



Depression Status in Relation to Gingival Status and Salivary Magnesium Among 17 Years Old Secondary School Female in Baghdad City/Iraq

Noor Abdulrazzaq^{1*}, Nada Jafer MH Radhi²

¹Department of Pedodontics and Preventive Dentistry, College of Dentistry, University of Baghdad, Iraq

²Department of Pediatric and Preventive Dentistry, College of Dentistry, University of Baghdad, Iraq

ABSTRACT

Background: Depression is a low-mood, activity-aversion disorder. It may influence the emotions, actions and sense of well-being of an individual. This may impact oral safety when oral hygiene procedures are ignored and having Cariogenic diet that contributes to a higher probability of oral diseases.

This research aimed to test the effect of state of depression on gingival health condition Among 17-year-old high school female Pupils in relation to salivary magnesium.

Materials and Methods: Total sample including 500 students selected from schools in Baghdad city/ Iraq. Consent form was obtained from the ethical approval committee in college of Dentistry/University of Baghdad. All were subjected to Children Depression Inventory questionnaire by Kovacs in 2011. Plaque and gingival indices by Loe and Silness in 1964 were used to assess the oral health status. Subgroups were selected from high and low grade of depression to analyze magnesium.

Results: The percentage of occurrence of depression was 100%. The mean value of plaque and gingival indices were higher in high depression grade. For salivary magnesium concentration, the mean value was higher in low grade. For plaque and gingival indices, magnesium correlated positively in low grade, but in high grade, plaque index correlated negatively while gingival index correlated positively.

Discussion: UNICEF world report in 1991 that "Iraq is the most traumatized county of war ever described" and that "a majority of the Iraqi would suffer from severe psychological problems throughout their lives". Depression supports a chronic neural and immune dysfunction, causes changes in health-related behaviors and antidepressive medication may lead to Changes In circulation of the gingives and changes in saliva composition, which may lead to an exacerbation of periodontitis.

Conclusion: Depression has biological plausible association with oral health, it increases gingival inflammation also affects the normal constituents of saliva.

Key words: Depression, Children Depression Inventory, Oral health, Magnesium

HOW TO CITE THIS ARTICLE: Noor Abdulrazzaq, Nada Jafer MH Radhi, Depression Status in Relation to Gingival Status and Salivary Magnesium Among 17 Years Old Secondary School Female in Baghdad City/Iraq, J Res Med Dent Sci, 2020, 8 (7): 4-8.

Corresponding author: Noor Abdulrazzaq

e-mail ✉: ali.mario28@yahoo.com

Received: 16/09/2020

Accepted: 09/10/2020

INTRODUCTION

Depression is a common and severe psychiatric disorder that affects the emotions, thinking and behaving negatively [1]. It's not Know exactly what causes depression but can involve a variety of problems as genetic and environmental

causes. Many small-effect genes will affect the responsibility of an person to the disease as well as a number of non-genetic genes causes (environmental causes) including Stress, toxic drugs, stressful events, childhood issues and pollutants, Noise production and accidents both natural and catastrophic [2,3].

The Diagnosis Mental Disorders Diagnostic and Statistical Manual Anxiety (DSM-IV) is linked to factors which are severity, duration, and course of disease. Through diagnosis by using

three factors just provide fractional attributive about person who has trial with depression. Additionally, depressed people may have a co-morbid psychiatric diagnostic feature, for example worry, Welfare phobia, scare and different Personality disruptions. It complicates even further the diagnosis and treatment. However, the diagnosis of depression may not directly hint a special treatment making a Depression diagnosis does not necessarily mean any specific treatment [4]. Children Depression Inventory (CDI) [5] is the most established self-report measure of depressive symptoms. It is good tool used to recognize the symptom of depression in children and adolescents at age (7-17) years old. It Is self-assessed, That means the infant or adolescent is assessed Records their responses to the test sheet questions as distinct from giving verbal answers to the questions which The examiner then analyzes and records this [6]. Oral diseases can affect a small region of the human body directly, but their effects affect the entire body and Could have adverse effects on physical and psychological health [7].

Periodontal disorders include a large variety of destructive Inflammatory conditions affecting the teeth 's supporting structures (gingiva, bone, and parodontal ligaments), which may lead to tooth loss. It is one of the most common illnesses globally and with two major conditions, gingivitis and parodontitis [8].

