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Original Article

Study of Quality of Life Associated with Oral Health in Patients with MS (Multiple Sclerosis)

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ABSTRACT

Multiple Sclerosis (MS) is an inflammatory disease that destroys neurons, which, in addition to physical and mental complications, has devastating effects on oral health. Despite many investigations in the field of oral health in people with MS, no study has been conducted to investigate the life quality related to oral health in these people. This study aimed to investigate the life quality related to oral health in people with MS. In this case-control research, there were 103 people with MS and 103 healthy individuals. People of both groups completed the standardized OHIP (Oral Health Impact Profile) questionnaires and the evaluation of indicators associated with oral health behavior. Caries index was also recorded and measured for both groups. Finally, the data were analyzed in SPSS23 software using T-test and Mann-Whitney tests and linear regression between variables. The life quality related to oral health in the group of people with MS was statistically significantly lower than the healthy group (P = 0.032) in terms of performance limitation. In addition, the caries index score was remarkably higher in MS patients (P = 0.025). According to the obtained results, it seems that the life quality related to oral health in patients with MS is not significantly different compared to healthy people, despite having more caries. Qualitative studies are needed to better express the problems of these patients in this field.

Keywords: Quality of life, Multiple sclerosis, Patients, Oral health

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Introduction

Oral health has a significant effect on general health and quality of life [1, 2]. Various diseases can affect oral health; one of these diseases is multiple sclerosis (MS). This disease is a neuron-destroying disease that affects the gray and white parts of the nervous system, causing atrophy of the brain and spinal cord. Demyelination is the main mechanism in the destruction of neurons [3, 4]. This disease causes temporomandibular problems, dysarthria, dysphagia, facial paralysis, and trigeminal nerve pain [5]. This pain in the area of the face and mouth reduces oral health by limiting the methods of observing oral hygiene and receiving dental services [6].

The study by Griffiths and Trimlett and the study by McGrother *et al*. show that 25% of MS patients were unable to clean their teeth and removable prostheses, one-third of them had difficulty in maintaining oral hygiene, and 30 A percentage of them changed their dominant hand to brush their teeth due to the symptoms of the disease [7, 8]. In addition, this disease increases tooth decay. In women, there is a direct relationship

between this disease and the development of chronic periodontitis [9]. The drugs prescribed for this disease have several side effects, the most important of which is dry mouth, followed by other problems such as a change in the sense of taste, dysphagia, mouth ulcers, and sinusitis in the patient [10].

In 2007, during research on health-related quality of life (HRQOL), it was determined that patients with secondary progressive multiple sclerosis had a lower health-related quality of life than the control group [11]. In fact, in addition to physical disorders, this disease also causes psychological and social problems. This disease increases a person's chance of depression through different mechanisms. In multiple sclerosis, patients who reported more fatigue, more depression, and lower quality of life have been observed [12, 13]. The gradual decrease in performance and satisfaction with daily activities increases with age. In another study, it was reported that these patients are embarrassed for others to notice their symptoms and are afraid that these symptoms will worsen in public [14, 15]. In addition, multiple sclerosis can disrupt the patient's social communication [16].

In some patients with multiple sclerosis, following dysphagia, problems such as food being stuck and drinks jumping in the throat occur during swallowing, which can affect the pleasure of eating and their quality of life [17]. Despite the high prevalence of this disease and its effect on oral health, information on oral health-related quality of life (OHRQoL) is not available for patients with multiple sclerosis. Oral health-related quality of life or OHRQoL is a multifaceted construct that affects comfort when eating, sleeping, and participating in a social situation, self-confidence, and satisfaction with oral health. OHRQoL is evaluated by psychological, functional, and social factors and the experience of pain or discomfort [18]. However, to plan to improve the life quality related to oral health in multiple sclerosis patients, self-perceived information about the impact of this disease on the quality of life is necessary.

According to what was said, due to the lack of sufficient articles in the field of life quality related to oral health about multiple sclerosis and also the increasing incidence of this disease in the world, this study aims to investigate a case-control among people in the community and The members of the Multiple Sclerosis Association, using a questionnaire and gathering information about the relationship of Multiple Sclerosis disease to the life quality related to oral health.

Materials and Methods

In this case-control study, 103 patients with multiple sclerosis, who were confirmed to have multiple sclerosis according to the definitive diagnosis of a specialist doctor, were selected as the case group. In addition, 103 healthy individuals from the normal population of the society were included in the study under the name of the control group by an accessible and random but matched sampling method. The duration of disease in multiple sclerosis patients who entered the study was between 2 and 25 years. Both case and control groups were matched in terms of age and sex.

