ORIGINAL RESEARCH

The Impact of Handicap Severity on Oral and Periodontal Status of Patients with Mental Retardation

[1]Ozkan Ozgul, [2]Erhan Dursun, [3]Betul Memis Ozgul, [4]Yasemin Kartal, [5]Fatih Mehmet Coskunses
[6]Ismail Doruk Kocyigit, [7]Tolga F Tözüm

ABSTRACT

Aim: Mental retardation (MR) subjects comprise a considerable amount of the community and are susceptible to oral and periodontal problems due to insufficient oral care. The aim of this cross-sectional study was to determine the oral health and periodontal status of MR patients in Turkey with regard to periodontal indices and Decay missed filling teeth (DMFT) scores and compare findings according to severity of the MR.

Materials and methods: One hundred and five MR patients were included to the study and divided into 3 groups according to MR severity diagnoses. Demographic variables like age, gender, disabled sibling, BMI, living an institution and clinical parameters like plaque index (PI), gingival index (GI), bleeding on probing (BOP), probing depth (PD), clinical attachment level (CAL), missing teeth and DMFT scores were recorded from all subjects. Appropriate statistical analyses were used to compare the findings.

Results: There were no statistically significant differences between groups according to age, gender, disabled sibling, living status and DMFT scores. Clinical periodontal indices and the number of missing teeth were showed a statistically significant increasing trend with the severity of MR (p < 0.05). Correlation analysis showed significant positive correlations between PI and periodontal disease measures like GI, PD, CAL and BOP and also between PI and DMFT (p < 0.05).

Conclusion: The deteriorated teeth condition and deprived periodontal health of MR patients may be most likely caused by the poor oral hygiene and may be worsen with the severity of the MR.

[1,3,4]PHD DDS, [2,5]Assistant Professor, [6]Associate Professor [7]Professor

[1]Department of Oral and Maxillofacial Surgery, Faculty of Medicine, Ufuk University, Ankara, Turkey

[2,7]Department of Periodontology, Faculty of Dentistry Hacettepe University, Ankara, Turkey

[3]Department of Pediatric Dentistry, Faculty of Dentistry Baskent University, Ankara, Turkey

[4]Department of Oral and Maxillofacial Surgery, Private Practice, Ankara, Turkey

[5]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Kocaeli University, Kocaeli, Turkey

[6]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Kirikkale University, Kirikkale, Turkey

Corresponding Author: Ozkan Ozgul, Department of Oral and Maxillofacial Surgery, Faculty of Medicine, Ufuk University 06100, Ankara, Turkey, Phone: 90 312 2044000, Fax: 90 312 2872390, e-mail: ozkanozgul@yahoo.com

Clinical significance: Knowledge of oral and periodontal status of mental retardation patients has great importance for public health and family education.

INTRODUCTION

Mental retardation (MR) has been defined by the American Association of Mental Deficiency (AAMD) as a sub average general intellectual functioning, which originates during developmental period and is associated with impairment in adaptive behavior or as a deficiency in theoretical intelligence that is congenital or acquired in early life of the person.[1] According to AAMD, MR classified into four categories in relation to intelligence quotient (IQ): Mild (IQ score 50-55 to 70), moderate (IQ score 35-40 to 50), severe (IQ score 20-25 to 35) and profound (IQ score below 20-25).[1] The disabled subjects comprise a considerable amount of the community and it is estimated that there are about 500 million people having disabilities worldwide.[2] Developmental disabilities can develop due to a variety of conditions including Down's syndrome, cerebral palsy, seizure disorders, autism, congenital defects and hearing and visual impairments.[3]

It has been reported that intellectually disabled (previously reported as mentally retarded) people have poorer oral health than does the general population.[4] Many published studies have reported relatively poor oral hygiene and high levels of periodontal inflammation in mentally changed children.[5,6] The 2,000 Surgeon General's Report on Oral Health indicates that people with developmental disabilities have significant drawback to obtain hygiene services, have worse oral hygiene than their non-disabled counterparts, and have an increased need for periodontal treatment than the general population.[4]

Particular care, such as sedation or general anesthesia usually required due to the severity of oral disease or the

patient's inability to cooperate with treatment. As a result of deprived cooperation of the patient with MR, dental therapy mostly includes tooth extraction, resulting in a high number of missing teeth.[7]

