Evaluation of DMFT Index Based on Mental and Psychological Profile in Shahedieh, Yazd Province

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Abstract

Background and Objective: Oral health affects physical and mental health, growth, enjoyment and community. Anxiety and depression can lead to tooth decay, thereby indirectly affecting the periodontal health of people. Those who experience mental illness also suffer from poor oral health and do not adherence with oral health instructions. Mental illness leads to fear, unhealthy habits, and distrust of dentists, each of which alone affects oral and dental health. This study aimed to evaluate the DMFT-affecting mental diseases in adults in Shahedieh in a cohort study in 2016.

Material and Methods: In this prospective cohort study, Shahedieh cohort plan was used to collect the research data. Different psychological variables such as the history of these diseases, the drugs used in these patients, and the current incidence of mental illness were extracted from the especial Yazd Shahedieh cohort questionnaire. Oral health status in the participants was estimated based on the DMF index for permanent teeth in the participants. Mean, percentage, and standard deviation was performed to describe descriptive data, as well as Chi-square, t-test, and ANOVA, Regression. In addition, a P-value of less than 0.05 was considered statistically significant.

Results: In the present study, total, 9967 subjects were enrolled in the study, 5028 of whom were men and 4939 were women. No significant difference was observed between the male and female participants regarding the number of decayed (p=0.14) and missing teeth (p=0.24) and DMFT index (p=0.69). There was no significant relationship between age and DMFT indexes. No correlation was observed between the level of education and DMFT index (p=0.147). There was no significant relationship between DMFT index and psychological disorders (depression [P=0.19]), other psychiatric diseases [P= 0.32]), mental health care (depression treatment [P=0.45] and treatment of other psychiatric diseases [P=0.97].)

Conclusion: According to the results of the study, no significant relationship was found between the DMFT index based on the mental and psychological profiles of the subjects.

Highlights

There is an association between poor oral health and mental health. Dental anxiety has negative impact on oral health. A higher level of anxiety is associated with fewer filled teeth and higher calculus index. Therefore, in this prospective research, we use DMFT index to evaluate oral health status based on mental and psychological profile of 9967 subjects in Shahedieh, Yazd province.

Introduction

Oral health affects physical and mental health, growth, enjoyment, looking, talking, chewing, food tastes and community. However, oral and dental health might have less priority in terms of diagnosis of psychological diseases (1). The goal of the World Health Organization (WHO) is achieving the highest level of health for all people. In its statute, the WHO defines health as: "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."(2).

Attention deficit hyperactivity disorder (ADHD) can cause poor oral and dental health, thereby having adverse effects on the periodontal health of people with this condition. Dental anxiety (dental anxiety is a term used to describe fear, anxiety or stress in a dental setting. Being scared to visit the dentist can result in delaying or avoiding dental treatment) has a negative impact on oral health (3). A higher level of dental anxiety is associated with fewer filled teeth and a higher calculus index. Studies show that those who experience mental illness also suffer from poor oral health and do not adhere to oral health instructions (4).

In 2015, Roohafza et al. found a relationship between psychological factors (e.g., stress, anxiety and depression) and tooth decay.

Broken and missing teeth might affect depression mostly through the psychological constructs of OHRQoL (oral health-related quality of life), which confirms the link between psychological factors and missing teeth (5).

Decayed, missing, and filled teeth (DMFT): suggested by the WHO, DMFT is used to evaluate oral health. In fact, this is an index for evaluation of dental health and can be measured by clinical examination with the use of a mirror and an explorer.

The index's parameters are, as follows:

Decay (D): this term refers to opaque enamels, clinging explorer, a cavity, recurrent caries, and temporary filling.

Missing (M): untreated decayed teeth or teeth that cannot be kept due to decay.

Filling (F): All teeth that have a filling or are covered due to caries.

Tooth (T)

After the evaluation of each of the three parameters, the number of teeth that had any of these features was summed up to determine the DMFT index. Unfortunately, the DMFT index is extremely higher among Iranian children, compared to the global mean. In other words, Iranian children have many more decayed, filled and missing teeth, compared to the global average (6). In addition to tooth decay, lack of oral hygiene has consequences such as gingivitis, endocarditis, cardiovascular disease, memory impairment, diabetes, cancers, halitosis, dental irregularities, as well as reduced self-esteem and quality of life (7).

