

Depression status in relation to caries experience and salivary physiochemical characteristics among 15 years old students in Al-Swera city – Wassit Governorate-Iraq

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ABSTRACT

Background: Depression is a common mental disorder that presents with depressed mood; it can become chronic or recurrent and affect dental health. Thus this research aimed to assess the prevalence and severity of dental caries among students with different grade of depression in relation to physicochemical characteristics of stimulated whole saliva.

Materials and methods: The total sample involved for depression status assessment is composed of 800 students for both gender aged 15 years old that were selected randomly. This was performed using children depression inventory (CDI) index that divided the students into four groups of depression (low or average grade, high average grade, elevated grade and very elevated grade). The diagnosis and recording of dental caries was by using decay, Missing, Filled surface index (DMFs); and according to the criteria of Manji et al (1989), Salivary samples were collected from 30 student with very elevated grade of depression and 30 from low or average grade under standardized conditions, then analyzed for measuring salivary flow rate and viscosity, in addition to estimation salivary elements that includes total protein, zinc, copper, chromium and Lithium.

Results: the data of the present study showed that the percentage of Caries free students was higher among very elevated grade (8.60%) followed by low or average grade (8.52%), the less was among elevated grade of depression (5.04%). Concerning caries experience, the highest result was among elevated grade of depression followed by low or average grade, the lower result was among high average grade. While the severe grade of dental caries (D₄) was found to be highly significant differ among different grade of depression, The data analysis of salivary elements found that the protein was higher in very elevated grade than low or average grade while other elements show the opposite result with significant concerning copper and zinc among very elevated grade that show significant difference. DMFs correlated negatively with salivary flow rate among low or average grade and very elevated grade; while concerning salivary viscosity, the correlation was direct with DMFs. With highly significant in very elevated grade, Salivary elements show positive relation with not significant except copper that show negative relation with significant.

Conclusion: The results of the current research revealed that depression status had an adverse effect on salivary physicochemical characteristics and dental status including caries experience

Key words: Depression, dental caries, salivary elements. (J Bagh Coll Dentistry 2015; 27(2):158-162).

INTRODUCTION

Depression is a common mental disorder that presents with depressed mood, loss of interest pleasure, decreased energy lead to substantial impairments in an individual's ability to take care of his or her everyday responsibilities⁽¹⁾. Depression is an important cause of morbidity, and the World Health Organization (WHO) has predicted that depression will be the second leading contributor to the global burden of disease⁽²⁾. Variety of studies indicated there is a relation between depression and concentration of different nutritional and toxic elements in human body (total protein, zinc, copper, chromium and lithium)⁽³⁻⁷⁾.

Dental caries is one of the most common, communicable and intractable infectious disease in human⁽⁸⁾. Dental caries is strongly age-related, as there is an often an increase in severity and prevalence with increase age⁽⁹⁾.

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Adolescence can be defined as a major life stage in which a child matures physically into an adult⁽¹⁰⁾. Psychological changes begin during puberty and continue through adolescence directly affected nutritional status and nutritional needs⁽¹¹⁾.

Depression is always connected with a declined metabolism of serotonin, which is later linked to the high carbohydrate intake. This lays the foundation for favorable conditions for the development of acid uric bacteria. The existence of a high prevalence of these bacteria indicates the growth and progression of dental caries⁽¹²⁾.

Many of protein molecules secreted by the salivary glands are of extreme importance in protecting the integrity of the teeth⁽¹³⁾, they found a significant effect of zinc salts rinsing in decreasing Streptococcus Mutans counts⁽¹⁴⁾. Thus, several researches found inverse correlation of salivary zinc with dental caries^(15,16), whereas the elements copper and lithium present in food or water protect the teeth and act as cariostatic⁽¹⁷⁾, whereas Cr ions may play a role in improving mineralization and crystallinity of teeth⁽¹⁸⁾.