Studies dealing with the oral health of the intellectually disable patients reported the difficulties as poor oral and denture hygiene, a high prevalence of gingival and periodontal disease and untreated dental caries, a large number of missing and filling teeth, intense tooth wear due to bruxism (tooth grinding) and high susceptibility to traumatic injuries to the teeth and mouth.[8-12] The number of special needs children who survive to adulthood is increasing due to improved neonatal and pediatric care.[13] In adult MR patients, the higher prevalence of caries and periodontal problems becomes more problematic. Both children and adults are often referred to the dental clinics with an accumulation of untreated dental problems.[14]

To best of our knowledge, there is no published study about oral and periodontal status of mental retardation patients in Ankara, Turkey. The aim of this cross-sectional study was to determine the oral health and periodontal status of MR patients in Ankara, Turkey with regard to periodontal indices and DMFT scores and compare findings according to severity of the MR.

MATERIALS AND METHODS

Patient Selection and Study Design

This cross-sectional study was conducted in 105 mentally retarded subjects who were referred to Department of Oral and Maxillofacial Surgery at Ankara University between years of 2009-2011 for their oral and dental care. Patients were included in the study if they have diagnosed as mentally retarded (mild, moderate or severe) and those were excluded if they had Down syndrome, severe harmful disorders like cardiac defects and with unknown etiology for mental disability. The age of the patients were between 11 and 40 years (mean: 24 ± 8, 96) and the study protocol was explained in details to all patients' parents, guardians and institution authorities and they were asked to sign inform constant forms.

Clinical Examinations

Demographic information of each patient like age, gender, height and weight, BMI (the weight in kilograms divided by the square of the height in meters), intermarriage and living status (with parents or in institution) was recorded prior to dental examination. All subjects received comprehensive

oral and periodontal measurements. The examiners were calibrated on all periodontal indices like plaque index, gingival index and probing measures which were used in the study. The inter examiner variability was tested and weighed kappa statistic was calculated as 90.1%. Dental caries was recorded according to WHO caries diagnostic criteria by using the mouth mirror and probe, and missing teeth scores were recorded. The following clinical periodontal parameters including probing depth (PD), clinical attachment level (CAL), gingival index (GI),[15] bleeding on probing [BOP presence (+) or absence (–)], and plaque index (PI)[16] were recorded to evaluate the clinical periodontal status of the patients. All measurements were performed at four sites around each tooth in the mouth and were carried out to the nearest millimeter using a conventional periodontal probe with Williams markings**. For all periodontal examinations only fully erupted teeth were used. Clinical examinations and treatments were done in dental chair without general anesthesia if possible. When the patients were unable to cooperate sufficiently with the examinations, general anesthesia was performed.

Statistical Analysis

The Statistical Package for Social Science[††] (SPSS) version 20.0 software for was used for all statistical analysis. For descriptive statistics; mean ± SD was used for numerical data (PI, GI, CAL and PD), percent and count was used for qualitative data (living status, BOP). Chi-square test was used to compare qualitative data in 3 groups. For numeric values, when the data was normally distributed one-way ANOVA test was used and multiple comparisons were done by Duncan test; when the data was not distributed normally Kruskal Wallis test was used. Pearson and Spearman correlation coefficient was used for correlations.

RESULTS

Table 1 illustrates the general profile of the study population. Chi-squared test showed no statistically significant differences between MR groups according to gender (p = 0.06), having disabled siblings (p = 0.07) and intermarriage (p = 0.43) distribution. According to mean BMI calculations and mean age no significant differences found between groups (p = 0.45 and p = 0.57 respectively). Totally 48 (46.2%) MR patients were living in institution (nursing home) and the number of subjects who were living in an institution (65.6 %) was significantly higher (p = 0.02) at severe MR group, where the majority of subjects at mild and

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** PQ-OW Hu-Friedy, Chicago, IL, USA
[††] Windows SPSS, Chicago, IL USA

moderate MR groups were not institutionalized and living with their family (35.1%, 40.0% respectively).

Table 2 summarizes the clinical periodontal, DMFT and missing teeth scores in MR groups. There were statistically significant differences found between MR groups according to BOP%, PI, GI, PD and CAL scores. The mean PI score of severe MR group was significantly higher than moderate and mild MR group (p = 0.04 and p = 0.01 respectively) and moderate MR group has significantly higher PI scores when compared to mild MR group (p = 0.029). The GI scores were significantly higher at severe MR group when compared to other groups (p = 0.041 and p = 0.004, respectively) and moderate MR group has higher GI scores than mild MR group (p = 0.02). The severe MR group showed higher BOP than either of two groups and mild MR group has significantly less BOP. The severe MR group showed significantly greater CAL (p = 0.02) and PD (p = 0.017) scores than both two groups and PD and CAL scores of moderate MR group were significantly higher than mild MR group (p = 0.041 and p = 0.032). There were no statistically significant differences between groups according to DMFT scores. The number of missing teeth showed statistically

significant differences between groups. The mean number of missing teeth was significantly higher at moderate MR group when compared to mild MR group (p = 0.04), and significantly higher at severe MR group when compared to moderate MR group (p = 0.035).