Reduced energy and depression-related motivation can affect oral health and prevent measures related to oral hygiene, which results in an increased risk of tooth decay and

periodontal diseases, cryogenics nutrition (leading to decay), avoiding dental cares and xerostomia caused by antidepressants (8). While there is an association between poor oral health and mental health, psychological conditions are assessed using comprehensive psychometric tools applied to determine HRQoL, which also includes mental health in most cases. This research showed the association between missing teeth and dental pain with HRQoL (9). According to studies, there are behavioral and psychological mechanisms explaining the relationship between depression and oral health. Increased depression intensity is associated with poor oral hygiene caused by decreased saliva secretion and increased Lactobacillus count (10).

Despite many efforts in interventions and use of all abilities, many students and other target groups of oral health programs have difficulties adhering to recommended programs or changing behavior. It is recommended that more studies be conducted on dental anxiety in the Iranian population. On the other hand, despite the existing findings on the relationship between psychological diseases and tooth decay in adults, few clinical studies have been performed on this issue. Moreover, literature review revealed a lack of study on the assessment of the relationship between psychological diseases and oral health. With this background in mind, this study aimed to evaluate the DMFT-affecting psychological diseases in adults in Shahedieh in a cohort study in 2016.

Materials and Methods

In this prospective research, we used the Shahedieh cohort study in 2016, to collect data. Total, 9967 subjects were enrolled in the study, 5028 of whom were men (50.4) and

4939 were women (49.6). Psychological variables such as the history of depression and other psychological disorders, the treatment and no treatment in patients, and the current incidence of mental illness were extracted from the especial Yazd Shahedieh cohort questionnaire after receiving the necessary permissions. Oral health status in the participants was estimated based on the DMF index for permanent teeth in the participants. In this context, the total number of decayed teeth (D=decayed), the number of missing teeth (M=missing) and filled teeth (F=filled) were assessed as the DMF indexes. A total score of zero to 28 or 32 could be obtained by the participants. The uncounted teeth in the study included: impacted teeth, congenitally missing teeth, supernumerary teeth, and teeth extracted for reasons other than decay.

Inclusion and Exclusion Criteria

Inclusion criteria: age of ≥30 years

Exclusion criteria: incomplete questionnaires.

Type & Methods of Study

This is a prospective cohort research.

Sampling Procedure

All subjects were residing in Shahedieh and aged above or equal to 30 years.

Data Analysis Method

Data analysis was performed in SPSS version 22 using frequency distribution, mean, percentage, and standard deviation to describe the descriptive data, as well as Chi-square, t-test, and ANOVA to analyze the data. In addition, a P-value of less than 0.05 was considered statistically significant.

Result

According to Table 1, the lowest (zero) and highest (32) DMFT rates were observed in 130 and 2001 individuals, respectively.

The mean age of the participants was 48.84 years, and all of the subjects were aged above 30. The highest mean DMFT index (19.77) was observed in the age group of 50-59 years. Based on ANOVA results, there was no significant relationship between age and DMFT indexes, and this difference between age group was not statistically significant (p=0.747).

The mean number of decayed teeth was 2.34, and the highest number of this type of teeth was detected in subjects in the age range of 50-59 years. Therefore, there was no significant relationship between age and tooth decay (p=0.35).

The highest mean number of missing teeth (13.58) was observed in the age group of above 60 years. Therefore, there was no correlation between age and missing teeth (p=0.61).

The highest mean number of filled teeth (4.37) was observed in the age group of 30-39 years. Therefore, there was no correlation between age and filled teeth (p=0.08).

No significant difference was observed between the male and female participants regarding the number of decayed (p=0.14) and missing teeth (p=0.24) and DMFT index (p=0.69). However, a higher number of filled teeth were found in male subjects, compared to female participants, showing a significant difference in this regard (p=0.02).

It was observed that a high number of participants (31.2%) had an elementary level of education. Meanwhile, only 0.2% of the subjects had a PhD.

