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The impact of post-traumatic stress disorder on dental and gingival status of children during syrian crisis: A preliminary study

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Abstract

Aim: Most children in war zone countries often experience post-traumatic stress disorder (PTSD). This turns the war into a health issue of great importance. The aim was to evaluate dental and gingival status of children suffering from PTSD.

Methods: A case control study, which included 60 children (30 diagnosed with PTSD and 30 healthy controls) between 9 and 14 years, was undertaken. Dental status was assessed using decayed, missing, and filled teeth (DMFT) for permanent and decayed, missing and filled teeth (dmft) for primary. Gingival status was examined using plaque (PI) and gingival (GI) indices. Child PTSD reaction index (CPTSD-RI) was used to evaluate the severity of PTSD.

Results: There was no significant difference in DMFT and dmft indices between the PTSD children and the controls. However, PTSD children had more decay in permanent (DT) and primary teeth (dt), more primary missing teeth mt and less filled teeth in their permanent (FT) and primary (ft) dentition. Significant difference was found between PTSD children and controls regarding PI ($P < 0.00001$) and GI ($P < 0.0001$). CPTSD-RI was positively correlated with DMFT ($P = 0.002$), PI ($P = 0.038$), and GI ($P = 0.007$).

Conclusion: PTSD children had poor dental and gingival status than matched controls and they were affected by PTSD severity.

KEYWORDS

children, dental, gingival status, post-traumatic stress disorder, Syrian crisis

1 | INTRODUCTION

It is well-known that people located in an area exposed to war and conflict suffers from bad consequences in their health, especially mental health.¹ The Literature examining the effects of war on children has reported significant levels of psychiatric problems following exposure to conflict.² Post-traumatic stress disorder (PTSD) is a widespread³ psychiatric disorder that can occur following experiencing or witnessing of life-threatening events such as military combat, terrorist incidents, and other serious accidents.⁴

This debilitating condition has been an area of interest in the last decades.⁵

PTSD is a chronic illness; and it showed up in one large community survey that 53% of patients with PTSD remained ill at 5 years, and 40% were ill after 10 years beyond the trauma.⁶

Teenagers may present symptoms such as depression, increased fears, nightmares, and sleep disorders, psychosomatic symptoms, a sense of helplessness, aggressive behavior⁷ and problems at school.⁸ Younger children demonstrate regressive behaviors,⁹ poor concentration, addictive behavior, hyperactivity, and tantrums.⁷

Symptoms of PTSD may occur years after the traumatic event, although they can start within days.¹⁰ The first symptoms of PTSD include orofacial pain or discomfort, before the appearance of other physical or psychological signs and symptoms.¹¹

Nowadays, Syria is under a conflict and Syrian people are affected by this unexpected condition. Therefore, unsurprisingly, during the crisis, the number of outpatients in psychiatric clinic, with somatic symptoms and related disorders such as PTSD has increased.¹² Latifeh and Dashash addressed the critical importance of designing recovery oriented programs that can promote mental health and psychosocial well-being of Syrian people affected by crisis.¹²

Oral health, however, should be a part of those programs because war population surveys showed that exposure to severe stressors may culminate in significant deterioration of oral health.^{13,14} Given the physiological response to excessive or prolonged stress, it is hypothesized that PTSD can increase the risk of periodontal disease. Other issues may include orofacial and TMJ pain.¹⁵ It's also hypothesized that dental treatment per se is considered as a trigger for memories of the traumatic event and PTSD.¹⁶

Previous studies reported oral and dental health status among PTSD patients. The results of those studies indicated PTSD subjects as a high risk group for periodontal disease.^{17,18}

However, much of our knowledge about oral health in PTSD patients is based on studies of adults. It is clear that what we learn from research involving adults may not necessarily be applicable to children and adolescents. Moreover, evaluating the dental and gingival status of pediatric patients suffering from PTSD has not been studied yet. Therefore, the recent study aimed to explore dental and gingival status of children suffering from PTSD during Syrian crisis and compare it with healthy children.

2 | MATERIALS AND METHODS

2.1 | Ethical approval

The recent study was approved by the Research Committee, Faculty of Dentistry, Damascus University.

