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Original research article

Assessment of periodontal status and periodontal treatment needs of the institutionalized intellectually Disabled Subjects in Satara District, Maharashtra, India: A cross sectional study

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Abstract

Aims and Objective: In India, limited data available on the periodontal health and treatment needs of intellectually disabled (ID) subjects. To determine the periodontal status and periodontal treatment needs among ID subjects in Satara District, Maharashtra, India.

Materials and Methods: A total of 576 ID subjects, aged 10-60 years were examined. This descriptive cross sectional study was conducted by both questionnaire and clinical examination. Periodontal health was assessed by Community Periodontal Index of treatment needs (CPITN) and periodontal treatment need was assigned accordingly. Data was analyzed using the Statistical Package for Social Sciences (IBM SPSS Statistic for window, version 21.0. Armonk, NY: IBM Corp.) at 95% CI and 80% power to the study.

Results: Of the 576 subjects examined, the mean age of the patients was 18.21 ± 7.4years. Subjects with profound level of ID had the highest mean periodontal status and periodontal treatment needs score of 2.84±0.78, and 2.25±0.44, respectively. Odds ratio for periodontal status, and increased periodontal treatment needs was significantly higher among subjects with older age as compared with younger age (p<0.001), among subjects with severe degree of ID as compared with mild degree of ID (p<0.001), and subjects with lower SES as compared to higher SES.

Conclusion: The present study signified that ID subjects had predominantly poor periodontal status with highest periodontal treatment needs. This warrants provision of periodontal treatment services to meet existing periodontal treatment needs in India.

Keywords: Intellectually disabled, periodontal status, periodontal treatment needs, Satara

1. Introduction

Intellectual disability (ID) refers to "a group of developmental conditions characterized by significant impairment of cognitive functions, which are associated with limitations of learning, adaptive behaviour and skills". The disorder is considered chronic and originates before the age of 18 [1]. ID is divided based on intelligent quotient (IQ) score measured through standardized general aptitude evaluation tools, such as the Wechsler Intelligence Scales or Stanford-Binet Intelligence Scales. They have an IQ score of about 70 or below. Various degrees of ID are mild (50 to 69), moderate (35 to 49), severe (20 to 34), and profound (less than 20) categories. IQ has been used as the sole criteria for deciding educational programs for these subjects [1, 2]. The oral health needs of individuals with ID are multifaceted, persistent, expensive, and for various reasons they are not satisfactorily met.

In India, according to the National Sample Survey Organization (NSSO) the number of disabled persons is approximated to be about 1.8% of the total population, while the ID population estimated to 0.44 million individual [3]. Evidence has existed in the literature for decades that individuals with ID have poor oral hygiene, higher rate of gingivitis and periodontal disease (PD). This may be due to poor patient cooperation, incapacity to accurately convey their symptoms, or underestimation of treatment needs by the parent or caregivers. In India, even though the persons with disabilities act (1995) and the National Trust Act (1999) enacted for persons with ID to enable and empower them, there is no legislation till date

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that makes a provision of dental services to the disabled population. Scientific research on ID in India has been predominantly in the form of case reports. There is still a paucity of literature on ID subjects [4]. There are a few reports on the periodontal status of the ID population from India but none of those studies has explored the periodontal treatment needs of this population. The increase in degree of ID negatively influences oral hygiene status & periodontal status; which subsequently leads to increase in periodontal treatment needs [5-12]. Community periodontal index of treatment needs (CPITN) adopted by the WHO, to assess periodontal condition provides standardized and comparable measurements of treatment needs [13]. This study therefore intended to determine the periodontal status and treatment needs among multicentric institutionalized ID subjects in Satara district, Maharashtra, India.

2. Materials and Methods

A cross sectional descriptive survey was conducted in 600 ID subjects, aged 10-60 years, attending different ID institutes in Satara district, Maharashtra, India. Survey was scheduled during March 2023 to July 2023. Subjects who were present at institutes on the days of the survey were included whereas aggressive, non-cooperative, and severely disabled children were excluded from the study. Final sample size calculated was 576. The ethical approval for conduct of the study was availed from Institutional Ethics Committee. A specially designed questionnaire proforma was prepared according to the need for the study. The first part of the proforma consisted of collection demographic information, location, socioeconomic status (SES), degree of ID, oral hygiene practices, and previous visit to the dentists. Information was collected by means of personal interviews with subject and parents or caregivers administered by examiner.