Table 3 illustrates the significant correlations between clinical and demographic findings. Significant correlations were found between PI and DMFT (r = 0.414, p < 0.001), PI and GI (r = 0.065, p < 0.001), PI and CAL (r = 0.041, p = 0.003), PI and PD (r = 0.188, p = 0.043), BMI and PD (r = 0.353, p = 0.047), BMI and CAL (r = 0.211, p = 0.042).

DISCUSSION

In this study, we examined the oral health and periodontal status of a mental retardation population and compared the findings according to MR severity. All subjects in the study population were dentate (have at least 10 teeth). No differences were found between groups according to age, gender, having disabled siblings and intermarriage distribution. Our data showed high PI, GI, PD, CAL and DMFT scores in the study population and confirm many epidemiologic research findings of higher rates of dental and periodontal problems among MR patients in other countries.[8-10]

The lack of proper oral hygiene has been suggested to be the principal cause of gingival/periodontal disease in individuals with intellectual disability.[3,17] The most probably reason that the MR subjects had high plaque levels and gingival inflammation may be the inability of people with MR to practice adequate personal hygiene. In a clinical study, which the age groups of MR population was compared, it was reported that oral hygiene index scores increase with age due to cumulative effect of plaque and calculus.[18] The findings of the present study where significant correlations were found between age and PI confirmed the previous findings. Nicolaci and Tesini[19] have reported a correlation between the

Table 1: The general profile and background characteristics of the total study population

N = 105	Frequency	Percentage
IQ level		
Mild	37	35,23
Moderate	36	34,29
Severe	32	30,47
Gender		
Females	53	50,5
Males	52	49,5
Living in institution	48	46,2
Disabled sibling	3	2,9
Intermarriage		
Yes	19	18,1
No	85	81,7

Table 2: Demographic and Clinical parameters

	Total (N = 105)	Mild (N = 37)	Moderate (N = 36)	Severe (N = 32)
PI	1.72 ± 0.9	1.56 ± 0.8	1.71 ± 0.73[†]	1.9 ± 0.78*[¶]
GI	1.86 ± 0.62	1.62 ± 0.42	1.8 ± 0.35[†]	2.16 ± 0.47*[¶]
BOP (%)	85.4 ± 26.1	75 ± 19.8	80.9 ± 22.9[†]	89.3 ± 24.4*[¶]
PD (mm)	3.11 ± 1.12	2.79 ± 0.81	3.08 ± 0.83[†]	3.26 ± 0.82*[¶]
CAL(mm)	2.97 ± 1.05	2.49 ± 1.27	2.97 ± 1.15[†]	3.27 ± 1.35*[¶]
DMFT	9.35 ± 5.8	9.05 ± 4.4	9.14 ± 5.5	9.87 ± 5.4
Missing teeth	6.79 ± 5.6	4.4 ± 3.6	6.1 ± 5.21[†]	9.7 ± 6.4*[¶]
Age	24.00 ± 8.96	22.17 ± 7.24	25.56 ± 6.35	24.27 ± 5.56
BMI	22.49 ± 6.8	21.04 ± 5.7	22.17 ± 5.8	23.26 ± 5.2

*p < 0.05 statistically significant difference between severe and moderate MR groups
[†]p < 0.05 statistically significant difference between moderate and mild MR groups
[¶]p < 0.05 statistically significant difference between severe and mild MR groups
All data are given as mean ± SD. PI: Plaque index, GI: Gingival index; BOP: Bleeding on probing; PD: Probing depth; CAL: Clinical attachment level; DMFT: Decay missed filling teeth; BMI: Body mass index.

