

## Association of depression with dental caries and periodontal disease at a tertiary care hospital

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### Abstract

**Objective:** To determine the association of depression with dental caries and periodontal disease.

**Methods:** The cross-sectional descriptive study was conducted at the Nishtar Institute of Dentistry, Multan, Pakistan, from May 7, 2018 to January 7, 2019, and comprised samples from subjects with dental caries and periodontal disease. Hospital Anxiety and Depression Scale was applied to screen the participants for the presence or absence of depression. Data was analysed using SPSS 21.

**Results:** Of the 296 participants, 125(42.2%) were males and 171(57.7%) were females. The overall mean age was 38.74±12.87 years. Depression was found in 195(65.8%) patients. Significant association of depression in patients of dental caries and periodontal disease was found with female gender, age <50 years, illiteracy, marital status, pre-existing hypertension, coronary artery disease, illicit substance addiction and psychotropic medication use ( $p < 0.05$ ).

**Conclusion:** There was high frequency of depression among patients of dental caries and periodontal disease.

**Keywords:** Depression, Dental caries, Periodontal disease, Medical illness, Multan, Pakistan. (JPMA 71: 1345; 2021)

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### Introduction

Depression is one of the most common psychiatric disorders with a lifetime prevalence of 8-12% in the general population.<sup>1</sup> The World Health Organisation (WHO) ranks depression fourth among the leading causes of the global disease burden, while it is expected to rank second by 2030.<sup>2</sup> Although depression is prevalent worldwide, it is more common among those suffering from medical illnesses than in the general population.<sup>3</sup> About a third of people attending medical clinics have a co-morbid depressive disorder.<sup>4</sup> Depression is also a common cause for apparent worsening of medical illnesses and its adequate recognition and treatment has shown to improve outcome of medical illnesses.<sup>5</sup>

Further, poor oral health has often been identified in patients of depression.<sup>6</sup> Recent evidence supports the association of depression with dental caries and periodontal disease, suggesting that a bidirectional link is possible between the two conditions.<sup>7</sup>

Among the common dental diseases, dental caries and periodontal disease are the two oral pathologies that remain prevalent in community.<sup>8</sup>

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Dental caries, which is also known as dental cavities or tooth decay, is an infectious disease that may result in pain and tooth damage, and may lead to tooth-loss.<sup>9</sup> Periodontal disease is mainly the result of some infection, leading to inflammation of the gum and bone that surround and support the teeth.<sup>10</sup>

As far as the association of depression with medical illnesses are concerned, the underlying mechanisms for such associations have been extensively studied, but the association between mental health and oral health is relatively a neglected area.<sup>11</sup> No study on the subject was conducted in Pakistan. The current study was planned to fill the gap by determining the association of depression with dental caries and periodontal disease, and to identify factors that can affect such an association.

### Patients and Methods

The cross-sectional descriptive study was conducted at the Nishtar Institute of Dentistry, Multan, Pakistan, from May 7, 2018 to January 7, 2019. After approval from the institutional ethics committee, the sample size was determined by considering 95% confidence interval(CI), 5% margin of error and 26% anticipated prevalence of depression using a sample estimation formula [ $n = z^2pq / d^2$ ].<sup>7</sup> The sample was raised using non-probability purposive sampling technique.

Those included was male and female patients aged 18-65 years having dental caries or periodontal disease. Those excluded were patients diagnosed simultaneously with dental caries and periodontal disease or suffering from a dental disease other than dental caries or periodontal disease.

After taking informed consent, Detailed socio-demographic data was collected on a predesigned proforma. For depression screening, the validated Urdu version of the depression subscale of the Hospital Anxiety and Depression Scale (HADS-D), a 7-item section, was administered. Each item in the scale is scored 0-3. A score of 8 or above indicates the presence of depression without categorising depression into mild, moderate, severe or stupor types.<sup>12</sup>

Data was analysed using SPSS 21. Descriptive statistics were expressed as frequencies and percentages. Pearson chi-squared test was used to determine the association of depression with dental caries and periodontal disease.  $P < 0.05$  was considered statistically significant.