The IQ of the subjects was registered from the subject's records in the institute. The SES was recorded according to Kuppuswamy's SES scale which takes into account education, occupation, and income of the family to categorize families into upper, upper middle, lower middle, upper lower, and lower SES [12]. The second part of the proforma consisted of the assessment of periodontal status and periodontal treatment needs. A brief description of both the indices is as follows:

Periodontal status and periodontal treatment needs: The CPITN index assessed by CPITN probe was used to record periodontal status and periodontal treatment needs [13, 14]. The periodontal status was expressed in terms of Community Periodontal Index (CPI) code and loss of attachment score (LOA). Subjects below the age of 15 years were assessed for bleeding and calculus only as recording of periodontal pockets would be overestimated in this population because of false pockets. Hence, these subjects were not assessed for presence of periodontal pocket and LOA. The specified index teeth for CPITN index were 16, 11, 26, 36, 31, and 46. Pocket depths were measured at six sites around each tooth (mesial, middle, and distal on vestibular and lingual/ palatal surfaces). The highest CPI and LOA score for the sextants examined in a person were taken as the respective CPI and LOA for the person. The subjects were classified into different treatment need based on the highest scores recorded during the examination, as was recommended. [Table 1]

Study was performed by the single examiner and trained assistants. Dental team comprised of one examiner, two assistants, and a local health worker. 10 percent of the subjects examined each day were selected randomly, to be re-examined and results verified with initial exam, to assess intra examiner reliability [15]. Intra-examiner reliability for various indices was assessed using kappa statistic which was 92.3%. Examination was carried out in school classrooms & premises. In all locations, natural light was used and the subjects were placed in such way that maximum illumination was obtained.

2.1 Stastical analysis: Statistical analysis was done with Statistical Package for Social Sciences (IBM SPSS Statistic for window, version 21.0. Armonk, NY: IBM Corp.) at 95% CI and 80% power to the study. Descriptive statistics in terms of Mean, Standard deviation, Frequency and percentage were used to describe the pattern of periodontal status and periodontal treatment needs among the different ID group on basis of age, etiology of disability, degree of ID. Multiple logistic regression analysis was executed to test the associations of various independent variables with the periodontal status and periodontal treatment needs scores. The continuous data were dichotomized for cross tabulation and logistic regression analysis. The odds ratios (OR) with 95% confidence intervals (95% CI) were used to estimate the relative risk of the various variables for the occurrence of periodontal disease and periodontal treatment needs. Only those subjects aged 15 or more years were included in the multivariate analysis for occurrence of periodontal disease. For the purpose of multiple logistic regression analysis, response variables namely periodontal status and periodontal treatment needs were transformed to binary variables. The level of significance was set at $p<0.05$.

3. Results

The present descriptive cross sectional study consisted of 576 study subjects in the age range from 10 to 60 years with mean age of 18.21 ± 7.4 years. The maximum number of study subjects [(47.2%)] belongs to 16-25 years of age. Majority of the study were male subjects 401 (69.6%) and 175 (30.4%) were

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females.

Periodontal status

Table 1: Shows mean periodontal status and periodontal treatment needs scores among the ID groups. There was statistically high significant difference (p<0.001) observed among the groups for periodontal status and periodontal treatment needs. Among the groups, subjects with profound level of ID had the highest mean periodontal status and periodontal treatment needs score of 2.84±0.78, and 2.25±0.44, respectively. It was observed that mean score for all indices increased gradually with the increase in degree of ID. (Figure 1 and 2)

Table 1: Comparison of mean periodontal status and periodontal treatment needs scores among the different degree of ID

Degree of ID	N	Periodontal status (CPI) Mean (SD)	Periodontal treatment needs Mean (SD)
Mild	138	2.12 (0.67)	1.91 (0.42)
Moderate	228	2.52 (0.87)	2.09 (0.52)
Severe	159	2.7 (0.84)	2.2 (0.45)
Profound	51	2.95 (0.81)	2.35 (0.49)
ANOVA		F = 16.331, p<0.001*	F = 10.385, p<0.001*