Table 3: Correlations

		BMI	Age	PD	GI	PI	CAL	DMFT
BMI	r		0.143	0.353	0.027	0.080	0.211	−0.161
	p		0.216	0.047	0.813	0.492	0.042	0.164
Age	r	0.143		0.171	0.138	0.639	0.171	0.112
	p	0.216		0.111	0.162	0.046*	0.041*	0.256
PD	r	0.353	0.171		0.111	0.188	0.773	0.141
	p	0.047	0.111		0.302	0.043*	< 0.001*	0.194
GI	r	0.028	0.138	0.111		0.652	0.045	0.063
	p	0.814	0.162	0.302		< 0.001*	0.649	0.532
PI	r	0.080	0.639	0.188	0.652		0.415	0.414
	p	0.492	0.046*	0.043*	< 0.001*		0.003*	< 0.001*
CAL	r	0.211	0.171	0.773	0.045	0.415		−0.224
	p	0.042	0.041*	< 0.001*	0.649	0.003*		0.254
DMFT	r	−0.161	0.112	0.141	0.063	0.414	−0.224*	
	p	0.164	0.256	0.194	0.532	< 0.001*	0.254	

*p < 0.05 statistically significant PD: Probing depth; CAL: Clinical attachment level; GI: Gingival index; BOP: Bleeding on probing; PI: Plaque index; DMFT: Decay missed filling teeth; BMI: Body mass index

level of oral hygiene and the severity of mental retardation. In another study, it was reported that mild MR patients had significantly better manual dexterity which explains the poorer oral of the severe ones.[20] In the present study, plaque scores showed an increasing trend with the severity of the handicap and confirmed the previous findings.[19,20]

The association between plaque levels and gingival inflammation is well recognized. High BOP percents and high GI scores indicate that gingival inflammation is a common finding in the present study group and associated with high plaque levels. The clear association between PI and GI suggests that dental plaque induced gingival inflammation in this group could be resolved by attention to oral hygiene (tooth brushing) and basics forms of periodontal treatment such as scaling.

Poor oral hygiene is a well-defined risk factor for periodontal disease progression.[21] Thus, it is not surprisingly that people with MR were shown to have more PD and CAL scores. In this study, where periodontal disease development measures like PD and CAL scores increase with the severity of MR, it could be assumed that, the severe MR group having the highest PD and CAL scores and the greatest need for treatment for periodontal problems as shown by other studies.[22]

Prevalence of obesity measured by BMI has been reported to be higher in MR patients than the general population.[23,24] With increasing longevity in MR patients, obesity can be expected to become a major problem in older ages. Possible explanations for the high prevalence of overweight and obesity in these patients are usually eating unhealthy food and using antipsychotic drugs.[25] The NHANES III study found a significant relationship between obesity and periodontal disease using a combination of deep pockets and attachment loss as criteria of periodontal disease.[26] In the present study, the significant positive correlations between

BMI and periodontal disease criteria like PD and CAL, may suggest that high BMI scores may be a contributing factor for periodontal disease susceptibility in these patients.

A comparison between MR groups according to DMFT index and the number of missing teeth showed that the severe MR group has the highest number of missing teeth where no differences found between groups according to DMFT scores. Since caries rates are directly associated with poor oral hygiene, it seems rational that MR patients who have high plaque level would have high rates of caries.[27] The DMFT and missing teeth findings of the present study confirmed the previous report of Pieper et al[7] and may suggest that due to poor cooperation of severe MR patients with the dental treatment, the dental therapy often has been extraction and resulting in a low number of restored teeth and high number of missing teeth. The use of general anesthesia places constraints on the operator due to limited time available.[28] A greater number of extractions due to caries or periodontal reasons may be performed due to time constrain and due to inherent difficulties in performing other treatment options.[29]

The main limitations of our study are the relatively small sample size and cross-sectional design. Additionally we could not explore the influence of various sociodemographic variables like parents' or career's education and income, daily brushing habits that could affect the results.

CONCLUSION

Different survey designs, different definitions of oral and periodontal health and different study populations do not allow the ability to compare the results of different studies. Oral health of many people with MR fundamentally depends on their career's or family's knowledge or concern about looking after the teeth. The results of this study that performed in Ankara, Turkey and based on the scientific

literature about MR patients, it would be suggest that the teeth condition and periodontal health of MR patients largely due to the poor oral hygiene and may be worsen with the severity of the MR. On the other hand, obesity and high BMI scores can be a contributing factor for periodontal disease progression in these patients. To improve the oral health status of patients with MR, further studies are necessary to develop preventive programs and to ensure full awareness about this special group.

CLINICAL SIGNIFICANCES

Knowledge of oral and periodontal status of mental retardation patients has great importance for public health and family education. Thus, families have the necessary knowledge about oral health applications and they might help preserve the teeth in oral cavity for longer time which would increase the comfort of children and families.

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