## Results

Of the 296 participants, 125(42.2%) were males and 171(57.7%) were females. The overall mean age was

**Table-1:** Frequency of depression in patients of dental caries and periodontal disease.

Type of dental disease	Dental diseases (n)	Dental diseases (%)	Depression in dental diseases (n)	Depression in dental diseases (%)
Dental caries	211	71.3	139	65.87
Periodontal disease	85	28.7	56	65.88
Total	296	100	195	65.87

**Table-2:** Sample distribution and prevalence of depression and dental diseases according to study factors (n=296).

Study Factors	Dental Disease	Presence of Depression		
		Number(n)	Percentage(%)	
Gender	Male	Dental caries	56	18.9
	Female		83	28
	Male	Periodontal disease	16	5.4
	Female		74	24.3
Age groups	Up to 50 years	Dental caries	120	40.2
	More than 50 years		19	6.4
	Up to 50 years	Periodontal disease	48	16.2
	More than 50 years		8	2.7
Residential status	Rural	Dental caries	43	14.5
	Urban		96	32.4
	Rural	Periodontal disease	19	6.4
	Urban		37	12.5
Marital status	Married	Dental caries	100	33.7
	Unmarried		30	10.1
	Divorced		2	0.6
	Widow/widower		7	2.3
	Married	Periodontal disease	39	13.1
	Unmarried		11	3.7
	Divorced		4	1.3
	Widow/widower		2	0.6
Family system	Nuclear	Dental caries	50	16.8
	Joint		89	30
	Nuclear	Periodontal disease	23	7.7
	Joint		33	11.1
Literacy status	Illiterate	Dental caries	96	32.4
	Literate		43	14.5
	Illiterate	Periodontal disease	43	14.5
	Literate		13	4.3
Occupational status	Employed	Dental caries	39	13.1
	Un-employed		68	22.9
	Self-employed		32	10.8
	Employed	Periodontal disease	17	5.7
	Un-employed		29	9.7
	Self-employed		10	3.3

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Study Factors	Dental Disease	Presence of Depression		
		Number(n)	Percentage(%)	
Dental follow-up	Dental caries	None	51	17.2
		Once	46	15.5
		Twice	24	8.1
		Thrice	5	1.6
		4 times	5	1.6
		5 times	3	1
	Periodontal disease	6 times	5	1.6
		None	19	6.4
		Once	19	6.4
		Twice	9	3
		Thrice	4	1.3
		4 times	1	0.3
		5 times	3	1
		6 times	1	0.3
Number of decayed teeth	Dental caries	0	2	0.6
		1	46	15.5
		2	4	13.5
		3	19	6.4
		4	9	3
		5	5	1.6
	Periodontal disease	6	18	6
		0	1	0.3
		1	8	2.7
		2	20	6.7
		3	9	3
		4	5	1.6
		5	3	1
		6	1	3.3
Obesity	Dental caries	Yes	99	33.4
		No	40	3.5
	Periodontal disease	Yes	19	6.4
		No	37	12.5
Diabetes	Dental caries	Yes	117	39.5
		No	22	7.4
	Periodontal disease	Yes	46	15.5
		No	10	3.3
Hypertension	Dental caries	Yes	106	35.8
		No	33	11.1
	Periodontal disease	Yes	41	13.8
		No	15	5
Coronary artery disease	Dental caries	Yes	119	40
		No	20	6.7
	Periodontal disease	Yes	47	15.8
		No	9	3
Illicit substance addiction	Dental caries	Yes	96	32.4
		No	43	14.5
	Periodontal disease	Yes	31	10.4
		No	25	8.4
Psychotropic medication use	Dental caries	Yes	117	39.5
		No	22	7.4
	Periodontal disease	Yes	42	14.1
		No	14	4.7

**Table-3:** Association of depression with dental caries and periodontal disease.

Study Factors	Statistic value ( $\chi^2$ )	P-value (p)
Gender	6.59	0.01
Age group	4.19	0.04
Residential status	0.29	0.58
Marital status	10.0	0.01
Family system	2.24	0.13
Literacy status	7.0	0.008
Occupational status	0.59	0.74
Duration of dental complaint	9.37	0.09
Dental follow ups	3.44	0.75
Number of decayed teeth	7.86	0.24
Obesity	0.20	0.65
Diabetes	3.13	0.07
Hypertension	17.50	<0.001
Coronary Artery Disease	14.0	<0.001
Illicit substance addiction	13.21	<0.001
Psychotropic medication use	11.97	0.001

38.74±12.87 years. Dental caries was found in 211(71.3%) patients, while 85(28.7%) had periodontal disease. Depression was found in 195(65.8%) patients (Table-1).