The fourth most common cation in the body is magnesium, an essential cation element Needed for a wide variety of physiological duties. It Provided as Physiological calcium antagonist, a cofactor for more than 300 enzymes, can act as an essential regulator of cell functions and Several basic Functions such as muscle relaxation, conduction of the neuromuscular, glycemia regulation, Blood pressure and myocardial contractions, are regulated [9]. Magnesium plays important roles across all major metabolisms, across ionic regulation and in oxidation-reduction as it regulates Calcium ion surge in the calcium neuronal canals which help to regulate the development of Nitric oxide in neurons. Neuronal Magnesium Claims cannot be met in magnesium deficiency, causing neuronal harm that could manifest in terms of depression. Magnesium Disease therapy Are under hypothesis successful in treating extreme

depression induced by Deficits in Magnesium intraneuronally that Can be caused Excessive calcium in the diet, by stress hormones and dietary magnesium deficiencies [9,10]. Number of studies have been reviewed On Therapeutic impacts magnesium Administration to treat depression, depression, and anxiety disorders [10-13]. Magnesium The remarkable ability to minimize inflammation caused by bacterial toxins can also Take a big part in the prevention of parodontal diseases. So reduced magnesium Concentrations relate to increased inflammatory response to bacterial challenges [14]. It has been shown that magnesium supplements minimize the occurrence of osteoporotic fractures, suggesting their beneficial effect on bone maintenance as there is a seesaw balance between calcium and magnesium levels in bone by the action of parathyroid hormones. With High consumption of magnesium, calcium goes out of the bones to boost calcium level In tissues while a heavy intake of magnesium allows calcium to get out of the tissues and into the bones and this leads to better bone mineralization [15]. Supplementation with nutritional magnesium may improve periodontal health as it will have a positive impact on non-surgical periodontal therapy, also showed less loss of attachment and more remaining teeth [16]. Since there is no historical analysis of Iraq concerning depression in relation to gingival diseases and salivary Magnesium among 17-year-old high school female Students in Iraq / Baghdad, this study was carried out.

MATERIALS AND METHODS

We performed this analysis in Baghdad city / Iraq during the period between November 2019; and July 2020. The sample involved 500 randomly selected females' students aged 17 years from secondary schools in first Alrasafa. Official permission was obtained from the Iraqi Ministry of Education to examine the students without obligation and to ensure support from schools' authority. The age of sample was calculated according to last birthday according to World Health Organization, 1997 [17].

Children's Depression Inventory (CDI2) [18] was used to divide the sample into three groups according to the severity of depression (low, medium, high grade). All sample was requested to

fill all items for Children’s Depression Inventory 2 questionnaire by themselves. Subgroups of 45 students were taken randomly and selected from high and low grade of depression to make comparisons between certain oral variables and salivary analysis. Oral health assessments were carried out Behind the fundamental’s procedures of the Oral health Services for the World Health Organization (1997) [17]. The thickness of dental plaque adjacent to the Gingival margin was evaluated with the plaque index of Loet al. [19], also gingival inflammation was examined and recorded using Loet al. [19]. Unstimulated Check salivaries were collected in sterile screw capped tubes, samples were taken to the laboratory for centrifugation and biochemical analysis. In the saliva of (90) students, by using a ready kits, salivary magnesium in (mg/dl) was determined colorimetrically. Nevertheless, the theory of the preparation of reagents, the checking of procedures and the measurement of tests is all carried out according to the manufacturing procedural instructions. The social sciences statistical software (version 21 of the SPSS) was used for both data description, presentation, and analysis. Mean and standard error were used for quantitative variables while percentage for normal ones. One Way of Variance Analysis (ANOVA) has been included in detect the differences with Test post hoc Games-Howell. Correlation with Pearson test Used

as a correlation among quantitative variables. Significance level as: Not significant $P>0.05$, Important $P<0.05$, rather important $P<0.01$.

RESULTS

The sample in the present study, involved 500 secondary school female students aged 17 years randomly selected from schools of first Alrasafa sector in Baghdad city/Iraq. From the total sample, subsamples of 90 students were taken randomly and selected from high and low grade of depression to make comparisons between certain oral variables and salivary analysis. Table 1 shows that for the total sample, low depression grade is more in occurrence followed by medium grade then high grade.

Table 2 demonstrate the mean values of plaque index and gingival health condition for each group according to depression grade. For the total sample data analysis showed that the mean value was higher in high depression grade while the least value was among low grade with highly significant difference. In Table 3, multiple comparisons of plaque index and gingival health condition values according to depression grade can Let’s see. There was one statistical high significant difference upon making comparisons for the plaque index between low and high and between medium and high grades of depression, while for gingival index, it was between low

Table 1: Distribution of the sample according to depression grade.

Groups	Number	% (percentage)
Low	245	49
Medium	164	32.8
High	91	18.2

Table 2: Descriptive and statistical test of Gingival and plaque index according to depression grade among groups.

