Effect of Susceptibility to Depression on Periodontal Health Indicators Among University Students

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Abstract

Objective: This study was conducted to investigate the relationship between the susceptibility to depression and gingival health among Jordanian university students.

Methods: Two hundred and sixty four participants were recruited for this study (135 females and 129 males, mean age = 21.4 years ± 1.9 years). The Zung Self-rating Depression Scale (ZSDS) was used to determine psychologically the perception of depression. The level of oral hygiene was assessed using a survey followed by a clinical oral examination.

Results: Data showed a significant association between the susceptibility to depression and the plaque index and gingival index. A significant relationship was also observed between the susceptibility to depression and some oral hygiene habits like brushing teeth, regular dental visits and frequency of brushing. According to the stepwise logistic regression model, both the gingival index and regular dental visits had a significant positive correlation with the susceptibility to depression.

Conclusion: The susceptibility to depression among Jordanian university students had an adverse effect on gingival health and oral hygiene behaviours.

Keywords: Susceptibility to depression, gingival inflammation, probing pocket depth, oral hygiene behaviors, university students.

(J Med J 2012; Vol. 46 (3):258-266)

Received	***Accepted***
December 28, 2011	*February 28, 2012*

Introduction

The contribution of psychological factors to the development and progression of periodontal disease has recently become an area of increased research activity.[1–4] Research showed variations in the severity of periodontal disease and its response to therapy which is influenced by many individual factors, such as coexisting systemic conditions, genetics, smoking, and oral hygiene.[3]

Studies indicated that there may be strong relationships between stress, depression and periodontal disease demonstrating convincing linkages between depression and elevated cortisol levels, neglect of oral hygiene, pocket depth, attachment loss, and tooth loss.[1–4] These findings have important clinical implications because they suggest that addressing psychological factors such as stress and depression represent an important part of overall preventive periodontal maintenance and, more importantly, may also prevent oral inflammation from developing into systemic inflammation in susceptible individuals.

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Stress is part of human suffering but due to social differences, its impact varies in severity on individuals.[5] However, stress, in itself, may not be a risk to health provided that individuals adequately control and adjust themselves to the environment.[6] Negative psycho-social conditions may lead to an individual's failure to adapt to stress. [7] Coping mechanisms and social support may significantly modify and alleviate the level of stress. [8, 9]

Stress is one of the leading predisposing factors in the development of anxiety and depression.[10] Depression is probably the most widely known psychiatric disorder and has been labeled the 'common cold' of psychopathology. Depression is of various degrees ranging from mild to severe.[11] There are proposed mechanistic links for stress and depression: one biological and the other behavioural.[4] The biological mechanism emphasizes how stress and depression can reduce the immune system function and facilitate chronic inflammation, especially since depression is associated with inflammation.[12] The behavioral mechanism emphasizes that people suffering from stress and depression may increase poor health behaviors, such as smoking or drinking more frequently, consuming an unhealthy diet, irregular tooth brushing, irregular dental attendance, and neglecting oral hygiene. This leads to increased plaque accumulation which is the primary etiological factor for periodontal disease [13, 14] and decreased resistance of the periodontium to inflammatory breakdown. So, maintenance of good oral hygiene is essential in dental health promotion.[15, 16]

This study aimed to assess the effect of the susceptibility to depression with levels of oral hygiene behaviors and their effect on gingival inflammation and periodontal parameters, among the young Jordanian population.

Materials and Methods

Participants

The study consisted of three hundred adult students who were randomly selected from those who attended the Students' Dental Clinics at the University of Jordan in Amman. Participants' ages ranged between 18 to 23 years (mean age = 21.4 years ± 1.9 years). Students who had diabetes, a respiratory tract infection and/or antibiotic treatment within the previous 3 months were excluded. Only two hundred and sixty four students were eligible to participate in the study. All participants had not received previous periodontal treatment.

Data Collection

All subjects completed a self-reported oral hygiene questionnaire including questions about age, gender and oral health behaviour [i.e. daily tooth brushing, frequency of brushing (coded as: 0 = none, 1 = once daily, 2 = twice daily), flossing, using mouth wash, and regular dental visits "every 6 months"].

