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The association between Oral Health and Depression among university students in Makkah city: A web-based survey study

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ABSTRACT

Background: Oral health encompasses a global health burden. Recently, a connection between oral health and depression was detected in many studies. Our study aimed to determine the association level between oral health and depression among university students in Makkah City. *Methodology:* A survey-based study was conducted via online social media channels utilizing two validated standardized tools: Oral Health Impact Profile-14 questionnaire and Patient Health Questionnaire (PHQ)-9. *Results:* 534 students were included in this survey; the Mean age was 21.3 with (SD=2.03)—most students aged 20 years old, 21.91%. Most participants had good levels of oral health, 94.19%, while most of the participants, on the other hand, had mild levels of depression, 38.58%. A statistically significant association was found between those with mild levels of depression and those with good levels of oral health (P-value, >0.001). *Conclusion:* This study demonstrated an association between oral health and depression among university students in Makkah City. More research is advised to support the results.

Keywords: Oral Health, Depression, Students, Saudi Arabia.

1. INTRODUCTION

It is now widely established that oral problems and diseases affect people's lives (Mulla, 2021; Dahl et al., 2012). Oral health-related pain can interfere with the ability of people to speak and decide what to eat, which lowers their quality of life (QoL) and has functional, emotional, and social implications (Mulla, 2021; Alzahrani et al., 2019; Beaudette et al., 2017). The World Health Organization (WHO) amended the definition of health in 1984, stating it is the degree to which a person or group can realize objectives and satisfy requirements and adapt and cope with the environment. Health is a positive

term highlighting social and personal resources and physical capacities. It is a resource for daily life, not the goal of living (Mulla, 2021; Organization, 1984).

The general health of a person can be determined by their oral health (OH), which is closely related to both public health and health-related quality of life (HRQoL) (Thirunavukkarasu et al., 2022; Sabbah et al., 2019; Kieffer and Hoogstraten, 2008). A suitable metric for evaluating the general health of people and the impact of medical conditions on their quality of life is HRQoL (Thirunavukkarasu et al., 2022; Karimi and Brazier, 2016). Understanding oral health-related quality of life (OHRQoL) helps us better understand our overall health and quality of life (Thirunavukkarasu et al., 2022; Bennadi and Reddy, 2013). OHRQoL is the subjective perception of oral health-related symptoms that impact an individual's well-being (Thirunavukkarasu et al., 2022).

To determine how OH affects social, psychological, and functional well-being in daily life, the OHRQoL includes patient-centered outcome measures (Thirunavukkarasu et al., 2022; Bennadi and Reddy, 2013; Mehta and Kaur, 2011). Low self-esteem, sadness, lower performance in daily activities, a lack of social connection, and an increased cost on the healthcare system are only a few of the detrimental effects of poor OH and OHRQoL in persons (Thirunavukkarasu et al., 2022; Kieffer and Hoogstraten, 2008; Kane, 2017). Additionally, some research Hajek and König, (2022), AlJameel et al., (2015), de-Andrade et al., (2012), Barbosa et al., (2018), Esmeriz et al., (2012), Hassel et al., (2011), Hybels et al., (2016), Kim et al., (2017), Silva et al., (2015), Mitri et al., (2020) has been done on the relationship between probable depression and dental health-related quality of life.

They mainly demonstrated a correlation between a lower quality of life connected to dental health and a higher probability of likely depression (Hajek and König, 2022; AlJameel et al., 2015; de-Andrade et al., 2012; Barbosa et al., 2018; Hybels et al., 2016; Silva et al., 2015; Mitri et al., 2020). Only two studies have been done on the relationship between adult anxiety and dental health-related quality of life. These two investigations, however, did not clearly distinguish between anxiety and depression. Both studies Hajek and König, (2022), Moon et al., (2020), Hayashi et al., (2019) found a substantial correlation between anxiety/depressive symptoms and a lower quality of life linked to dental health. Our study aimed to emphasize the relationship between oral health and depression among students in Makkah City. This will help in the early determination of depression and increase awareness of other consequences among individuals with poor oral health and their quality of life.