The subjects of the control group did not have any systemic disease and did not take any medicine that would affect the questionnaire. In addition, none of the two groups consumed alcohol or cigarettes.

After obtaining verbal consent from both groups, the demographic information of the patients was recorded. A dentist subjected the people of both groups to an oral examination and their DMFT index was recorded. The dentist's examination tools were a mirror, disposable latex gloves, and a three-layer mask. Then, people were asked to complete the standardized OHIP questionnaires and to evaluate indicators associated with oral health behavior (including the number of times they use a toothbrush and dental floss, interest in sweets, and their frequency of use).

The OHIP-14 questionnaire includes seven areas physical pain, functional limitation, physical disability, mental and emotional disability, mental and emotional discomfort, social disability, and general disability, and each area contains two questions. To evaluate the responses, the ADD (additive) method was considered, in which the test options are scored as “never = 0, rarely = 1, sometimes = 2, often = 3, and always = 4.” In this method, the OHIP-14 score was between 0 and 56, the lower the value of this score, the better the quality of life for that person [19].

Finally, the data was entered into the SPSS 23 software, and Mann-Whitney and T-tests were used to examine the variables of the two groups and to examine the scores of the questionnaires between the two groups individually or to examine the areas. In addition, multivariable linear regression analysis was done to investigate the relationship between variables and OHIP score.

Results and Discussion

In the present study, the case group included 103 people with multiple sclerosis and the control group included 103 healthy people (average age in both groups was 40 and 54 years). The number of women in each group was 68 and men were 35.

The patients were collected from two MS disease centers and their disease duration was between 2 and 25 years. To collect the sample of the control group, normal people were used using the available sampling method. The people of the control group were matched with the people of the case group in terms of age and gender. After talking to the people of both groups and explaining the objectives of the research, obtaining their satisfaction, and ensuring that they do not have any specific medical and psychiatric problems, the researcher provided them with the questionnaires. In addition, after performing oral examinations, their DMFT index was recorded. The characteristics of both groups are shown in **Table 1**.

Table 1. Frequency distribution of some characteristics of people under study by group.

Variable		Number (%)	Control group	Patients with MS	P-value
Education level	Under diploma	22(10.7%)	6(5.8%)	16(15.5%)	0.035
	Diploma	57(27.7%)	20(19.4%)	37(35.9%)	
	University degree	127(61.7%)	77(74.8%)	50(48.5%)	
Job	Employee	82(39.8%)	62(60.2%)	20(19.4%)	< 0.001
	Freelance job	28(13.6%)	18(17.5%)	10(9.7%)	
	Unemployed	89(43.2%)	17(16.5%)	72(69.9%)	
	Students	7(3.4%)	6(5.8%)	1(1%)	
Taking medicine	Consumes	95(46.1%)	5(4.8%)	90(87.3%)	< 0.001
	Does not consume	111(53.9%)	98(95.2%)	13(12.7%)	
Brushing times per day	More than once	78(37.9%)	41(39.8%)	37(35.9%)	0.496
	Once	106(51.5%)	52(50.5%)	54(52.4%)	
	Sometimes	17(8.3%)	9(8.7%)	8(7.8%)	
	Never	5(2.4%)	1(1%)	4(3.9%)	
How often to use dental floss per day	More than once	36(17.5%)	21(20.4%)	15(14.6%)	0.037
	Once	53(25.7%)	29(28.2%)	24(23.3%)	
	Sometimes	63(30.6%)	33(32%)	30(29.1%)	
	Never	54(26.2%)	20(19.4%)	34(33%)	
Interest in consuming sweets	A lot	75(36.4%)	33(32%)	42(40.8%)	0.491
	Moderate	85(41.3%)	48(46.6%)	37(35.9%)	
	Low	38(18.4%)	19(18.4%)	19(18.4%)	
	At all	8(3.9%)	3(2.9%)	5(4.9%)	
Consumption of sweets per day	A lot	20(9.7%)	7(6.8%)	13(12.6%)	0.291
	Moderate	85(41.3%)	42(40.8)	43(41.7%)	
	Low	91(44.2%)	50(48.5%)	41(39.8%)	
	At all	10(4.9%)	4(3.9%)	6(5.8%)	

There was no significant difference between the control and case groups in the cases of brushing frequency, liking, and consumption of sweets per day ($P > 0.05$). While there, was a significant difference between the two groups regarding education, occupation, medication use, and flossing frequency ($P < 0.05$). According to the results, 95% of patients were taking drugs such as immunosuppressive drugs (43%), interferon (35%), antidepressants (18%), anticonvulsants (15%) and corticosteroids (6%).