2.2 | Study population

A total of 60 children aged 9-14 years participated in this study and were categorized into study or control group. The study group included 30 patients (11 boys vs 19 girls) who attended the Department of Psychiatry in Children's Hospital in Damascus, and met the full criteria for PTSD. Controls were 30 (14 healthy boys and 16 girls) who attended the Department of Pediatric Dentistry at the Faculty of Dentistry in Damascus University.

Diagnosis of PTSD was undertaken by two independent psychologists, through interviewing children according to the Fifth edition of Diagnostic and Statistical Manual of Mental Disorders (Structured Clinical Interview, DSM-V, PTSD part) which was approved by American Psychiatric Association.⁴

The widely used 20 item child post-traumatic stress reaction index (CPTSD-RI) questionnaire was also used in order to evaluate the severity of PTSD. The CPTSD-RI is a self-report questionnaire designed to assess PTSD reactions in children and adolescents aged 6-16 years old. The scale has been found to be valid in detecting PTSD according to psychiatric diagnostic classification.¹⁹ Items were rated on a 0-4 likert scale. The scale includes the absence of PTSD (between 0 and 11), mild PTSD (12-24), moderate PTSD (25-39), severe PTSD (40-59), and very severe PTSD (>60). Previous studies suggested that a score of 40 or more is closely related to the diagnosis of post-traumatic stress.²⁰ The CPTSD-RI is the most widely used measure of childhood PTSD after an exposure to a broad range of traumatic events such as natural disasters, war, life threatening illness, or sexual abuse.²¹ The instrument has been used internationally and in two Middle Eastern countries (Egypt and Palestine).²² The scale has been translated into Arabic and validated for this culture.^{23,24} Reliability of the scale in the recent study was ($r = 0.81$).

PTSD children were included in this study if they did not receive any treatment, or medication, before oral examination. Exclusion criteria included all children who already have other psychiatric disorders and those refused to be part of this study. Participants in the control group were randomly selected using systematic sampling method by choosing every third child entering the department. Then only healthy children with a CPTSD-RI score between (0-11) were included until the control were completed to 30 participants.

2.3 | Informed consent

A covering letter together with a consent form was provided to the parents explaining the rationale for the study and only if signed consent was received the child was enrolled in the study. Confidentiality was assured to patients in the consent letter. All data collected would remain strictly confidential.

2.4 | Clinical data

The clinical data were obtained by the same calibrated dentist. Oral examination was performed by (S.H.) according to World Health Organization guidelines²⁵ at the psychiatric clinic using standard room lighting with the child sitting on a normal chair. Dental status was recorded using the decayed/missing/filled teeth (DMFT) index for the permanent dentition and (dmft) for primary ones. The Mean scores of DMFT and dmft were calculated for each individual by adding D, M, and F or d, m, and f. Increased score means greater decay. The mean DMFT scores provide an estimate for dental caries prevalence.²⁵

Gingival status was assessed using plaque and gingival indices. Plaque index (PI) evaluates the thickness of plaque growth at the gingival margin of the teeth. Plaque levels give a good indication of tooth brushing habits and it is a useful tool to monitor oral hygiene.²⁶ Gingival index (GI) is one of the most commonly used indices for assessing the status of gingival health or inflammation.²⁷ Each of the buccal, mesial, lingual, and distal surfaces of the tooth surface in PI and the gingival

TABLE 1 Sample characteristics of all children according to group, gender, mean age and mean CPTSD-RI scores

Gender	PTSD group			Control group		
	n (%)	Mean Age \pm SD	Mean CPTSD-RI \pm SD	n (%)	Mean Age \pm SD	Mean CPTSD-RI \pm SD
Male	11 (36.76%)	11.09 \pm 1.45	43.27 \pm 15.3	14 (46.76%)	10.36 \pm 0.93	5.57 \pm 3.63
Female	19 (63.33%)	11.32 \pm 1.11	55.32 \pm 16.83	16 (53.33%)	10.44 \pm 0.89	6.06 \pm 3.94
Total	30 (100%)	11.23 \pm 1.22	50.9 \pm 17.07	30 (100%)	10.40 \pm 0.89	5.83 \pm 3.74

CPTSD-RI, child post-traumatic stress disorder reaction index; PTSD, post-traumatic stress disorder; SD, standard deviation.