In addition, depression symptoms were measured using the Zung Self-rating Depression Scale (ZSDS) [17], which was filled out by each subject. The ZSDS includes 20 questions each with four specified alternative answers. Each answer is given a score ranging from 1 to 4. The sum score of the points ranges from 20 to 80. The severity of depressive symptoms was determined using the cut-off points (≤ 39, ≥ 40) as suggested by Zung,[17] such that individuals scoring ≤ 39 were considered as having low stress and those scoring ≥ 40 were considered to have high stress . Depressed individuals usually score between 50 and 69. A high score of ZSDS was regarded as a level of depressive symptoms of potential clinical significance and not as a clinical diagnosis of depression.

Oral Examination and Diagnostic Criteria

After filling both questionnaires, all participants were clinically examined by a consultant periodontist. The status of the periodontium was assessed using the following clinical periodontal indices measured for all students: the plaque index (PI) of Silness and Löe,[18] the gingival index (GI) of Löe and Silness,[19] and probing pocket depth (PPD) measured to the nearest millimetre at each of the 6 sites of every present tooth (mesio-buccal, mid-buccal, disto-buccal, mesio-lingual, mid-lingual, and disto-lingual) which were only recorded if ≥ 5mm. Third molars were excluded.

Intra-observer reliability was verified by 20 subjects who were randomly chosen for re-examination on two subsequent days.

Statistical Analysis

The statistical package SAS software version 9 (SAS Institute Inc., NC, USA) was used for data processing and analysis. Frequency distribution and cross-tabulation were used to describe and analyze the variation in the distribution of the variables. Statistical data analysis included Chi-square test of association which was used to assess the association between the categorized variables and the severity of depression symptoms. Stepwise logistic regression was used to screen out significant variables on the susceptibility to depression. Cronbach's alpha was calculated to examine intra-observer variability to measure the reliability of the periodontal parameters.

For all statistical analysis, the significance level was set at $P \leq 0.05$.

Results

The total study sample consisted of 135 (51%) females and 129 (49%) males with a mean age 21.4 ± 1.9 years.

Of the total students, 81% brushed their teeth with mean brushing frequency of 1 ± 0.5, 52 % visited the dentist regularly, 35 % used mouthwash and only 10 % used dental floss. One hundred and three participants (39 %) were highly susceptible to depression.

The clinical examination revealed that of the total students, 4.9% had healthy gingiva (0), 45.8% suffered mild gingivitis (1), 20.5% had moderate gingivitis (2) and 28.8% had severe gingival disease (3). Meanwhile, 3.4% of participants had periodontal pockets ≥ 5mm. In addition, 27.7%, 45.1%, and 27.3% had (≤ 1), (> 1-2) and (> 2-3) plaque accumulation, respectively.

Susceptibility to depression was found to be significantly associated with the following variables: brushing teeth, regular dental visits and frequency of brushing as shown in Table (1).

Results also revealed a significant association of susceptibility to depression with PI and GI.

'High susceptible to depression' participants had more gingival inflammation and plaque accumulation than 'low susceptible to depression' participants as seen in Table (2).

The logistic regression test showed that the gingival index and maintaining regular dental visits were the most significant variables affecting the susceptibility to depression as shown in Table (3).

Intra-examiner Reliability

Of the total number of duplicate measurements, the exact agreement was 93 % for PPD, 95 % for PI and 89 % for GI.

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Table (1): Association Between Oral Hygiene Methods and Susceptibility to Depression.

		Susceptibility to Depression		
		High (*n* = 103)	**Low (*n* = 161)**	**P- value**
		n (%)	n (%)	
Brushing teeth	Yes	75 (72.8)	138 (85.7)	**0.0096**
	No	28 (27.2)	23 (14.3)	
Flossing	Yes	10 (9.7)	17 (10.6)	0.8240
	No	93 (90.3)	144 (89.4)	
Using mouth wash	Yes	33 (32.0)	58 (36.0)	0.5062
	No	70 (68.0)	103 (64.0)	
Regular dental visits	Yes	40 (38.8)	96 (59.6)	**0.0010**
	No	63 (61.2)	65 (40.4)	
Frequency of brushing	0	27 (26.2)	23 (14.3)	**0.0006**
	1	72 (69.9)	109 (67.7)	
	2	4 (3.9)	29 (18.0)	

n= number of subjects

Table (2): Clinical Parameters and Susceptibility to Depression.