In evaluating the DMFT index of people of both groups, the average and standard deviation of this index are given in **Table 2**. The number of decayed teeth in healthy subjects was between 0 and 8 teeth and in MS patients between 0 and 18 teeth. The number of missing teeth was between zero and 14 teeth in healthy people and between zero and 15 teeth in MS patients, and the number of filled teeth was between zero and 15 teeth in healthy people and between zero and 16 teeth in MS patients. In total, the amount of DMF in healthy people

was 1 to 21 teeth and in MS patients, it was 0 to 31 teeth.

Table 2. Mean and standard deviation of DMFT in the studied subjects.

Variable	Control group (N = 103)	Patients with MS (N = 103)	P-value
D	2.45 ± 3.12	1.45 ± 2.09	0.005
M	4.32 ± 3.32	3.73 ± 2.81	0.353
F	6.13 ± 4.36	5.97 ± 4.30	0.806
DMF	12.89 ± 6.17	11.14 ± 4.80	0.025

In the evaluation of the life quality related to oral health, the total score of OHIP-14 of multiple sclerosis patients was 10.99 ± 9.38 and the control group was 10.44 ± 7.56, and statistically no significant relationship was found between the two groups (P = 0.081). The Mean ± SD of OHIP-14 ranges in each of the two studied groups are given in **Table 3**. As can be seen, in the first area, patients with multiple sclerosis revealed significantly more functional limitations than the healthy group (P = 0.032).

Table 3. Average total scores in OHIP-14 domains in the studied subjects.

OHIP-14 areas	Control group (N = 103)	Patients with MS (N = 103)	P-value
Functional limitation	0.67 ± 1.27	0.35 ± 0.79	0.032
Physical pain	2.43 ± 1.80	2.40 ± 1.65	0.904
Mental and emotional distress	2.26 ± 2.01	2.72 ± 2.00	0.098
Physical disability	1.66 ± 1.83	1.52 ± 1.60	0.544
Mental disability	1.86 ± 1.82	1.88 ± 1.69	0.937
Social disability	1.05 ± 1.53	0.85 ± 1.40	0.321
General disability	1.01 ± 1.63	0.68 ± 1.10	0.091

There was no significant difference between the average score of OHIP in men and women, so the average (standard deviation) of OHIP score in men was equal to 10.99 (9.38) and in women, it was equal to 10.40 (P = 0.65). The correlation value of people's age with OHIP score was not significant (P = 0.45, r = -0.05). There was no significant difference between the average score of OHIP in employed and unemployed individuals so the average (standard deviation) of OHIP score in unemployed individuals was equal to 11.81 and in employed individuals was equal to 9.89 (P = 0.12). There was no significant correlation between brushing frequency and OHIP score in individuals (P = 0.16, rs = -0.10). There was no significant relationship between the frequency of sweets consumption and OHIP score in individuals (P = 0.28, rs = 0.07).

A positive and significant correlation was found between the OHIP score and the number of decayed, fallen, and filled teeth (P = 0.002, r = 0.22). Regarding the number of times of flossing, a negative and significant relationship was also seen with the OHIP score (P = 0.02, rs = -0.17). Regarding the person's education, a negative and significant correlation was obtained with the OHIP score. In addition, using linear regression modeling, the effect of all variables on OHIP score was studied and the results are presented in **Table 4**. As can be seen, increasing age and increasing level of education were associated with lower OHIP scores while increasing the number of filled, decayed, and fallen teeth was associated with higher OHIP scores.

Table 4. The results of evaluating the effect of all variables on the OHIP score using a linear regression model.

Variable	Coefficient	Standard error	P-value
Group (People with multiple sclerosis)	-2.10	1.39	0.13
Gender (Female)	-1.44	1.36	0.29
Age	-0.16	0.07	0.02

Job (No job)	1.79	1.52	0.24
Education	-1.98	0.98	0.04
Brushing frequency	-0.19	0.88	0.82
Flossing frequency	-0.69	0.60	0.25
Frequency of consumption of sweets	0.61	0.79	0.44
The number of filled, decayed, and fallen teeth	0.39	0.11	< 0.001

Many studies have evaluated the effects of oral problems caused by common systemic diseases, including social and psychological effects such as the patient's performance and quality of life. In addition, in previous research, many studies have been conducted on the life quality or oral health of patients with MS. Questionnaires like OHIP-14 have not been done in MS patients.