As observed in Table 2, the mean number of missing teeth was lower in PhD holders (10.63), compared to other participants. However, these statistics were not significant (p=0.26). The mean number of filled teeth in subjects with MScs was lower, compared to the other groups. The eight groups were compared in terms of the difference in the number of filled teeth using ANOVA, showing no significant difference between the groups (P=0.66).

Table 1. Mean and standard deviation of DMFT index based on age

Age		N	Mean	Standard deviation	Confidence interval		Mini mum	Maxi mum	ANOVA results P-value
					Lower limit	Higher limit			
DMFT	30-39	1825	19.66	8.94	19.25	20.07	0	32	0.74
	40-49	2924	19.71	8.98	19.38	20.3	0	32	
	50-59	2254	19.92	8.83	19.55	20.28	0	32	
	+60	1470	19.88	8.94	19.43	20.34	0	32	
	Total	8473	19.78	8.92	19.59	19.97	0	32	

Table 2. Mean and standard deviation of the number of missing and filled (M, F) in eight groups assessed based on the level of education

Level of education		Number of subjects	Mean	Standard deviation	Confidence interval		Minimum	Maximum	ANOVA results P-value
					Lower limit	Higher limit			
Missing teeth	Elementary	2899	13.50	10.94	13.10	13.90	0	32	0.260
	Junior high school	1535	13.01	10.71	12.47	13.55	0	32	
	Diploma	1908	13.07	10.70	12.59	13.56	0	32	
	Associate degree	367	13.71	11.04	12.57	14.84	0	32	
	BSc	922	14.02	11.10	13.30	14.74	0	32	
	MSc	177	13.47	11.20	11.81	15.14	0	32	
	PhD	16	10.63	9.57	5.53	15.72	0	32	
	Illiterate	1505	13.63	11.05	13.07	14.19	0	32	
	Total	9329	13.41	10.90	13.19	13.63	0	32	
Filled teeth	Elementary	2894	4.06	4.70	3.89	4.23	0	24	0.664
	Junior high school	1536	4.15	4.71	3.92	4.39	0	21	
	Diploma	1907	4.24	4.65	4.03	4.44	0	22	
	Associate degree	367	4.28	4.63	3.80	4.75	0	20	
	BSc	922	4.19	4.72	3.88	4.49	0	21	
	MSc	176	3.55	4.43	2.89	4.21	0	19	
	PhD	16	4.50	5.16	1.75	7.25	0	17	
	Illiterate	1503	4.09	4.72	3.85	4.33	0	24	
	Total	9321	4.13	4.69	4.03	4.22	0	24	

We estimated the DMFT index and the mean number of decayed teeth in eight educational groups of elementary, junior high school, diploma, associate degree, BSc, MSc, and PhD (Table 3). The mean DMFT decreased in PhD holders (16.68). In addition, the highest mean DMFT index was observed in the MSc group (20.36). The eight groups were compared using ANOVA, and the results showed no significant difference (P=0.14). The mean number of decayed teeth decreased in PhD holders (1.56). Furthermore, the highest mean number of decayed teeth was observed in subjects with an elementary level of education. The eight groups were compared in terms of decayed teeth using ANOVA, the results of which indicated no significant difference between the groups (P=0.82). As such, no correlation was observed between the level of education and decayed teeth (p=0.82) and DMFT index (p=0.147) (Table 3).

ANOVA results showed, there was a significant association between decayed teeth index and marital status (p=0.035). On the other hand, no significant relationship was found between filled and missing teeth and DMFT with marital status (p>0.05).

No significant relationship was observed between DMFT index and depression. (p=0.19) (Table 4).No significant relationship was observed between DMFT indexes and depression treatment. (p=0.45) (Table 5).

No significant relationship was detected between psychological disorders and the DMFT index. (P=0.82) (Table 6).