		Susceptibility to Depression		
		High (*n* = 103)	**Low (*n* = 161)**	**P- value**
		n (%)	n (%)	
Plaque index	**≤ 1**	22 (21.4)	75 (46.6)	**0.0265**
	>1-2	44 (42.7)	51 (31.7)	
	> 2-3	37 (35.9)	35 (21.7)	
Gingival index	**0**	4 (3.9)	9 (5.6)	**0.0010**
	1	34 (33.0)	87 (54.0)	
	2	22 (21.4)	33 (20.5)	
	3	43 (41.8)	32 (19.9)	
Probing depth	**≥ 5mm**	6 (5.8)	3 (1.9)	0.0836
	< 5mm	97 (94.2)	158 (89.1)	

n= number of subjects

Table (3): Results of Stepwise Logistic Regression for Susceptibility to Depression.

	Odds ratio	***Odds ratio 95% confidence limits***	***P- value***
Gingival index	*0.642*	*(0.481 - 0.856)*	***0.0001***
Regular dental visits	*0.543*	*(0.319-0.927)*	***0.0243***

Discussion

Psychosocial factors have been suggested by several studies to contribute to an increased susceptibility to periodontal disease.[20- 23] In this study, we investigated the relationship between the susceptibility to depression and oral health, gingival inflammation and periodontal disease.

The ZSDS [24] has been primarily designed for screening depressive symptoms among middle-aged populations but is widely used in clinical studies among different age groups. Its psychometric properties have been tested and found to be acceptable.[25] A high score of ZSDS is not used for clinical diagnosis of depression but rather as an assessment of the level of depressive symptoms of potential clinical significance.[26] It has been shown that ZSDS is a valid and sensitive measure of clinical severity in depressed patients. Fountoulakis et al. [27] have studied the reliability, validity and psychometric properties of ZSDS and found that for the cut-off of 39/40, ZSDS had a sensitivity of 95 % and a specificity of 83.3 %.

The questionnaire was modified to fit the cultural built of the population. Question number 6 of the ZUNG test (I still enjoy sex) was not asked because it was not suitable for our country.

The frequency of depressive symptoms among periodontitis subjects in this Jordanian sample was notably low (5.8%), when compared with the results reported for other populations. For example, Coyne et al. [28] reported a frequency of 6.6 % in a US population in Michigan, Elter et al. [29] reported a frequency of 12.2 % in another US population, while Simon and von Korff [30] reported a frequency of 13.5 % in primary care patients in Washington. This difference may be attributed to differences in the demographic makeup of the populations under study (age, gender, education level and race), leading to different social trends in addition to differences in economic factors between various populations.

In this study, there was no significant relation between periodontal health, represented by probing pocket depth ≥ 5mm and susceptibility to depression. This may indicate that depressive symptoms have no effect on periodontal health in the population examined especially that the age of our group sample (18-23 years) is relatively young for pocket formation of chronic periodontal disease. Our results were in agreement with results of other researchers like Vettore and Castro who did not report an association between stress, depression symptoms and periodontitis.[31, 32]

In contrast, other studies have reported a significant relation between depressive symptoms and periodontal disease. For example, Genco, Ng and Keung Leung, Sateesh, Moss and Sanders found that psychological stress had emerged as a significant risk indicator of clinical signs of periodontitis.[33- 37]

As for gingivitis, the present study reported a significant relation between depressive symptoms and gingival disease, observing that subjects highly susceptible to depression had more plaque accumulation and gingival inflammation compared to low depressive subjects agreeing with results of Johannsen et al. [38] who observed that women with stress-related depression had more plaque accumulation, GI and increased levels of IL-6 and cortisol in gingival crevicular fluid (GCF), compared with normal controls. We also agreed with the results of Hugo and Fehrenbach who showed that caregivers of people under physical or psychological stress, as well as those with the conditions themselves, were prone to elevated biofilm plaque levels and increased gingivitis.[39, 40]