Variables	Low		Medium		High		F	p value
	Mean	SE	Mean	SE	Mean	SE		
Plaque index	1.071	0.026	1.137	0.033	1.294	0.041	9.985	0.000**
Gingival index	0.928	0.026	1.012	0.035	1.151	0.047	9.324	0.000**

Degree of freedom=2, p: probability, **=highly significant at $p<0.01$, SE: standard error

Table 3: Multiple comparisons of plaque and gingival indices values according to depression grade with statistical differences among groups.

Dependent Variable	(I) Groups	Multiple Comparisons		
		(J) Groups	Mean Difference (I-J)	probability value
Plaque index	Low	Medium	-0.066	0.257
		High	-0.223	0.000**
	Medium	High	-0.157	0.009**
Gingival Index	Low	Medium	-0.084	0.127
		High	-0.224	0.000**
	Medium	High	-0.14	0.046*

*=significant at $p<0.05$, **=highly significant at $p<0.01$.

and high grades. A significant difference can be noticed only for gingival index between medium and high grades of depression. Other comparisons were not significant.

Concerning Table 4, results showed the level of salivary magnesium, according to depression grades. The mean value for magnesium was higher in low depression grade, with highly Big Differences ($p < 0.01$).

Correlation coefficient of plaque and gingival index with salivary magnesium according to depression grades could be seen in Table 5. for magnesium, the correlation for both low and high grades were weak positive and not significant ($P > 0.05$), except for PLI of high grade with magnesium, it was negative and not significant.

Table 4: Salivary magnesium according to depression grade with statistical difference among groups.

Variables	Groups				T	Df	Probability value	Cohen's d
	High		Low					
	Mean	SE	Mean	SE				
Magnesium	0.9	0.01	1.097	0.017	10.135	88	0.000**	2.14

**=highly significant at $p < 0.01$, T:Total, Df: Degree of freedom, SE: standard error

Table 5: Correlation coefficient of plaque and gingival indices with Magnesium according to depression grades.

Groups		Magnesium	
		r	Probability value
Low	Plaque index	0.112	0.463
	Gingival index	0.143	0.349
High	Plaque index	-0.048	0.753
	Gingival index	0.043	0.777

DISCUSSION

All examined female students have symptom of depression (the percentage of occurrence of depression is 100%), as "Iraq is the most traumatized county of war ever described" and that "a majority of the Iraqi would suffer from severe psychological problems throughout their lives" also suffering from economic sanctions then exposing to many wars [20]. Adolescents Can be especially vulnerable to a depressed mood after social rejection, education stress and Peer pressure, mobbing and others [21]. Plaque and gingival indices were higher in high depression with high significant difference. Upon making comparisons between grades, a high significant and significant differences can be seen. Several explanations Was suggested to clarify The Mechanism of Depression has a causal part to play in etiology Of Parodontal inflammatory disease:

Depression strengthens the hypothalamic-pituitary - adrenal (HPA) axis of chronic dysregulation and further defines cortisol and adrenal disorders, including immune dysfunction and proinflammatory cytokine excess secretion. Via these mechanisms, depression could affect the development of periodontal infections in patients with periodontitis and could be associated with a worse outcome of care by slowing wound healing [22].

Changes in behaviors related to health, such as oral hygiene, smoking and diet [23]. In addition, antidepressant drugs can also induce xerostomia, changes in gingival circulation and changes in saliva composition, which may lead to an exacerbation of periodontitis [24].

The mean value for Magnesium was lower in high depression grade than low grade with a high significant difference. The mechanism is unclear since the connection between magnesium and depression is well established. Magnesium does, however, play a role in many paths as enzymes activation, hormones regulation, protein synthesis, oxidation-reduction the neurotransmitters involved in controlling mood [12]. The N-methyl - D-aspartate channel is an antagonist in calcium and a blocker dependent on voltage that Regulates calcium influx into neurons. In States with low magnesium, high calcium and glutamate levels can deregulate synaptic function, leading to depression [25]. In magnesium deficiency, a variety of neuromuscular and psychiatric symptoms including various types of depression were observed and several studies found that magnesium A Pharmacological Armamentarium for Anxiety Control seems to be valuable [10,11,12,25]. Regarding plaque and gingival indices correlation with magnesium according to depression grades, the finding for both low and high grades were positive and not significant. This might be related to the finding that magnesium is important for the optimal growth of bacteria in a medium enclosing all other growth necessities of these organisms [26]. On the other hand, plaque index of high grade shows weak negative non-significant correlation. This might indicate the protective role of salivary magnesium as it acts as a modulator of the immune response, inhibit free-radical generation when present in high concentrations and also the controversy in the nature and composition

of microorganisms may play a role. This finding was in agree with [27,28].

CONCLUSION

From this study it was concluded that:

All examined female students have symptom of depression, with a percentage of 100% occurrence.

For the total sample data analysis showed that the mean values of plaque index and gingival health were higher in high depression grade with highly significant difference.