It seemed that since MS is a systemic disease and similar to any other systemic disease, it involves different organs of the body, this disease affects the life quality related to oral health as well as reducing the quality of life. Nevertheless, the results of the current study showed that the average overall score of the OHIP-14 index of patients with MS and healthy people was not significantly different, and only in the first area, patients with MS had significantly more functional limitations than healthy people.

In previous studies, Covello *et al*. used the OHIP-14 questionnaire to investigate the life quality related to oral health in MS patients [20], but in the design of their study, they did not have a control group and only examined the average total scores of the questionnaire domains in Patients with MS were studied. The average total scores in areas 2, 3, and 4 in the present study were higher than Covello's study and lower in areas 1, 5, 6, and 7.

In the present study, the DMFT index was also investigated in both groups. The amount of this index in patients with MS was significantly higher than in the control group, and most of the previous studies agreed with this finding [4, 8]. In the studies of Symons *et al*., McGrother *et al*. and Kovač *et al*. the D index was lower, the F index was lower (except for the study by Symons *et al*.), and the M index was higher than in the present study [4, 8, 21].

It seems that the high prevalence of caries in these patients is due to a lack of awareness, poor oral hygiene, incorrect nutritional habits, and low motivation to maintain dental health in these patients. In addition, the high rate of caries in these patients shows that they have difficulty accessing restorative and preventive dental treatments [22]. It has been stated in previous articles that the physical inability to observe oral hygiene can be the reason for the higher rate of caries in these patients. These studies showed that 25% of MS patients were unable to clean their teeth and removable prostheses, a third of them had difficulty in maintaining oral hygiene, and 30% of them changed their dominant hand to brush their teeth due to MS symptoms. They gave [7, 8]. In addition, the amount of dental floss used in the group of sick people was less, which could be another reason for the high rate of caries in these people.

In the current study, among the many factors that affect oral health, the amount of use of toothbrushes, dental floss, consumption of sweets, and the level of interest in sweets were investigated. Regarding the frequency of flossing, there was a significant difference between the two groups, and people in the subject group used less floss. There was a significant difference between the two groups in terms of the level of education. In the patient group, people had less university education and more post-diploma education. In addition, in terms of employment, a significant difference was observed between the two groups. The rate of unemployment was higher in the patient group, which seems to be the reason for the higher rate of disability in this group.

Other factors affecting oral health include the side effects of drugs used in these patients, including xerostomia [23], which has a direct relationship with the level of caries [24], or corticosteroids, which cause osteoporosis [25].

In the present study, the relationship between the variables and the OHIP-14 score has also been examined. The analyses did not show a significant relationship between the OHIP-14 score and gender, occupation, brushing frequency, and sweets consumption. However, age, level of education, use of dental floss and mean DMF score had a significant relationship with OHIP-14 score. In addition, considering the effect of all variables together, only the mean score of DMF had an intra-group relationship with the life quality related to oral health. In the previous studies, the relationship between the variables and the OHIP-14 score was not investigated, and the present research is the first to investigate this.

The results of the present study show that although this disease can reduce the quality of life of patients, it does not have a clear effect on the life quality related to oral

health, and often, despite poor oral health conditions, it affects the state of eating, chewing and speaking. They feel satisfied. It seems that these people pay little attention to their oral health and do not have high expectations of their oral health due to psychological reasons considering other aspects of their disease.

Considering the characteristics of multiple sclerosis and the wide range of symptoms, conditions, and disabilities it causes for the patient, it is necessary to manage this condition with a multidisciplinary team approach of health service providers and health professionals. Dentists and oral health hygienists must continuously monitor the progress of the disease and apply the necessary treatments related to the oral problems of multiple sclerosis through a specific professional and home treatment plan coordinated with the attending physician. All members of the oral health team should participate in the oral health process, including recommendations, skill training, encouragement, and verbal support throughout the treatment phase, as they contribute to oral health, improve patient attendance at oral health clinics, and increase the overall health of the patient [6, 26, 27]. On the other hand, due to the emerging issue of the quality of life related to oral health and the lack of familiarity of the majority of people in society with this phenomenon, people may not have a correct understanding of the meaning of their answers.

Conclusion

Based on the findings of the present study, multiple sclerosis patients have high DMF levels and poor oral health, but they are satisfied with their oral health status. It seems that patients' satisfaction is because they do not have a correct attitude towards their oral health. However, multiple sclerosis affects some aspects of oral health-related quality of life, especially functional limitations.

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