Saliva is a biologic fluid in the oral cavity, composed of a mixture of secretory products from the major and minor salivary glands⁽¹⁹⁾, reduced salivary flow rate and hyposalivation leading to oral dryness might be the effect of psychological processes (anxiety, stress, depression etc.)⁽²⁰⁾.

There is a negative relation between the salivary flow rate and dental caries⁽²¹⁾. Viscosity means the resistance to flow or alteration of shape by any substance as a result of molecular cohesion⁽²²⁾, increased salivary viscosity plays a role in increasing caries incidence⁽²³⁾.

MATERIALS AND METHODS

The sample size composed of 800 students male and female, that they were distributed in secondary schools of Swera center which randomly selected from different areas and represented 90% of the number of intermediate schools of Al-Swera center.

The whole male and females age 15 year old attending the selected secondary schools were examined depression status assessment by children Inventory index (CDI₂)⁽²⁴⁾ and oral examination; Then subgroups of 30 students from both very elevated grade and low or average grade were randomly selected for salivary analysis.

The caries experience was recorded by decay, missing, filling index (DMFs) and by using the criteria of Manjie et al⁽²⁵⁾, which allow recording decayed lesion by severity. The collection of stimulated salivary samples were performed under standard condition following instruction cited by Tenovuo and Lagerl⁽²⁶⁾. The salivary flow rate was measured as milliliter per minute (ml / min); while viscosity was assessed by using Ostwald's viscometer.

Target salivary elements were analyzed at The Poisoning Consultation Center / Specialized Surgeries Hospital. Salivary total protein, zinc,

copper, chromium and lithium, analyzed, using absorption spectrophotometer (Buck scientific, 210VGPUSA) following standardized procedure, while the method used to determine the level of salivary total protein is colometric method by using of special kits according to the manufactured instructions. Data analysis was conducted by application of SPSS program version 21.

RESULTS

The result of the present study showed that the percentage of Caries free students was higher among very elevated grade (8.60%) followed by low or average grade (8.52%), the less was in elevated grade of depression (5.04%) and that showed in table (1). Concerning caries experience, the highest result was among elevated grade of depression followed by low or average grade with not significant. Concerning the severity of dental caries (D₁-D₄), the result was higher among very elevated grade with highly significant (P=0.01), followed by low or average grade and then high average grade and the lower one was elevated grade

The data analysis of salivary elements found that the protein was higher in very elevated grade than low or average grade while other elements show the opposite result with significant concerning copper and zinc in very elevated grade that show significant difference, while others the differences were not significant. DMFs and its grades correlated negatively with salivary flow rate among low or average grade and very elevated grade; while concerning salivary viscosity, the correlation was direct with highly significant in very elevated grade. Salivary elements show positive not significant relation except copper that show negative relation with significant.

Table 1: Distribution of caries free students according to depression

	Depression grades							
	Low or average		High average		Elevated		Very elevated	
	No	%	No	%	No	%	No	%
Total	317	39.63	143	17.88	119	14.88	221	27.63

Table 2: Dental caries experience DMFs and its components (Ds, Ms, Fs)(Median, Mean rank) according to depression grade by gender .

	Depression grades								Chi
	Low or average		High average		Elevated		Vey elevated		
	Median	Mean rank	Median	Mean Rank	Median	Mean Rank	Median	Mean Rank	
D_s	6.00	400.5	5.00	368.57	7.00	426.14	6.00	407.75	4.19
M_s	0.00	404.11	0.00	393.54	0.00	414.42	0.00	393.53	2.87
F_s	0.00	400.52	0.00	398.79	0.00	402.53	0.00	402.03	0.20
DMF_s	7.00	403.97	6.00	365.16	7.00	431.85	6.00	402.26	5.68

Table 3: Severity of dental caries represented by grades of (D₁-D₄) (Median, Mean Rank) according to depression grades by gender