2. METHODOLOGY

This web survey study was conducted at Umm Al-Qura University, Makkah City, in June 2023. This study was approved by the ethical committee of Umm Al-Qura University in 2023 Approval No. (HAPO-02-K-012-2023-08-1697), and a principle of the Declaration of Helsinki (DoH) was followed. We interviewed male and female students electronically, utilizing a web survey of Google platforms distributed via social media platforms. Male and female Students aged from 20 to 35 years old from Umm Al-Qura University were included in this survey, while those outside the university were excluded. Additionally, we excluded students who could not reach or communicate, were physically ill, or were rejected from participating in this survey. Umm Al-Qura University statistics show that the number of students was estimated to be 101931 in 2018. We utilized epi-info software to compute the sample size according to the previous population. As a result, we need at least 385 participants to achieve a CI of 95%.

However, we collected 534 samples during data collection to overcome the incomplete participation. We structured our survey and categorized it into three different sections. We first gathered the social-demographical data of the participants. Then, we used the Arabic language of the Oral Health Impact Profile-14 questionnaire to evaluate oral health (Al-Habashneh et al., 2012). Lastly, we used the Arabic language of the Patient Health Questionnaire (PHQ)-9 to assess depression (Al-Qadhi et al., 2014; AlHadi et al., 2017). Our data was codded using MS Excel and then transferred into SPSS version 25. A descriptive analysis using mean and frequency was used for continuous variables. Then, we used an independent Chi-square test to determine the significance level and compared the categorical variable.

Variable related to the Oral Health Impact Profile-14 questionnaire was computed during analysis. The final score was categorized into the following: Those with less than 60% were classified as having good Oral health-related quality of life, while those with greater or equal to 60% were classified as having a poor Oral health-related quality of life (Al-Habashneh et al., 2012). Furthermore, a variable related to Patient Health Questionnaire (PHQ)-9 was calculated as well during analysis; the final score was labeled as follows, those who earned a score between 0-4 were classified as none or minimal depression, from 5-9 mild, from 10-14 moderate, from 15-19 moderately severe, while those 20-27 classified as extremely severe (Al-Qadhi et al., 2014; AlHadi et al., 2017).

3. RESULTS

This is an electronic survey study that enrolled a total of 534 university students in Makkah City. The age mean of the participants was 21.3 (SD, 2.03); participants with 20 years old showed the most responses (n=117, 21.91%) (Figure 1). Males, Saudis, and single

respondents responded the most (52.8%, 84.3%, and 74%, respectively) (Table 1). Most participants show a very good level of dental care (50.7%), while about (1.7%) show very bad care on the contrary. Moreover, 24.5% of participants had a previous history of TMJ problems, and 18% had mouth-burning sensations (Table 1).

Surprisingly, 94.19% of students show good oral health compared to poor oral health 5.81%. On the other hand, most participants had mild levels of depression, 38.58%. (Figure 2, 3) Tables 2 and 3 demonstrate participants' related oral health and depression profiles. Table 4 shows the relationship between oral health and depression. Participants with a mild level of depression corresponded significantly with good oral health (P-value, >0.001) (Table 4).

Table 1 Demographic data

Variable	Category	Frequency (n.)	(%)
Gender	Male	282	52.8%
	Female	252	47.2%
Nationality	Saudi	450	84.3%
	Non-Saudi	84	15.7%
Social status	Single	395	74.0%
	Married	139	26.0%
Level of dental care	Excellent	130	24.3%
	Very good	271	50.7%
	Good	95	17.8%
	Poor	29	5.4%
	Very bad	9	1.7%
TMJ pain	Yes	131	24.5%
	No	403	75.5%
Mouth-burning sensation history	Yes	96	18.0%
	No	438	82.0%
Age (Mean), (Standard deviation)	(Mean, 21.3), (SD, 2.03)		

Table 2 Oral health profile

Categories	Answers	N.	%
Have you ever had issues with your mouth or teeth that made it difficult for you to pronounce words?	None	227	42.5%
	Hardly ever	204	38.2%
	Occasionally	86	16.1%
	Fairly often	13	2.4%
	Very often/ Every day	4	0.7%
Have you noticed that teeth or oral health issues have made your sense of taste worse?	None	218	40.8%
	Hardly ever	195	36.5%
	Occasionally	105	19.7%
	Fairly often	11	2.1%
	Very often/ Every day	5	0.9%
Have you had painful aching in your mouth?	None	51	9.6%
	Hardly ever	160	30.0%
	Occasionally	268	50.2%
	Fairly often	47	8.8%
	Very often/ Every day	8	1.5%
Because of dental or oral issues, have you ever found it unpleasant to eat certain foods?	None	66	12.4%
	Hardly ever	133	24.9%
	Occasionally	248	46.4%
	Fairly often	70	13.1%