Table 3. Mean and standard deviation of decayed teeth and DMFT index in eight groups based on the level of education

Level of education		N	Mean	Standard deviation	Confidence interval		Mini mum	Maxi mum	ANOVA results
					Lower limit	Upper limit			
DMFT	Elementary	2894	19.79	9.04	19.46	20.12	0	32	P-Value
	Junior high school	1534	19.47	8.84	19.03	19.92	0	32	0.147
	Diploma	1907	19.53	8.77	19.13	19.92	0	32	
	Associate degree	367	20.26	9.14	19.32	21.20	0	32	
	BSc	922	20.36	8.88	19.78	20.93	0	32	
	MSc	176	19.44	9.36	18.04	20.83	0	32	
	PhD	16	16.68	7.91	12.47	20.90	0	32	
	Illiterate	1503	19.92	8.96	19.47	20.37	0	32	
	Total	9319	19.77	8.93	19.59	19.95	0	32	
Decayed teeth	Elementary	2894	2.23	3.41	2.11	2.35	0	26	
	Junior high school	1535	2.32	3.31	2.15	2.48	0	22	0.829
	Diploma	1907	2.21	3.31	2.07	2.36	0	21	
	Associate degree	367	2.28	3.63	1.91	2.66	0	19	
	BSc	922	2.16	3.29	1.94	2.37	0	24	
	MSc	176	2.52	3.65	1.98	3.07	0	17	
	PhD	16	1.56	2.50	0.23	2.90	0	8	
	Illiterate	1503	2.21	3.37	2.04	2.38	0	22	
	Total	9320	2.24	3.37	2.17	2.31	0	26	

Table 4. Comparison of indexes and having depression at the present time

Parameter	Decayed teeth		Filled teeth		Missing teeth		DMFT	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Had depression	2.08	3.19	4.15	4.73	13.83	10.92	20.06	8.94
Had no depression	2.26	3.39	4.13	4.68	13.34	10.89	19.72	8.93
P-value	0.06		0.86		0.12		0.19	

Table 5. Comparison of indexes and depression treatment

Parameter	Decayed teeth		Filled teeth		Missing teeth		DMFT	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Under treatment	2.22	3.47	4.29	4.73	13.49	10.45	20.01	8.64
No treatment	2.24	3.36	4.12	4.68	13.40	10.93	19.75	8.96
P-value	0.88		0.34		0.84		0.45	

Table 6. Comparison of indexes and other psychological disorders

Parameter	Decayed teeth		Filled teeth		Missing teeth		DMFT	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Had psychiatric disorders	2.09	3.11	3.84	4.47	13.77	11.05	19.70	9.16
Had no psychiatric disorders	2.25	3.39	4.16	4.71	13.37	10.88	19.77	8.91
P-value	0.20		0.06		0.32		0.82	

Based on Table 7, no significant relationship was observed between the DMFT indexes and the treatment of psychological disorders (P=0.97).

The results of regression analysis showed that the level of DMFT in those who have depression is 0.34 higher than those who do not have depression, (Table 8) and the level of DMFT in those who have psychological disorders is 0.34 higher than those who do not have other psychological disorders, but this difference was not significant (Table 9).

This analysis also showed that the amount of DMFT in other variables (sex, age, level of education) were not significantly different from each other. (P>0.05) (Table 8, 9).

Table 7. Comparison of indexes and treatment of other psychological disorders

Parameter	Decayed teeth		Filled teeth		Missing teeth		DMFT	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Under treatment	2.28	3.36	3.80	4.43	13.61	10.79	19.69	8.89
No treatment	1.98	2.95	3.87	4.49	13.90	11.24	19.70	9.32
P-value	0.18		0.84		0.71		0.97	

Table8. Regression

Model	Unstandardized Coefficients		Standardized coefficients		
	B	Std.Error	Beta	t	Sig.
Constant	19.472	.484		40.208	.000
Depression	.346	.264	.014	1.314	.189
Age	.007	.010	.007	.649	.516
Education	.031	.040	.009	.785	.433
Sex	-.340	.186	-.019	-1.829	.067

a. Dependent Variable: DMFT
b. Predictors: (Constant), Depression, Education, Sex, Age