	Depression grades								Chi
	Low or average		High average		Elevated		Very elevated		
	Median	Mean Rank	Median	Mean Rank	Median	Mean Rank	Median	Mean Rank	
D ₁	2.00	198.86	1.00	201.82	2.00	189.95	2.00	201.14	1.25
D ₂	1.00	405.49	1.00	384.97	0.00	396.12	0.00	405.67	1.01
D ₃	0.00	397.05	0.00	393.56	0.00	410.56	0.00	404.73	1.31
D ₄	0.00	405.05	0.00	390.19	0.00	361.95	0.00	421.95	11.28**

** Highly significant P ≤ 0.01

Table 4: The salivary physicochemical characteristics among students with very elevated grade and low or average grade of depression

	Depression grades				Z	U-test
	Low or average		Very elevated			
	Median	Mean Rank	median	Mean Rank		
Protein (mg/l)	60.69	30.44	80.68	31.58	-0.20	436.500
Zinc (µg/l)	4.15	33.33	3.69	28.76	-0.85	392.000
Copper (µg/l)	2.70	27.94	2.60	34.06	-0.80	396.000
Chromium (µg/l)	0.11	32.8	0.11	29.2	-0.25	432.500
Flow rate (ml/min)	1.12	32.23	1.07	29.77	-0.54	413.000

Table 5: Salivary viscosity (poise) among students with very elevated grade and low or average grade of depression

	Depression grades				Statistical difference		
	Low or average		Very elevated		df	t-value	P
	Mean	±SD	Mean	±SD			
Total	0.0143	0.0075	0.0154	0.0087	58	-1.03	0.428

Table 5: Correlation coefficient between the salivary physicochemical characteristics and caries experience (Ds and DMFs)

	Ds				DMFs			
	Low or average		Very elevated		Low or average		Very elevated	
	r	p	r	p	r	p	r	p
Protein	0.35	0.05*	0.11	0.55	0.32	0.08	0.13	0.48
zinc	0.20	0.27	0.31	0.09	0.03	0.86	0.32	0.07*
copper	0.23	0.20	0.25	0.17	0.13	0.49	0.33	0.07*
chromium	0.23	0.20	0.18	0.31	0.28	0.12	0.04	0.83
Flow rate	-0.41	0.44	-0.22	0.30	-0.15	0.41	0.22	0.41
Saliva viscosity	-0.001	0.995	0.507	0.004**	-0.09	0.63	0.499	0.005**

*significant P ≤ 0.05

** Highly significant p ≤ 0.01

DISCUSSION

In this study, the prevalence and the experience of dental caries among elevated grade were non-significantly higher than other grades of depression, the increased dental caries in depressed individuals agrees with other study⁽²⁷⁾, could be attributed to that depression is always connected with a declined metabolism of serotonin, which is later linked to the high carbohydrate intake. Other explanation could be the Limitations in sunlight exposure that was reported among depressed person that leads to Vitamin D deficiency⁽²⁸⁾, as individual patients may have symptoms of depression related to potentially deficient vitamin D levels⁽²⁹⁾ that

reported to be associated with increased dental caries⁽³⁰⁾.

Moreover, other condition could be the decreased in salivary flow rate among students with very elevated grade of depression, the higher the flow rate, faster the clearance, higher the buffer capacity^{(31),(32)}. this result also found in the present study by the inverse relation between the salivary flow rate and dental caries among both groups Other factor could be increase in salivary viscosity among students with very elevated grade than low or average grade with not significant and that agree with other study⁽³³⁾. The higher viscosity the less capable of flowing freely to oral sites where its protective functions such as

clearance would be affected^(34,35). This also found in the present study as Saliva viscosity show positive relation with dental caries in very elevated grade. All elements in this study related positively with dental caries with not significant in the two grade of depression, for total protein, the host salivary protein CSP-1 binds to *S. Mutans* cells and may influence the initial colonization of this pathogenic bacterium onto the tooth surface⁽³⁶⁾. Additionally, Salivary copper as other trace elements are essential for growth and metabolism of bacteria, but become injurious if presents in a high concentration⁽³⁷⁾. Concerning salivary zinc enhanced remineralization especially in deeper part and exhibited detrimental effects on remineralization in a dose response manner⁽³⁸⁾. This study did not show any results for the concentration of lithium in saliva using spectrophotometer device, the likelihood that small concentration of lithium in the two grade that was not detected in the device and that need further studies, also the distribution of depression was 100% and lithium has been shown to reduce the oxidative stress that occurs with multiple episodes of mania and depression, lithium is the first drug used for depression⁽³⁹⁾.