*Statistical significance at $p<0.05$

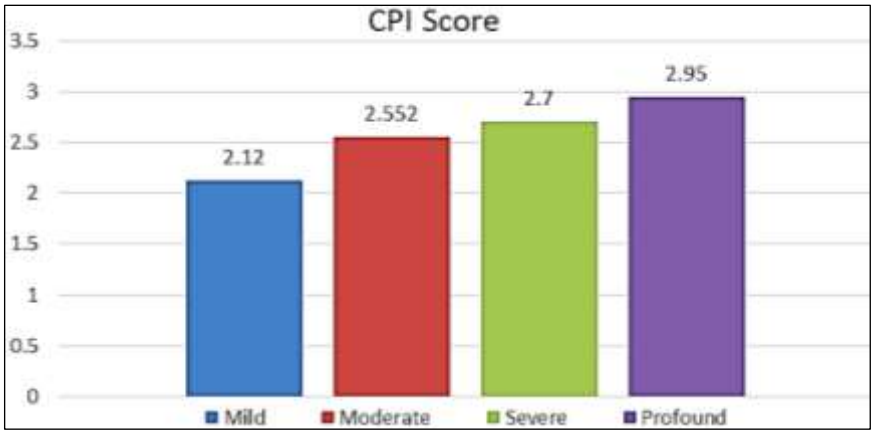

Fig 1: Comparison of CPI score between Degree of ID

Table 2: shows the predictors for periodontal status, and periodontal treatment needs were older age, severe degree of ID, low SES, residential location of subjects, low education of mother, and unaided institutions. OR for periodontal status, and increased periodontal treatment needs was significantly higher among subjects with older age as compared with younger age ($p<0.001$), among subjects with severe degree of ID as compared with mild degree of ID ($p<0.001$), and subjects with lower SES as compared to higher SES. A similar pattern was observed for these dependent variables; where OR was higher among subjects among those subjects who were residential as compared with nonresidential and subjects who enrolled in unaided institutes as compared with government aided institutes.

Table 2: Logistic regression: Odds ratio (OR) and 95% Confidence interval (CI) for periodontal status and periodontal treatment needs according to age, gender, education of father, education of mother, degree of I.D, SES, location and institution type

Independent Variable	Periodontal status (CPI) OR (95% CI)	Periodontal treatment needs OR (95% CI)
Age: Young vs. Old	40.609 (9.581-172.12) ($p<0.001$)	16.087 (7.694-33.637) ($p<0.001$)
Gender: Male vs. Female	0.855 (0.573-1.275) ($P=0.442$)	1.031 (0.598-1.778) ($P=0.914$)
I.D.: Mild vs. Severe	2.191 (1.517-3.165) ($p<0.001$)	2.621 (1.568-4.38) ($p<0.001$)
SES: High vs. Low	2.06 (0.80-5.26) ($p=0.133$)	13.15 (1.34-128.9) ($p=0.02$)
Location: Nonresidential vs. Residential	1.052 (0.642-1.725) ($P=0.84$)	1.087 (0.559-2.115) ($p=0.805$)
Institution Type: Aided vs. Unaided	0.778 (0.492-1.23) (P=0.283)	1.021 (0.543-1.921) ($p=0.948$)

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*Statistical significance at $p<0.05$ OR= Odds ratio, CI= Confidence interval.