The presence of depression was classified along various socio-demographic characteristics (Table-2).

Significant association of depression in patients of dental caries and periodontal disease was found with female gender, age <50 years, illiteracy, marital status, pre-existing hypertension, coronary artery disease, illicit substance addiction and psychotropic medication use (Table-3).

## Discussion

The findings of the current study are in line with literature.<sup>11,13-18</sup>

The study further corroborated the findings of an earlier study explaining the possible aetiology of depression in dental conditions.<sup>6</sup> As highlighted earlier, the result underlines the neglected oral health of people with psychiatric disorders.<sup>18</sup> The current results were also consistent with the findings supporting the association of depression with dental caries.<sup>7</sup> Increased prevalence of depression in patients of dental diseases who had hypertension and coronary artery disease were also in line with literature.<sup>19-21</sup>

The finding regarding illicit substance addiction was in line with a study which highlighted an increased rate of illicit substance addiction among depressed individuals.<sup>22</sup> As a consequences of illicit substance abuse, certain behavioural changes, such as poor oral hygiene and increased intake of sweetened beverages, are observed

which can result in dental plaque and recurrent oral infections, leading to dental caries and periodontal disease.<sup>24</sup>

Additionally, the current study's finding regarding psychotropic medicines corroborated literature, confirming that psychotropic medicines induce dry mouth, or xerostomia, through reduced salivary flow which may result in an increased risk of dental caries and periodontal disease.<sup>23</sup>

The overall prevalence of depression in patients of dental caries and periodontal disease reported in the current study was 65.8% which was much higher compared to the 26% reported in Finland.<sup>23</sup> This high rate might reflect the already high prevalence of depression in the general population of Pakistan, which has been reported to range from 22% to 60%.<sup>24,25</sup> The rate detected in the current study, however, falls within the prevalence rates of depression in patients with medical illnesses, which is 17-53%,<sup>3</sup> suggesting a high prevalence of depression in the presence of dental diseases.

The current study has limitations as it used a cross-sectional design limited to a single centre. Further multicentre, randomised controlled trials (RCTs) are recommended to confirm the findings.

In the light of the findings of the current study, however, a multidisciplinary management approach is recommended while catering to the needs of patients suffering from depression and dental diseases. It should include a close liaison involving dental, psychiatry and medical departments. Clinicians and mental health professionals should include oral health as part of a comprehensive assessment of people presenting with depression. Furthermore, a dentist should identify symptoms of depression in patients by careful observation and screening of depression by a valid scale combined with a detailed medical and social assessment. If required, a timely referral to a mental health professional and a medical specialist should be made.

## Conclusion

There was high prevalence of depression among patients of two common dental diseases. Factors, such as female gender, younger age, low educational status, illicit substance addiction, medical illnesses and psychotropic medications usage, associated depression with dental caries and periodontal disease.

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**Conflict of Interest:** None.