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الخلاصة

الاكتئاب هو اضطراب عقلي لمشترك مع مزاج مكتئب، ويمكن أن تصبح مزمنة أو متكررة وتؤثر على صحة الأسنان. وهذا يهدف هذا البحث إلى تقييم مدى انتشار وشدة تسوس الأسنان بين الطلاب مع درجة مختلفة من الاكتئاب بالنسبة للخصائص الفيزيائية لللعاب المحفز.

أهداف الدراسة: يهدف هذا البحث إلى تقييم مدى انتشار وشدة تسوس الأسنان بين الطلاب مع درجة مختلفة من الاكتئاب بالنسبة للخصائص الفيزيائية لللعاب المحفز.

المواد والإساليب: تكون العينة الكلية المعنية لتقييم الوضع الاكتئاب من 800 طالب لكلا الجنسين الذين تتراوح أعمارهم بين 15 سنة التي تم اختيارها عشوائياً، تم تنفيذ ذلك باستخدام مؤشر الأطفال الاكتئاب للاطفال (CDI) وتم تقسيم الطلاب إلى أربع مجموعات من الاكتئاب (الدرجة المنخفضة أو المتوسط، متوسط ارتفاع، و مرتفع ودرجة مرتفعة جداً). وكان التشخيص باستخدام مؤشر التسوس (DMFs). وفقاً لمعيار (Manji, 1989)، تم جمع العينات للعباب من 30 طالب بتقدير مرتفع جداً من الاكتئاب و 30 من الدرجة المنخفضة أو المتوسط في ظل ظروف موحدة، ثم تحليلها لقياس معدل تدفق اللعاب والزوجة، بالإضافة إلى تقدير عناصر اللعابية التي تتضمن البروتين الكلي والزنك والنحاس والكروم والليثيوم.

النتائج: أظهرت بيانات هذه الدراسة أن نسبة تسوس الطلاب كان أعلى بين درجة مرتفعة جداً من الاكتئاب (8.60%)، يليه الدرجة المنخفضة أو المتوسطه (8.52%)، وكانت أقل بين درجة مرتفعة من الاكتئاب (5.04%). فيما يتعلق بالتسوس، كانت النتيجة أعلى بين الدرجة المرتفعة من الاكتئاب تليها الدرجة المنخفضة أو المتوسط، كانت النتيجة أقل بين الدرجة العالية. في حين ان شدة تسوس الأسنان (D₄) كانت كبيرة بين الدرجة العاليه من الاكتئاب وبصوره واضحه . ووجد تحليل البيانات للعناصر اللعابية أن البروتين كان أعلى في الصف مرتفعة جداً من الاكتئاب من الدرجة المنخفضة أو المتوسطه. في حين تظهر عناصر أخرى العكس وكانت صوره واضحه في الزنك والنحاس. وكان المؤشر DMFs على علاقه سلبية مع معدل تدفق اللعاب بين الدرجة المنخفضة أو المتوسط ودرجة مرتفعة جداً. بينما لزوج اللعاب كانت علاقتها مباشره مع المؤشر، DMFs. مع أهمية، واضحه في الصفوف المرتفعة جداً تظهر العناصر اللعابية علاقة إيجابية و غير الهامة باستثناء النحاس التي تظهر علاقة سلبية مع أهمية.

الاستنتاجات: كشفت نتائج الأبحاث الحالية أن الوضع الاكتئاب له تأثير سلبي على الخصائص الفيزيائية للعباب وحالة تسوس الأسنان .