Table 9. Regression

Model	Unstandardized Coefficients		Standardized coefficients		
	B	Std. Error	Beta	t	Sig.
Constant	19.536	.483		40.414	.000
Age	.006	.010	.007	.636	.525
Education	.031	.040	.008	.774	.439
Sex	-.341	.186	-.019	-1.831	.067
Psychological disorders	-.079	.328	-.002	-.240	.811

a. Dependent Variable: DMFT
b. Predictors: (Constant), Psychiatric disorders, Education, Sex, Age

Discussion

Oral and dental diseases (e.g., tooth decay and periodontal diseases) are very common and are associated with economic, social and psychological complications in addition to physical problems. This disease seriously affects the quality of life in several people and various aspects of their lives, such as mouth function, facial appearance, and social relations. In other words, personal self-assessment of the effect of functional, psychological, social factors and experience of pain and discomfort due to oral problems is defined as " oral health-related quality of life (OHRQoL)" (11). In fact, OHRQoL is a personal assessment of how functions and psychological and social states of a person are affected by clinical indexes of oral health. While there are common clinical indexes in dentistry such as DMFT and CPITN to evaluate prevalent oral and dental diseases, they fail to meet the needs in the field of OHRQoL assessment.

In the current research, there was no difference between the four age groups in terms of the number of filled teeth and DMFT index, which showed a lack of association between age and filled teeth and DMFT index, which is inconsistent with the results of current studies. However, this lack of consistency might be due to our larger sample size and difference in research settings. Nonetheless, aging can increase dental caries due to changes in dietary habits, an increase in unhealthy habits, as well as changes in the composition and function of salivary glands. The WHO has measured the DMFT index for Iran in its surveys, reporting a low level for the age range of 8-12 years (1.2-2.6). The same index is in the average range (9- 13.9) for the age range 35-44 years, which shows the increase of the index by aging, which is

incongruent with our findings (12). This may be due to the disparity of different age groups concerning other variables affecting the DMFT index, which results in bias.

In the present study, the mean DMFT index was slightly higher in women (19.94), compared to men (19.60). However, no significant difference was observed between the groups. Therefore, it could be concluded that gender does not correlate with the DMFT index. However, Nourollahian reported a lower mean DMFT index in women, compared to men (13). In another research by Torabi et al., the mean DMFT was lower in women, compared to men (14). Notably, the mentioned results are not consistent with our findings, which might be due to the larger sample size in the current research and difference in the research setting.

On the other hand, Ajami found no significant difference between male and female participants in terms of DMFT (15). Deyhimi et al. reported a mean DMFT index of 5.43 for evaluated dental students. In the aforementioned study, the mean DMFT index was insignificantly higher in women, compared to men (16). In this respect, our findings are in line with the mentioned study. Nevertheless, the results cannot be compared due to the lack of significance. Some of the causes of this slight difference are various geographical locations and cultural differences. On the other hand, none of the aforementioned studies are comparable to the present research in terms of sample size. In addition, the current research has a good internal power and citing strength owing to its larger sample size.

Nonetheless, Splieth et al. conducted research on 4022 subjects in Germany and reported a higher DMFT in women, compared to men, which is congruent with our findings (17). In

the current research, the mean number of missing teeth was lower in PhD holders (10.63), compared to other groups. Moreover, the mean number of filled teeth was lower in subjects with MScs, compared to the other groups. In the present study, no association was found between the level of education and missing and filled teeth. According to the results, there was just a slight difference between seven groups of elementary education, junior high school, diploma, associate degree, BSc, MSc, and illiterate regarding the mean DMFT index. However, the mean DMFT index decreased in PhD holders (16.68). Furthermore, the groups of elementary education, junior high school, associate degree, BSc, MSc, and illiterate were almost similar in terms of decayed teeth.

In addition, our findings were indicative of no relationship between the level of education and the number of decayed teeth and DMFT index. In a research by Khalilnejhad et al., subjects with higher levels of education had lower DMFT indexes, which is in line with our findings [18]. On the other hand, Torabi et al. found no association between literacy and DMFT index [14]. Moreover, Rigi Lodz et al. identified no relationship between the level of education and DMFT [10]. In this respect, the results of the mentioned study are in accordance with the results obtained by Siukosaari et al [19]. The level of knowledge, attitude and health performance were higher in women, compared to men, and in graduated individuals and lower ages, compared to poorly educated people and higher ages, reported by Taheri et al . The obvious cultural differences and the traditional structure of the geographical areas studied in the researches cited by the present study might be the cause of different results.