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## References

- Nelson J, Klumparendt A, Doebler P, Ehring T. Childhood maltreatment and characteristics of adult depression: meta-analysis. *Br J Psychiatry* 2017;210:96-104. doi: 10.1192/bjp.bp.115.180752.
- WHO. Mhgap intervention guide for mental, neurological and substance use disorders in nonspecialized health settings version 2.0. Geneva: World Health Organization; 2016.
- Wang J, Wu X, Lai W, Long E, Zhang X, Li W, et al. Prevalence of depression and depressive symptoms among outpatients: a systematic review and meta-analysis. *BMJ Open* 2017;7:e017173. doi: 10.1136/bmjopen-2017-017173.
- Maiden NL, Hurst NP, Lochhead A, Carson AJ, Sharpe M. Quantifying the burden of emotional ill-health amongst patients referred to a specialist rheumatology service. *Rheumatology* 2003;42:750-7. doi: 10.1093/rheumatology/keg211.
- Harrison P, Cowen P, Burns T, Fazel M. Psychiatry and medicine, Chapter 22. In: *Shorter Oxford Textbook of Psychiatry*, 7th ed. Oxford, UK: Oxford University Press, 2018; pp 631-74.
- Hexem K, Ehlers R, Gluch J, Collins R. Dental patients with major depressive disorder. *Curr Oral Health Rep* 2014;1:153-60. Doi: 10.1007/s40496-014-0020-0
- Delgado-Angulo EK, Sabbah W, Suominen AL, Vehkalahti MM, Knuutila M, Partonen T, et al. The association of depression and anxiety with dental caries and periodontal disease among Finnish adults. *Community Dent Oral Epidemiol* 2015;43:540-9. doi: 10.1111/cdoe.12179.
- Sharda J, Mathur LK, Sharda AJ. Oral health behavior and its relationship with dental caries status and periodontal status among 12-13 year old school children in Udaipur, India. *Oral Health Dent Manag* 2013;12:237-42.
- Laudenbach JM, Simon Z. Common dental and periodontal diseases: evaluation and management. *Med Clin North Am* 2014;98:1239-60. doi: 10.1016/j.mcna.2014.08.002.
- Centre for Disease Control and Prevention (CDC). Periodontal disease. [Online] 2013 [Cited 2019 January 03]. Available from URL: <https://www.cdc.gov/oralhealth/conditions/periodontal-disease.html>
- Kisely S, Sawyer E, Siskind D, Lalloo R. The oral health of people with anxiety and depressive disorders - a systematic review and meta-analysis. *J Affect Disord* 2016;200:119-32. doi: 10.1016/j.jad.2016.04.040.
- Mumford DB, Tareen IA, Bajwa MA, Bhatti MR, Karim R. The translation and evaluation of an Urdu version of the Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand* 1991;83:81-5. doi: 10.1111/j.1600-0447.1991.tb07370.x.
- Albert PR. Why is depression more prevalent in women? *J Psychiatry Neurosci* 2015;40:219-21. doi: 10.1503/jpn.150205.
- Akhtar-Danesh N, Landeen J. Relation between depression and sociodemographic factors. *Int J Ment Health Syst* 2007;1:e4. Doi: 10.1186/1752-4458-1-4
- Kessler RC, Bromet EJ. The epidemiology of depression across cultures. *Annu Rev Public Health* 2013;34:119-38. doi: 10.1146/annurev-pubhealth-031912-114409.
- Ciancio SG. Medications' impact on oral health. *J Am Dent Assoc* 2004;135:1440-9. doi: 10.14219/jada.archive.2004.0055.
- Scannapieco FA. Systemic effects of periodontal diseases. *Dent Clin North Am* 2005;49:533-50. doi: 10.1016/j.cden.2005.03.002.
- Kadia S, Bawa R, Shah H, Narang P, Lippmann S. Poor oral hygiene in the mentally ill: be aware of the problem, and intervene. *Curr Psychiatr* 2014;13:47-8.
- Sadock B, Sadock V, Ruiz P. Neural sciences, Chapter 1. In: *Synopsis of Psychiatry*, 11th ed. Philadelphia, PA: Lippincott Williams and Wilkins, 2015; pp 67-70.
- Dumitrescu AL. Depression and Inflammatory Periodontal Disease Considerations-An Interdisciplinary Approach. *Front Psychol* 2016;7:e347. doi: 10.3389/fpsyg.2016.00347.
- Youfee L. The link between oral health and medical illness. [Online] 2012 [Cited 2019 January 03]. Available from URL: <https://www.everydayhealth.com/dental-health/oral-conditions/oral-health-and-other-diseases.aspx>
- Thomas AC, Staiger PK. Introducing mental health and substance use screening into a community-based health service in Australia: usefulness and implications for service change. *Health Soc Care Community* 2012;20:635-44. doi: 10.1111/j.1365-2524.2012.01079.x
- Delgado-Angulo EK, Sabbah W, Suominen AL, Vehkalahti MM, Knuutila M, Partonen T, et al. The association of depression and anxiety with dental caries and periodontal disease among Finnish adults. *Community Dent Oral Epidemiol* 2015;43:540-9. doi: 10.1111/cdoe.12179.
- Godil A, Mallick MSA, Adam AM, Haq A, Khetpal A, Afzal R, et al. Prevalence and severity of depression in a Pakistani population with at least one major chronic disease. *J Clin Diagn Res* 2017;11:05-10. doi: 10.7860/JCDR/2017/27519.10329.
- Mirza I, Jenkins R. Risk factors, prevalence, and treatment of anxiety and depressive disorders in Pakistan: systematic review. *BMJ* 2004;328:794. doi: 10.1136/bmj.328.7443.794.