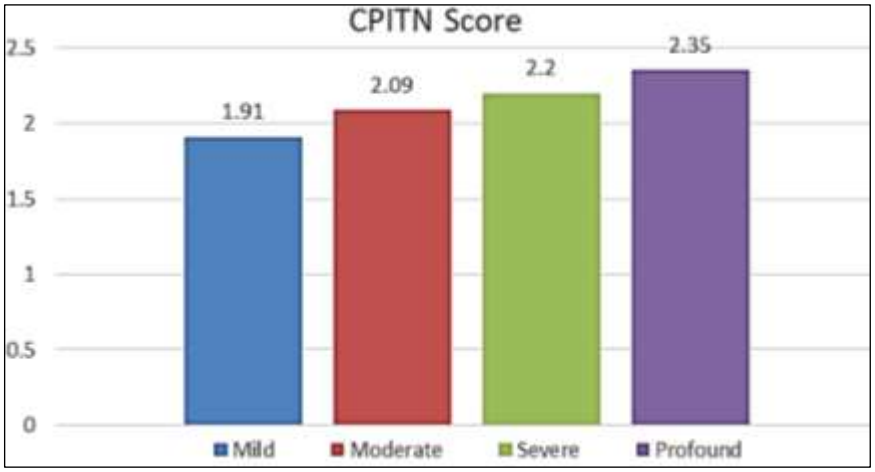

Fig 2: Comparison of CPITN score between Degree of ID

3.2 Discussion

The findings of this study represent report of periodontal status and the treatment needs among institutional ID subjects in Satara District of Maharashtra. The unmet dental treatment for this group is due in part to the underlying cause of their disability and in part to predisposing and interrelated factors such as poverty, illiteracy, and other social determinant. Improved oral health is likely to lead to improved quality of life for both the individuals with ID and their families. Most of the studies previously conducted on ID population, provided the data regarding the oral hygiene status and periodontal status of assorted disability groups or assessment with normal population whereas there are few studies about periodontal treatment needs of ID individuals [8-12]. As a result of growing concern about the oral health of ID subjects in India, the aim of this cross sectional study was to investigate the periodontal status and periodontal treatment needs of this population. The finding depicted the influence of various socio-demographic characters and clinical variables (age, gender, location, SES, institution type, and degree of ID) on periodontal status, and periodontal treatment needs of ID subjects. In this study meticulous periodontal examinations were difficult, due to limitations in cooperation, low powers of concentration, communication problem, and hyperactive behavior of the subjects. However, bleeding response and probing depth were carefully recorded.

Comparison between studies is difficult because of the lack of common indices. In general, oral cleanliness is less adequate and deteriorates more with age in subjects with ID, Down's syndrome, and cerebral palsy [17-19]. The process of developing gingival and PD in ID does not differ from non-disabled individuals. The main factor related to gingival and PD in ID subjects is the physical inadequacy of the mechanical plaque removal from the teeth. Limited motor skills, lack of knowledge of oral hygiene and effective brushing technique in ID have resulted in the progression of inflammatory diseases.

In present study the majority of subjects had never visited dentist. This might be due to their low SES, parental education, underestimation of treatment needs, fear of dental procedures, along with the cost of dental care, which might have influenced dental service utilization. De Jong *et al.* [26] reported that a significantly higher proportion of non-institutionalized ID subjects in their study did not receive any routine dental care in comparison with healthy controls (53.1% and 23.8%, respectively) because noncooperation and communication problems were important barriers leading to a relatively low degree of quality dental care.

The ID subjects in the present study had overall poor periodontal status with high periodontal treatment needs. It was observed during the examination that very few subjects had healthy gingiva while bleeding on probing, calculus, shallow and deep pockets were observed in majority of the participants among each ID group PDL pocket with 4-5 mm was observed higher in profound (37.25%) ID group; while in severe, moderate, and mild group it was 30.19%, 28.95%, and 19.57% respectively. The results of our study were in consensus with a similar study by Lucchese C & Checchi L in which the periodontal status in the study population was very poor. Majority of the subjects (66%) of the subjects presented with a probing depth more than 3.5 mm, 29% showed the presence of bleeding or calculus and only 5% showed a normal periodontal status [23].

In another study by Nazia Ameer *et al.* [17] highest LOA score observed was 4-5 mm in ID individuals as compared with other disabled study population. The higher incidence of PD can be attributed to the lack of manual dexterity among these disabled subjects. On the contrary Shaw *et al.* assessed manual dexterity in their study, and showed that although periodontal health was poor among the group, it was not correlated with manual dexterity [24]. Denloye OO *et al.* [9] observed that none of the children had healthy periodontium and all the children will need oral hygiene care with a significant percentage (8%)

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requiring complex periodontal care.

