

Association between level of depression and caries status in 12-17 year old children- a cross-sectional study

Abstract

Introduction: Depression is being considered the second leading contributor to the list of global burden of diseases according to the WHO. Dental caries, too, continues to be one of the most common infectious diseases affecting children. In adolescents, both may be associated with unhealthy dietary behaviours and poor quality of life. However, few studies in the literature have reported their association.

Aim: To determine the association between level of depression and caries status, and the effect of modifying factors in 12-17 year old children.

Materials and methods: 50 children aged 12-17 years were included in the study. Level of depression was measured using 11-point Kutcher Adolescent Depression Scale (KADS). Caries status was determined by DMFT index.

Results: High correlation was observed between KADS and DMFT ($\rho=0.85$, $p<0.05$) and KADS and sugar intake ($\rho=0.7$, $p<0.05$). Age, gender and brushing had no effect on the association.

Conclusion: Depression had a strong association with caries status.

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Introduction

Symbolic importance of the mouth and its basic function in a person's mental and psychological well-being should not be underestimated. During the past two decades, increasing interest has been developed regarding what an individual thinks about his oral condition and what impact would it have on the quality of life. A more holistic perspective of oral health has given rise to the concept of oral health-related quality of life, which has also been associated with depression. Major depression is a psychiatric disorder in which thoughts, moods, behavioural patterns are impaired, often for an extended period of time. This condition appears to have an increasing prevalence among young children and adolescents. It may be associated with disinterest in performing appropriate preventive oral hygiene techniques, a cariogenic diet, rampant dental decay, and advanced periodontal disease. WHO in 2016 defined depression as a common mental disorder that presents with depressed mood, loss of interest or pleasure, decreased energy, feeling of guilty or self-worth, disturbed sleep or appetite and poor concentration. Out of all the people suffering from depression, only 20% seek treatment. Suicide has been considered as the third leading cause of death among 15-24 year olds. Also, depression will be ranked as the second largest killer by 2020 after heart disease. WHO has also predicted that depression will be the second leading contributor to the global burden of disease.¹

In the Indian scenario, it has been reported that 11.2% of school dropouts had severe and extreme grades of depression as against 3% school going, and depression has been reportedly more prevalent in the urban population as compared to the rural. Rise in depression in the urban India is attributed to modernization, technological complexity and changing social values.² Dental caries, too, is one of the most common, communicable and intractable infectious diseases in human beings. Dental caries is one of the most prevalent chronic diseases in children worldwide and most expensive to treat.

It is a major public health concern impacting not only the child and individual families, but also from population health perspective.³ Almost half of the population in USA between 5 to 9 years of age suffers from dental caries. Asian countries, such as Korea and China, were in the middle of the spectrum, with caries prevalence of 56.6% and 55%, respectively. In India almost half of the population (rural as well as urban) below 5 years of age suffers from dental caries. In its multifactorial etiology, could depression be a factor?⁴ Few studies in Indian context have reported association between depression and dental caries. Therefore, the current study was planned with following aim and objectives:

Aim: To determine the association between level of depression and caries status, and the effect of modifying factors in 12-17 year old children

Objectives

1. To study the effect of depression on dental caries.
2. To study the effect of age and gender on depression and dental caries.
3. To study the effect of brushing frequency on depression and dental caries.
4. To study the effect of sugar intake frequency on depression and dental caries.

Materials and methods

This was a cross-sectional study. An urban area was selected for the study. The study unit comprised of children between the age group of 12-17 years. The target population was selected from the OPD of the Department of Pediatric and Preventive Dentistry. Information sheets were given to parents with written consent forms in three languages (Hindi, English and Marathi). The study consisted of

questionnaire (study tool) to be filled by participants and dental check-up was done. This being a preliminary investigation and in absence of literature reporting a similar association, a non-probabilistic sample of 50 children were selected. Children were between the age group of 12-17 years were chosen for the study. The study was conducted from June to July 2017. A prevalidated 11-point Kutcher Adolescent Depression Scale (KADS) was administered to calculate the score and level of depression as a quantitative continuous variable amongst the participants. Each question had 3 options, thus the total of the entire questionnaire would become 33. Participants having scores above 5 (of total 33) were being considered to have signs of depressions and scores below 5 would indicate no depression. Thus the depression status was recorded as a binary categorical variable: positive/negative. An example of the KADS has been given in Figure 1. Caries status was calculated using DMFT index. Mean DMFT was recorded as a quantitative continuous variable. The modifying factors considered in the study were age, gender, sugar intake and brushing frequency.