	Very often/ Every day	17	3.2%
Have you been self-conscious because of your teeth or mouth?	None	99	18.5%
	Hardly ever	121	22.7%
	Occasionally	205	38.4%
	Fairly often	85	15.9%
	Very often/ Every day	24	4.5%
Have you felt tense because of problems with your teeth or mouth?	None	104	19.5%
	Hardly ever	143	26.8%
	Occasionally	210	39.3%
	Fairly often	62	11.6%
	Very often/ Every day	15	2.8%
Have dental or oral health issues affected your diet in any way?	None	123	23.0%
	Hardly ever	122	22.8%
	Occasionally	192	36.0%
	Fairly often	79	14.8%
	Very often/ Every day	18	3.4%
Have you ever had to stop eating because of mouth or tooth issues?	None	121	22.7%
	Hardly ever	104	19.5%
	Occasionally	210	39.3%
	Fairly often	83	15.5%
	Very often/ Every day	16	3.0%
Have dental or oral health issues made it difficult for you to unwind?	None	119	22.3%
	Hardly ever	122	22.8%
	Occasionally	192	36.0%
	Fairly often	91	17.0%
	Very often/ Every day	10	1.9%
Have issues with your teeth or mouth caused you to feel a little dissatisfied	None	104	19.5%
	Hardly ever	138	25.8%
	Occasionally	202	37.8%
	Fairly often	71	13.3%
	Very often/ Every day	19	3.6%
Due to issues with your mouth or teeth, have you been a little upset around others?	None	174	32.6%
	Hardly ever	116	21.7%
	Occasionally	167	31.3%
	Fairly often	65	12.2%
	Very often/ Every day	12	2.2%
Have issues with your teeth or mouth prevented you from performing your regular duties?	None	143	26.8%
	Hardly ever	127	23.8%
	Occasionally	203	38.0%
	Fairly often	50	9.4%
	Very often/ Every day	11	2.1%
Have you felt that life in general was less satisfying because of problems with your teeth or mouth?	None	160	30.0%
	Hardly ever	119	22.3%
	Occasionally	180	33.7%
	Fairly often	68	12.7%
	Very often/ Every day	7	1.3%
Due to dental or mouth issues, have you ever been completely unable to function?	None	174	32.6%
	Hardly ever	112	21.0%

	Occasionally	180	33.7%
	Fairly often	58	10.9%
	Very often/ Every day	10	1.9%

Table 3 Depression profile

Categories	Answers	N.	%
Little interest or pleasure in doing things?	Not at all	172	32.2%
	Several days	307	57.5%
	More than half the days	46	8.6%
	Nearly every day	9	1.7%
Feeling down, depressed, or hopeless?	Not at all	169	31.6%
	Several days	266	49.8%
	More than half the days	77	14.4%
	Nearly every day	22	4.1%
Difficulty falling or staying asleep, or excessive sleep?	Not at all	170	31.8%
	Several days	234	43.8%
	More than half the days	98	18.4%
	Nearly every day	32	6.0%
Feeling tired or having little energy?	Not at all	126	23.6%
	Several days	275	51.5%
	More than half the days	97	18.2%
	Nearly every day	36	6.7%
Poor appetite or overeating?	Not at all	152	28.5%
	Several days	238	44.6%
	More than half the days	108	20.2%
	Nearly every day	36	6.7%
Feeling bad about yourself or that you are a failure or have let yourself or your family down?	Not at all	192	36.0%
	Several days	230	43.1%
	More than half the days	84	15.7%
	Nearly every day	28	5.2%
Having trouble focusing on activities like reading a newspaper or watching television?	Not at all	267	50.0%
	Several days	180	33.7%
	More than half the days	61	11.4%
	Nearly every day	26	4.9%
Speaking or moving too slowly for other people to hear? Or perhaps you've been more jittery or restless than usual, moving around much more than typical?	Not at all	213	39.9%
	Several days	250	46.8%
	More than half the days	59	11.0%
	Nearly every day	12	2.2%
Thoughts that you would be better off dead or hurting yourself in some way?	Not at all	339	63.5%
	Several days	145	27.2%
	More than half the	33	6.2%