TABLE 2 Mean and 95% CI of DT, MT, FT, DMFT, dt, mt, ft, dmft indices for permanent and primary teeth according to groups

Variable	PTSD			Controls			Group difference	P-value
	Mean	SD	95% CI	Mean	SD	95% CI		
DT	2.76	1.97	2.06, 3.47	1.76	1.43	0.10, 1.89	1.00	0.02*
MT	0.26	0.44	0.11, 0.42	0.36	0.55	0.16, 0.36	0.10	0.44
FT	0.10	0.30	0.00, 0.23	0.76	0.85	0.32, 0.99	0.66	0.000**
DMFT	3.13	2.09	1.63, 2.42	2.90	1.91	0.80, 1.27	0.23	0.65
dt	2.56	1.40	2.05, 3.07	1.43	1.31	0.43, 1.83	1.13	0.002**
mt	1.00	1.11	0.62, 1.43	0.40	0.49	0.14, 1.05	0.60	0.01*
ft	0.23	0.43	0.09, 0.41	1.13	1.43	1.45, 0.34	0.90	0.002**
dmft	3.80	2.32	2.09, 3.05	3.00	2.46	0.43, 2.03	0.80	0.20

CI, confidence interval; DT, decayed teeth; MT, missing teeth; FT, filled teeth; DMFT, decayed missing and filled teeth for permanent dentition; dt, decayed teeth; mt, missing teeth; ft, filled teeth; dmft, decayed, missing and filled teeth for primary dentition; PTSD, post-traumatic stress disorder; SD, standard deviation.

* $P < 0.05$, ** $P < 0.01$ two sample t test, difference between groups.

tissues in GI is given a score of 0-3. The scores in the both indices may be added and divided by the number of teeth examined to derive the GI or PI for the individual. Total PI and GI scores then have been classified into mild (0-1), moderate (1.1-2), and severe (2.1-3).

2.5 | Statistical analysis

The Statistical Package for Social Science (SPSS, Chicago, IL, USA version 20) was used for the analysis of data. Categorical variables are presented as number of patients (%) and continuous variables are shown as means and standard deviation. Two-tailed Student's t test for independent samples was used to test the differences between the groups for parameters expressed as mean. 95% confidence intervals were also calculated. Differences in the categorical variables and frequency were tested by chi-squared test or Fisher's exact test whichever was appropriate. The significance level was set at 0.05. In order to study the correlation between PTSD severity in the study group and other variables, Pearson's correlation coefficients was used.

3 | RESULTS

The recent study consists of two groups (30 subjects in each group). (Table 1) shows distribution of the participants in PTSD and control

groups according to gender, mean age and mean CPTSD-RI scores. 63.3% of participants in PTSD group ($n = 19$) and 16 (53.33%) in the control group were females. The mean age of PTSD children was (11.23 \pm 1.22 years) and was (10.40 \pm 0.89 years) in the control group. There were no significant differences between the two groups according to gender ($P = 0.44$) and age ($P = 0.06$). Mean CPTSD-RI score for PTSD group was (50.9 \pm 17.07) which indicates moderate PTSD symptoms among this group. Meanwhile, the mean CPTSD-RI score for the control group was (5.83 \pm 3.74) indicating no level of PTSD among this group. Females showed higher scores of CPTSD-RI comparing to males with no significant differences.

The findings of the present study showed that there was no significant difference ($P > 0.05$) in DMFT index between the PTSD children and the controls (3.13 + 2.09 vs 2.90 + 1.91). No significant difference reported between PTSD and control groups (3.80 \pm 2.32 vs 3.00 \pm 2.46) for dmft index (Table 2).

However, results showed that PTSD children had more decayed teeth (DT) and less filled teeth (FT) than controls in their permanent dentition ($P < 0.05$, $P < 0.00001$). There was no significant difference between groups in terms of missing teeth ($P > 0.05$). Similarly, PTSD children had more decayed and missed primary teeth (dt), (mt), and less filled teeth (ft) than controls ($P < 0.01$). (Table 2) shows DMFT, DT, MT, and FT indices for permanent teeth and dmft, dt, mt, ft indices for primary teeth in PTSD and control groups.

Plaque index (PI) was classified as moderate in (73.33%) of PTSD children and severe in (16.67%), while most of the controls had mild PI (70%) and none had severe PI. Significant differences were assumed between PTSD children and the controls regarding plaque index ($P < 0.00001$). Table 3 shows PI values for PTSD and control groups.