In contrast, the results of Trombelli found that there were no significant relationships between plaque-associated gingival inflammation and psychological variables.[41] Also, Monteiro Da Silva did not find a significant relation between the average of plaque index scores and total perceived stress in a case control study.[42]

Furthermore, when oral health behaviors were analyzed, the results of the present study showed that highly depressed individuals practiced less oral hygiene methods (brushing, flossing, use of mouth wash and regular dental visits) thus had poorer oral hygiene and poor compliance with dental care than low-depressed individuals with a significant association between susceptibility to depression and brushing teeth, regular dental visits and frequency of brushing. Our results agreed with many researches who have clearly demonstrated that there was a significant relationship between depression and oral health.[38, 42- 52]

After controlling for confounding factors, logistic regression analysis demonstrated a significant association between susceptibility to depression with both the gingival index and maintaining regular dental visits.

Discrepancies in results between this particular study and others may be due to the differences in the controlled variables: stress level, sampling strategies, study design, and age range.

Conclusion

Susceptibility to depression among Jordanian university students had an adverse effect on oral health indices such as GI and PI. It also affected the frequency and efficiency of oral hygiene behaviours.
Special emphasis on oral health practices is of great importance for patients with depression symptoms.

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A copy of the Zung Self-rating Depression Scale (ZSDS) used in this study.

Make check mark (/) in appropriate column	***A little of the time***	***Some of the time***	***Good part of the time***	***Most of the time***
1. I feel down-hearted				
2. Morning is when I feel the best				
3. I have crying spells or feel like it				
4. I have trouble sleeping at night				
5. I eat as much as I used to				
6. I still enjoy sex				
7. I notice that I am losing weight				
8. I have trouble with constipation				
9. My heart beats faster than usual				
10. I get tired for no reason				
11. My mind is as clear as it used to be				
12. I find it easy to do things I used to do				
13. I am restless and can't keep still				
14. I feel hopeful about the future				
15. I am more irritable than usual				
16. I find it easy to make decisions				
17. I feel that I am useful and needed				
18. My life is pretty full				
19. I feel that others would be better off if I were dead				
20. I still enjoy the things I used to do				

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أثر الضغط النفسي والإستعداد للكآبة على صحة الأنسجة الداعمة للأسنان عند طلبة الجامعات

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الملخص

الهدف: يهدف هذا البحث إلى دراسة العلاقة بين الإستعداد للكآبة والصحة الفموية عند طلبة الجامعة في الأردن.

الطريقة: اعتمد البحث على معلومات من (٢٦٤) مشارك في الدراسة (١٣٥ أنثى و ١٢٩ ذكر)، حيث كان معدل العمر ٢١.٤±١.٩ سنة. ولقد تم استخدام مقياس زونغ الذاتي Zung لتحديد مستوى الإستعداد للكآبة. كما تم تحديد مستوى الصحة الفموية عن طريق الاستبانة ثم الفحص السريري.

النتائج: اظهرت البيانات وجود ارتباط ذو دلالة إحصائية بين الإستعداد للكآبة وكل من مؤشر اللويحة الجرثومية ومؤشر أمراض اللثة. كما أظهرت البيانات وجود ارتباط ذو دلالة إحصائية بين الإستعداد للكآبة وبعض الطرق المتبعة للحفاظ على الصحة الفموية، مثل استخدام فرشاة الأسنان وعدد مرات التفريش اليومي وكذلك الزيارات الدورية لطبيب الأسنان. وقد أظهر تحليل الإنحدار اللوجستي أن كل من مؤشر أمراض اللثة والزيارات الدورية لطبيب الأسنان هما أهم عاملين لهما ارتباط دال إحصائياً بالإستعداد للكآبة.

النتيجة: يُعد الإستعداد للكآبة عند طلبة الجامعات في الأردن أثراً سلبياً على الطرق الصحية المتبعة للعناية بالفم والأسنان ومن ثم على الصحة الفموية.

الكلمات الدالة: الإستعداد للكآبة، الإلتهاب اللثوي، عمق الجيوب اللثوية، الطرق المتبعة في الصحة السنية، طلبة الجامعات.