	days		
	Nearly every day	17	3.2%

Table 4 The association between oral health and depression

Category	Oral Health		P-value
	Good (N.)	Poor (N.)	
Depression			
None	153	0	
Mild	204	2	>0.001*
Moderate	105	22	
Moderately severe	32	7	
Severe	9	0	

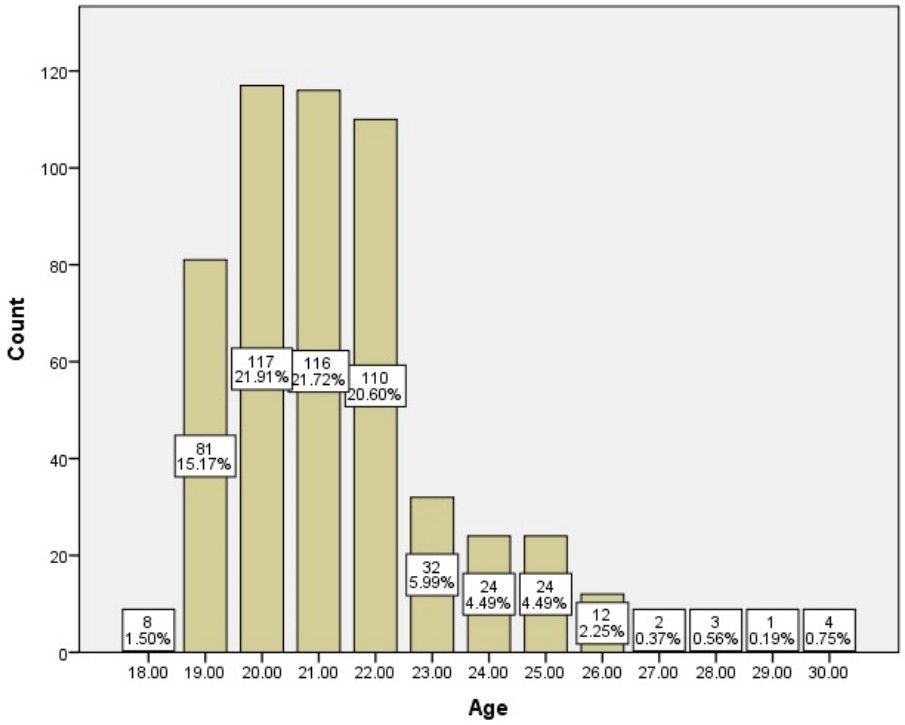

Figure 1 Age Frequency

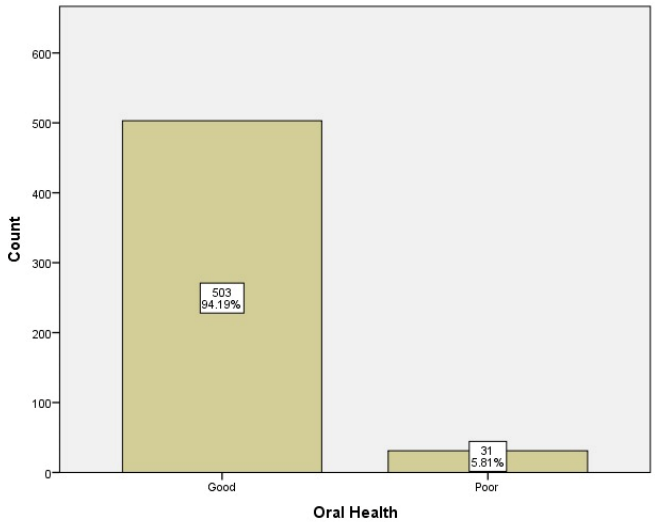

Figure 2 The Frequency of Oral Health

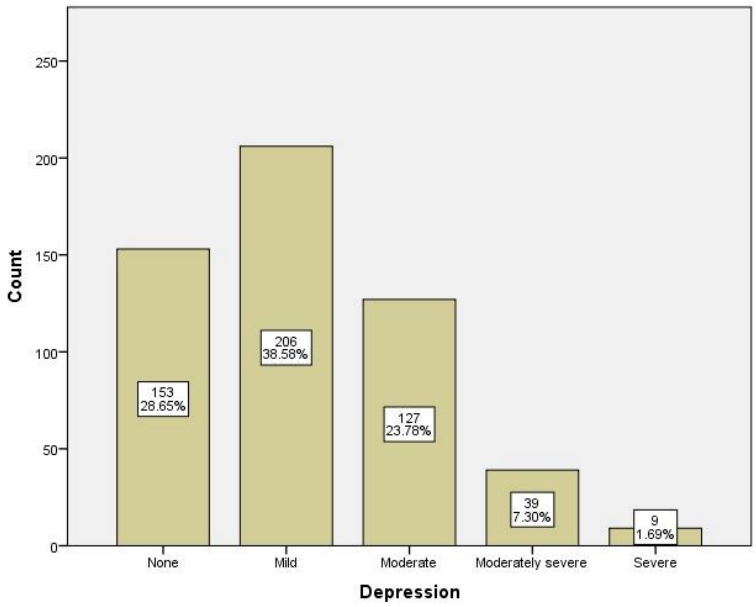

Figure 3 The Frequency of Depression

4. DISCUSSION

Our study highlighted the association between oral health and the probability of depression among students at Umm AL-Qura University, Makkah City. In concordance with many correlative studies with our results, a positive connection was detected between those with good oral health and a mild probability of having depression. A study conducted in Brazil by Barbosa ACS et al. shows that occlusion, self-perception of oral health, gingival bleeding, sex, and skin color were associated with depressive symptoms (Barbosa et al., 2018). A different study found a link between decreased dental health and moderate to persistent depression symptoms in elderly people (Hybels et al., 2016). Moreover, a cross-sectional study conducted in Germany shows a significant relationship between the likelihood of probable depression and lower oral health-related quality of life (Hajek and König, 2022).

In a cross-sectional pilot investigation, Rosania et al., (2009) demonstrated a relationship between periodontal disorders and stress, depression, and the quantity of salivary cortisol, despite even though the study only included a small number of participants (45 periodontal patients). This indicates that a group of individuals with oral problems were used in this study for examination of sadness and anxiety (Rosania et al., 2009). In contrast, some research showed no link between periodontal disorders and anxiety/depression. In a cross-sectional study involving 153 participants, Solis et al., (2004) failed to discover a link between depression or anxiety and periodontitis. In 191 older persons over 60 years old, Viana et al., (2013) also did not discover a significant link between depression and periodontitis.