Similarly, there was significant difference between the two groups according to gingival index ($P < 0.0001$). Almost one third (33.34%) of PTSD children ($n = 10$) showed severe gingivitis according to their gingival index (GI) with a majority had moderate gingivitis ($n = 16$, 53.33%), whereas (70%) of the controls ($n = 21$) had mild gingivitis (Table 4).

A moderate positive correlation was found between DMFT scores and CPTSD-RI ($r = 0.533$, $P = 0.002$). However, there was no correlation between PTSD severity and dmft scores. In another hand, there was a positive, but weak, relation between CPTSD-RI and PI ($r = 0.380$, $P = 0.038$). Meanwhile, a strong positive correlation was found between CPTSD-RI and GI scores ($r = 0.721$, $P = 0.000$). Results are shown in (Table 5).

4 | DISCUSSION

Oral, mental, and physical health are not separate entities and recognizing the importance of their interrelation is of critical importance. Mental illnesses can lead to poor oral health, which proves the strong interaction between oral and mental health.²⁸ Patients with mental illness are prone to develop dental problems. This may be owing to general self-negligence associated with mental illness, fear of treatment, inability to access dental health services.²⁹ In addition, dental patients with a history of traumatic experiences are more likely to engage in negative health habits.³⁰

The modern stressful way of life which related to military conflicts around the world will make more patients suffering from mental illnesses especially PTSD.³¹ PTSD is one of the most frequently reported mental health consequences of exposure to war experience.^{32,33}

PTSD is a complex neurological, biochemical, and psychological disorder that affects oral health and dental care of patients.^{34,35}

Recently, findings about prevalence of PTSD among Syrian children during Syrian crisis in the national level are unknown; still,

TABLE 3 Number and percent of children in PTSD and control groups according to plaque index classification

PI classification	PTSD group		Control group		P-value*
	n	%	n	%	
Mild	3	10.0	21	70.0	0.000
Moderate	22	73.3	9	30.0	
Sever	5	16.7	0	0	
Total	30	100	30	100	

(n,%) number and percent of children; PTSD, post-traumatic stress disorder; PI, plaque index.

*Fisher exact test, difference between groups.

Dental hygienists will definitely encounter patients with PTSD, in the operatory. Thus, understanding the possible effects of this disorder on oral health and treatment delivery is a key to developing successful approaches to provide oral health care.

As a result, learning how to treat the whole person expands and elevates the practice of dental hygiene especially when we are already aware that symptoms of PTSD may worsen with the passage of time.³⁶

To the best of our knowledge, there were no previous studies about oral health status of pediatric patients with PTSD. The recent study provides preliminary results regarding dental and gingival health among children suffering from PTSD during the Syrian crisis.

Evaluating dental caries prevalence and gingival status among PTSD patients was the main goal of our study since they are the most common diseases that affect the oral health.²⁸

Children of both groups completed CPTSD-RI in order to confirm the diagnosis and severity of PTSD symptoms.

Our findings showed that although there was no significant difference between the two groups, PTSD group had a higher DMFT index compared to control group. This was similar to the findings in a study conducted by Muhvic-Urek et al¹⁷

The same goes for dmft index where the PTSD group had higher values compared to controls with no previous data in the literature about the caries experience of primary teeth among this population. Subjects in PTSD group had more decayed and less filled teeth ($P < 0.05$, $P < 0.001$) compared with the control Subjects, but no difference reported regarding missing teeth. Muhvic-Urek et al

TABLE 4 Number and percent of children in PTSD and control groups according to gingival index classification

GI classification	PTSD group		Control group		P-value*
	n	%	n	%	
Mild	4	13.3	21	70.0	0.000
Moderate	16	53.3	7	23.3	
Sever	10	33.4	2	6.7	
Total	30	100	30	100	

(n,%) number and percent of children; PTSD, post-traumatic stress disorder; GI, gingival index.

*Fisher exact test, difference between groups.