The mean value for salivary magnesium was higher in low depression grade.

For plaque and gingival index, salivary magnesium correlated positively in low depression grade. In high grade, plaque index correlated negatively while gingival index correlated positively.

REFERENCES

- Nice. National institute for health and clinical excellence. The treatment and management of depression in adults. 2010.
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-IV-TR). 4th, Edn. Washington, DC 2000.
- Cole E, Chan K, Collins J, et al. Decayed and missing teeth and oralhealth-related factors: Predicting depression in homeless people. *J PsychosomRes*2011; 71:108-112.
- Kovacs M, Lopez D. Prodromal symptoms and a typical affectivity as predictors of major depression juveniles: Implication for prevention. *J Child Psychol Psychiatry*. 2010; 51:472-496.
- Kovacs M. Children depression inventory (CDI) manual Toronto, Canada: Multi Health Systems. 1992.
- Comer S, Kendall C. High-end specificity of the children's depression inventory in a sample of anxiety-disordered youth. *Depress Anxiety J* 2005; 22:11-19.
- Lam R. Epidemiology and outcomes of traumatic dental injuries: a review of the literature. *Aust Dent J* 2016;1:4-20.
- Savage A, Eaton KA, Moles DR, et al. A systematic review of definitions of periodontitis and methods that have been used to identify this disease. *J Clin Periodontol* 2009; 36:458-467.
- Rude RK. Magnesium. In: Ross AC, Caballero B, Cousins RJ, et al. eds. *Modern nutrition in health and disease*. 11thEdn Baltimore, Mass: Lippincott Williams and Wilkins; 2012; 159-75.
- Volpe SL. Magnesium. In: Erdman JW, Macdonald IA, Zeisel SH. *Present knowledge in nutrition*. 10thEdn. John Wiley and Sons. 2012; 459-74.
- Kalinin V, Zheleznova V, Rogacheva A, et al. A use of magne-B6 in the treatment of anxiety-depressive states in patients with epilepsy. A Prospective study of diet quality and mental health in adolescents. *Comparative Study* 2004;104:51-55.
- Durlach V, Millart H, Durlach J. Red blood cell magnesium concentrations: Analytical problems and significance. *Magnes Res* 1995;8:65-76
- Jacka N, Peter J, Kremer A, et al. A Prospective study of diet quality and mental health in adolescents *Plos One* 2011; 6:e24805.
- Meisel P, Schwahn C, Luedemann J, et al. Magnesium deficiency is associated with periodontal disease. *J Dent Res* 2005;84:937-941.
- Staudte H, Kranz S, Völpel A, et al. Comparison of nutrient intake between patients with periodontitis and healthy subjects. *Quintessence Int* 2012;43:907-916.
- Castiglioni S, Cazzaniga A, Albisetti W, et al. Magnesium and osteoporosis: Current state of knowledge and future research directions. *Nutrients* 2013;5:3022-3033.
- World Health Organization. Oral health surveys. Basic methods, Geneva 1997.
- Kovacs M. Children depression inventory (CDI2) manual Toronto, Canada: Multi-Health Systems 2011.
- Loe H, Silness J. Periodontal disease in pregnancy I. *Acta Odonto Scand* 1964; 21:533-551.
- UNICEF. Geneva. The Unicef Children's Fund, 15th of March. 2013.
- Mata DA, Ramos MA, Bansal N, et al. Prevalence of depression and depressive symptoms among resident physicians: A systematic review and meta-analysis. *JAMA* 2015; 314:2373-2383.
- Belvederi M, Pariante C, Mondelli V, et al. HPA axis and aging in depression: Systematic review and meta-analysis. *Psychoneuroendocrinology* 2014; 41:46-62.
- Alkan A, Cakmak O, Yilmaz S, et al. Relationship between psychological factors and oral health status and behaviours. *Oral Health PrevDent* 2015; 13:331-339.
- Macedo CR, Macedo EC, Torloni MR, et al. Pharmacotherapy for sleep bruxism. *Cochrane Database Syst Rev* 2014; 10.
- Lopez-Ridaura R, Willett W, Rimm E, et al. Magnesium intake and risk of type 2 diabetes in men and women. *Diabetes Care* 2004; 27:134-140.
- BrailsfordD, Shah B, Simons D, et al. The predominant aciduricmicroflora of root-caries lesions. *J Dent Res* 2001; 80:1828-1833.
- Dreizen S, Spies A, Spies D. The copper and cobalt levels of human saliva and dental caries activity. *J Dent Res* 1952; 31:137-142.
- Nyvad B, Fejerskov O. Active root surface caries converted into inactive caries as a response to oral hygiene. *Scand J Dent Res* 1986; 94:281-284.