One possible reason for these relationships is that oral health improves general health-related quality of life and life satisfaction Yamamoto et al., (2017), Benyamini et al., (2004), which can lead to depression (Cademartori et al., 2018). Furthermore, factors such as exhibiting teeth with embarrassment or feeling stigmatized because of the teeth may impair general self-esteem, increasing the chance of depression or anxiety (Yamamoto et al., 2017; Benyamini et al., 2004; Locker, 2009).

Limitation

It is essential to note some advantages and restrictions. Data were gathered for our study via a representative poll. The main variables—oral health-related quality of life—were measured using generally accepted and reliable techniques. It should be made clear that these are screening tools, in any case. Future study is therefore required to validate our findings. Our analysis also includes a cross-sectional design, which has known limitations in terms of causation. In this field, longitudinal research is mandatory. We cannot rule out the potential that non-responders have different characteristics from respondents, such as other health statuses. These potential variations, however, were impossible to calculate.

5. CONCLUSION

Our study finds a significant relationship between oral health and depression among students in Makkah City. National awareness programs are recommended for the early diagnosis of depression to prevent serious consequences. Furthermore, future investigation is also required to identify relative causes and confirm the study's findings.

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Ethical approval
Obtaining ethical approval from UQU's research ethics committee in 2033 Approval No (HAPO-02-K-012-2023-08-1697)

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Conflict of interest
The authors declare that there is no conflict of interest.

Data and materials availability
All data sets collected during this study are available upon reasonable request from the corresponding author.

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