Among ID group mean CPI score was highest in profound (2.95±0.81) as compared with severe (2.7±0.84), moderate (2.52±0.87), and in mild (2.12±0.67) degree of ID. There was statistically high significant difference observed in the CPI score between the degree of ID ($p<0.001$) Similar observation was reported for mean CPITN score in descending order was 2.35±0.49 (profound), 2.2±0.45 (severe), 2.09±0.52 (moderate), and 1.91±0.42 (mild) among ID group. ($p<0.001$) The findings from the present study reveal that as the degree of ID increases need for periodontal treatment also increases. These findings were in accordance with the previous study by Nematollahi *et al*. [16] were it was observed that, mean CPITN increased with age ($p =0.01$) and with the level of ID ($p= 0.001$). The treatments needed for most of the children were TN1 (74.42%), followed by TN2 (23.64%), and TN3 (1.16%). Only, 0.78% of the population demonstrated healthy periodontal tissue. Mean CPITN was significantly higher in governmental centers than private ones (*$p =0.02$).*

It indicates that in present study the periodontal status and subsequently periodontal treatment needs was highly influenced by increasing age, severity of ID, lower SES, residential location associated disability, and unaided institutes. The relationship of increasing age and worsening periodontal status was reflected in CPI scores for periodontal pockets. This is consistent with other studies [17, 19]. In accordance with other studies; our study also showed that increase in the severity of ID resulted in worsening of periodontal condition and tooth loss. This is likely due to the continuous neglect towards personal and oral hygiene. Patients who were severe and profound degree of ID had increased periodontal status scores. This was expected as the degree of helplessness worsens; the ability to perform their daily activities reduces. However, study by Gorski M & Buczkowska-Radlinska J in their study mentioned that, the knowledge of dental prophylaxis and dental treatment aspects of the parents of moderately ID children did not reveal any significant impact on oral hygiene status and periodontal status [26]. Moreover a high correlation between poor oral hygiene and the development and progression of PD has been well documented and the role of poor oral hygiene as a risk factor of PD is well established [27]. Similar study by Svatun B & Gjermo P [8] observed the average oral hygiene and poor periodontal health except for patients in a few institutions where the nurses were trained to clean teeth regularly. Increased age, high degree of ID, seizure disorder, and Down's syndrome were all elements that apparently contributed to impairment of periodontal status and to increased periodontal treatment needs. The preventive programs used in some institutions seemed to be effective as compared with non-institutionalized subjects. In present study SES was highly significant factor in the oral hygiene status, periodontal status, and periodontal treatment needs of subjects. A study by Kumar *et al*. observed that the periodontal status of ID population was influenced by disability type, degree of ID, disabled sibling, parent's education and SES [19].

This study has highlighted important aspects in the periodontal status and periodontal treatment needs of the ID institutionalized population. It has shown that poor oral health is a major problem for ID and the oral hygiene status of these subjects seemed to indicate a cumulative neglect of oral health. This study confirmed the need for strengthening organized preventive and care for this population in India. The highly alarming situation needs immediate attention as oral hygiene status of these subjects is related to their social acceptability. Even though efforts have been made in the western world to improve the oral health of these less fortunate subjects, less attention has been directed by the health authorities in India. The periodontal status observed in the current study was poor with majority requiring complex treatment except for subjects in a few institutions where the caregivers were trained to clean teeth regularly.

In patients with advanced ID prevention should be the main objective because these subjects are often anxious and non-co-operative in the dental clinic. Hence, no dental treatment was provided except referral to the dental surgeon for emergency treatment; thereby precluding from complex treatment. Hence more coordinative efforts between medical, dental, and social care sectors must be established to serve the needs of this underprivileged population.

This study was limited to the institutionalized ID subjects from Satara district, Maharashtra, India; who participated in the screening on the day of oral health examination. It has been observed that the multifactorial influence was present on overall oral health of ID subjects. Due to lack of cooperativeness and time constraint other risk factor associated with ID, which subsequently lead to poor oral health was not estimated like hereditary factors, consumption of medications, food intake habits, quality of water, etc. Despite all these factors present study was able to reach to achieve its goals in diagnosing prevalence of PD and periodontal treatment needs of this vulnerable population. Taking into consideration multifactorial influence on oral health status of the present disabled population, intervention programs should be concentrated towards this risk groups.

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4. Conclusion

The oral health status of the study population was poor and it was influenced by the disability, SES, parent's education. Oral health promotion programs should be specifically aimed at the special needs of schools and parents of disabled children.

5.1 Conflict of interest

No potential conflict of interest relevant to this article was reported.

5.2 Acknowledgement: None.

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