TABLE 5 Pearson's correlation between CPTSD-RI scores and DMFT, dmft, PI and GI

Variables	DMFT	dmft	PI	GI
CPTSD-RI	0.533**	0.161	0.380*	0.721**
Significance (2-tailed)	0.002	0.394	0.038	0.000

CPTSD-RI, child post-traumatic stress disorder reaction index; DMFT, decayed missing and filled teeth for permanent dentition; dmft, decayed, missing and filled teeth for primary dentition.

*Pearson's correlation is significant at the 0.05 level (2-tailed).

**Pearson's correlation is significant at the 0.01 level (2-tailed).

reported similar results except for missing teeth being higher among the PTSD group.¹⁷

In primary dentition, PTSD group had more decayed and missed primary teeth and less filled ones. Possible explanations for having more decays and less fillings may be due to less access to dental care, fear of treatment, negligence and/or having PTSD therapy as a priority in the parents' point of view.

Plaque and gingival scores in this study indicated poor oral health among PTSD children and were significantly lower compared to the control group ($P < 0.00001$ for PI and $P < 0.0001$ for GI). Muhvic-Urek et al and Haban et al reported similar results in Croatian adult patients suffering from PTSD.^{17,18} Other findings by Baker in 2001 also reported that PTSD patients also had significantly more tooth plaque and gingivitis compared to patients without PTSD.³⁷

Berk et al also found similar results and explained that during the oftenencountered depressive aspect of this disorder, personal hygiene tends to be ignored. The patients disregard previously learned oral hygiene habits and are at an increased risk for caries and periodontitis.³⁸ In addition, previous studies have suggested that the periodontal health of patients with PTSD, with the effect of poorer oral hygiene, is compromised by stress and hyper inflammatory reactions.³⁸⁻⁴⁰ Muhvic-Urek et al found that PI index for 78% of PTSD patients scored a value between 2-3 (High accumulation); while in the recent study the accumulation of plaque tends to score a moderate value (1.1-2) in 73.33% of the patients. Muhvic-Urek et al explained that chronic PTSD and chronic stress suppresses the immune system so that this system is no longer able to respond effectively against infective diseases like caries and periodontal disease.¹⁷ However, our results were in disagreement with a study conducted in Brazil where no difference between PTSD patients and controls regarding periodontal status.⁴¹ This contrast may be due to using different periodontal clinical evaluation by the latter study such as probing pocket depth (PPD), clinical attachment level (CAL), bleeding on probing (BP).

In the recent study, there was significant difference in the distribution of PI and GI values between males and females. However, female tended to have higher PI and GI values compared to males (data not shown).

Findings of the recent study suggested that severity of PTSD symptoms might influence dental and gingival status. Positive relationships between PTSD severity and DMFT, PI and GI were found in the recent study. Therefore, patients with severe PTSD levels had higher DMFT, GI, and (somehow) PI scores. These results may be explained by altered immune responses that facilitate increased colonization by pathogenic bacteria and the breakdown of the periodontal attachment accompanied with PTSD.⁴²

Generally, people with mental illness have increased risks of dental disease due to fear, costs, habits, lifestyle choices, distrust of dentists, negative past experiences, or stigma felt at a dentist visit. In fact, one limitation of the recent study has been the small sample size. Some parents did not accept to include their children in the study despite their knowledge that taking part in the project

is confidential "We don't want anyone to find out about our child psychiatric illness", they explained, so findings of the recent study could not be generalizable.

Although some communities accept the fact that psychiatric consultation is a good way to make you mentally healthy, it is still unacceptable behavior in other countries fearing of stigma and discrimination. Another limitation was that treating with these children in order to obtain oral examinations have never been an easy matter because of the isolation and avoiding symptoms shown by those patients besides the phobia of dental treatment and dentist that already existed in some of PTSD children. This has made increasing the sample impossible.

5 | CONCLUSION

It can be concluded that the oral health condition in PTSD children was significantly affected when compared to the controls. Subjects in PTSD group had poor dental and gingival status compared to controls. Furthermore, the higher the severity of PTSD symptoms, the poorer dental and gingival status gets. Therefore, dentists, in concert with physicians, have much to offer to young patients with PTSD.⁴²

Conflict and war may damage a child's environment and subsequently impair a child's ability to recover from a traumatic event.² This paper provides a closer look into two aspects of dental and gingival status of group of Syrian children suffering from PTSD. Understanding the mental and oral health status could make the experience of being in a war zone less damaging for those children.

CONFLICT OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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