 mm LOA was 0.03 ± 0.18 and with 9-11 mm LOA was 0.01 ± 0.09 . There was no sextants with LOA > 12 mm or excluded from the examination.

The lower prevalence of LOA may be because of lower age of the study subjects as LOA is found to increase with age and a higher incidence is usually reported after 50 years of age.

The gradual apical shift of the attachment is most probably the result of cumulative effect of minor pathologic involvement and/or reported minor direct trauma to the gingiva [31].

LOA seen in few of the study subjects may be due to tooth malposition as facially displaced teeth, deep bite may be associated with gingival recession [31], trauma from toothbrush or faulty

tooth brushing may also be responsible for LOA resulting from the gingival recession as the poor muscular coordination [39] is one of the finding seen this group of subjects.

The LOA has not been studied largely among mentally challenged subjects and no study could be accused from the available literature and therefore no comparison could be possible.

With respect to treatment needs, the study has observed a higher need of extraction and replacement of teeth increased with advanced age and it was statistically significant ($p < 0.05$). this may be due to advancement of previously established dental caries or periodontal diseases with mounting age and indicates the lack of timely dental caries in the past. In contrast, lower need for extraction were reported by Oredugba FA [35] and Akindayomi Y [35] and Svatum B and Heloe LA [48]. This may be because of better level of dental preventive or restorative care being provided to study subjects in those studies, more awareness about dental problems and need for their treatment among the parents or caregivers.

Conclusion

Within the limitation, the study is concluded that periodontal status of mentally challenged individual attending special school at Nashik district was poor. A strong deficit was seen in between the periodontal status and treatment needs of mentally challenged individuals. The most prevalent findings were presence of calculus with maximum number of mentally challenged individuals followed by bleeding on probing and shallow pockets.

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