On the other hand, lack of significance of the difference between the DMFT indexes in the different groups regarding level of education might be related to lack of examination of dental caries by a dentist and with the use of radiology images. It is expected that oral health indexes and oral care improve by increasing the level of education and knowledge about this area.

In the current research, there was no relationship between marital status and the number of missing and filled teeth. In studies by Fox, Locker et al., and Beck, it was shown that the relative importance of education will decrease in case of considering other socioeconomic factors, such as level of income, last dental visit, and age [20-22]. Evidently, this difference makes no change in the nature of the results obtained in the current research. This is mainly due to the fact that PhD holders will have a higher level of income, compared to other educational groups, owing to their level of education. On the other hand, an increased level of education is associated with higher knowledge and a better attitude toward adhering to health recommendations, which will ultimately lead to better health status. In a study by Taheri et al., knowledge, attitude, and practice of health were higher in women, compared to men and, in educated individuals and low ages, compared to poorly educated subjects and high ages [23], which confirmed our findings. In the present study, no correlation was observed between marital status and missing and filled teeth. However, a significant association was detected between marital status and the number of decayed teeth.

Given the higher mean of decayed teeth in the group of single participants, it can be hypothesized that two possible causes have led to this conclusion. Firstly, single people are usually younger, which might be associated with bad eating habits and eating

more harmful foods. On the other hand, given the cultural and traditional structure of Yazd province, it can be inferred that single people who are not young are usually unable to marry because of economic conditions. This factor is directly related to dental health and oral hygiene and the prevention of diseases (24).

SteveKiesly et al. reported that individuals with depression and anxiety have a possible potential risk of dental diseases and missing teeth (1). According to the results of Katarzyna et al., depression was associated with a higher number of missing teeth, decayed teeth, and dry mouth in individuals aged 65 years and higher. Therefore, some of the parameters of oral health can affect patients' overall health. In addition, depression can impair oral and dental health (25). In 2017, Kim et al. evaluated the relationship between stress, depression and suicidal thoughts with oral health status and oral function in a large sample of Korean adults aged 35 years and higher. According to the results, there was a correlation between oral functional problems (e.g., chewing and talking) and mental health (26). Meanwhile, we found no significant relationship between depression and tooth decay.

In another study by Zengin et al. (2015), oral hygiene of patients with psychological disorders was insufficient, and most patients had missing teeth and required prosthesis repair. Nevertheless, dental treatment was rejected. Some patients are reluctant to have appropriate dental treatment (e.g., prosthesis, restorative therapy, and surgical treatment (27). Nevertheless, our findings are incongruent with the results of the mentioned studies. There are several limitations to the results of this study. An important issue when comparing the results of various studies regarding DMFT variables is the

geographical, cultural and sample size differences that cause data dispersion. On the other hand, an examination by a dentist with the help of a mirror to detect distal and buccal caries, dental floss for interproximal caries, and radiographic images were not performed to confirm these issues. Therefore, this can be attributed to the weakness of the results and the cause of their difference with the smaller sample size studies, where precise examinations were performed by a dentist. In addition, there was no significant relationship between DMFT index and psychological diseases (depression and other psychiatric diseases) and between the treatment of psychological diseases (treatment of depression and treatment of other psychiatric diseases) and the DMFT index alone. As such, it is recommended that more studies be performed to evaluate oral health indexes and life quality indexes and the psychological state of people. This is mainly due to the fact that the current studies have shown a strong correlation between life quality and clinical state and dental diseases of individuals (5). The limitation in analyzing the results is the inconsistency of the subjects with incomplete completion of information for each variable. The subjects had a difference in terms of missed and null codes for each variable. As a result, the number and percentages in the two variables analysis were different from the analysis of each variable alone.

Conclusion

According to the results of the study, no significant association was observed between the DMFT index and the psychological profiles of the participants.

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