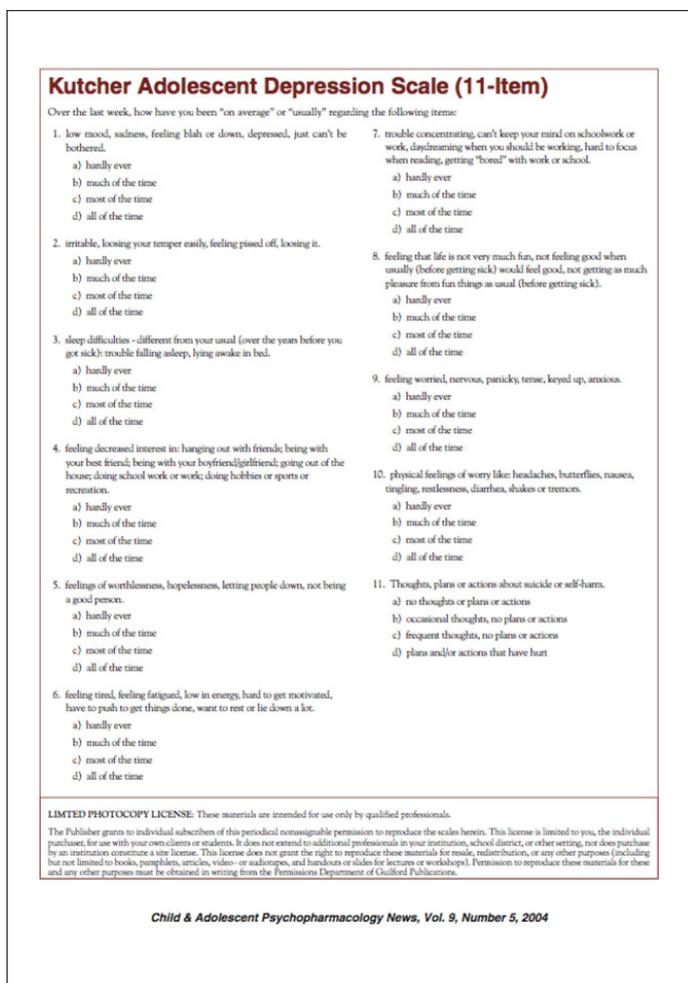


Figure 1

Results

Data obtained was compiled on a MS Office Excel Sheet (2010) and was subject to statistical analysis using Statistical Package for

Social Sciences (SPSS v 21.0, IBM). On checking for normality using Kolmogorov Smirnov test, data were found to be non-normal; hence, non-parametric tests were used. For all the statistical tests, $p < 0.05$ was considered as the level of statistical significance. Bivariate correlation was checked using Spearman's correlation test for the variables like age and depression scale with each other and with other variables like mean DMFT, sugar intake frequency and brushing frequency. Gender-wise comparison of variables like DMFT score, sugar intake frequency and brushing frequency was done using Mann Whitney U test (Table 1), (Table 2).

Table 1 Characteristics of study population

Age (years)	Number of boys	Number of girls
12	4 (40%)	6 (60%)
13	4 (44.4%)	5 (55.55%)
14	3 (42.8%)	4 (57.14%)
15	5 (71.4%)	2 (28.57)
16	6 (60%)	4 (40%)
17	3 (42.8%)	4 (57.14%)

Number of boys – 25 Number of girls – 25

Table 2 Associations between depression and Age, DMFT, Sugar intake frequency, and brushing frequency

Variable	Correlation statistic	Age	Depression score
Age	Spearman rho Sig. (2-tailed)		-0.253 .077#
DMFT Score	Spearman rho Sig. (2-tailed)	0.01 0.947	0.851 .001*
Sugar Intake Frequency	Spearman rho Sig. (2-tailed)	-0.404 0.004	0.701 .001*
Brushing Frequency (Times/Day)	Spearman rho Sig. (2-tailed)	-0.374 0.008	0.005 .975#

(* Significant, # Non-significant)

DMFT and sugar intake frequency was positively associated with depression and the strength of the association was high and statistically significant ($\rho = .851$ and $\rho = .701$ respectively; $p < 0.01$). Brushing frequency was also positively related with depression but the strength of the association was slight and statistically non-significant ($\rho = 0.005$; $p > 0.05$). Age was negatively associated with depression and the strength of the association was slight but statistically non-significant ($\rho = -0.253$; $p > 0.05$) (Table 3), (Table 4).

There was a statistically significant difference between depression scores grouped as > 5 & < 5 with respect to like DMFT Score but the difference between depression scores and other variables like sugar intake frequency & brushing frequency (times/day) ($p > 0.05$) was statistically non-significant.

Table 3 Gender-wise comparison of variables

	SEX	N	Mean	Std. deviation	Std. Error mean	Median	Mean rank	MWU	Z	p
Depression Score	Boys	25	5.36	2.706	0.541	6	25.28	307	-0.108	0.914#
	Girls	25	5.64	2.899	0.58	5	25.72			
DMFT Score	Boys	25	3.96	1.837	0.367	4	29.06	223.5	-1.1761	0.078#
	Girls	25	3.12	1.716	0.343	3	21.94			
Sugar Intake Frequency	Boys	25	1.76	0.723	0.145	2	23.58	264.5	-1.021	0.311#
	Girls	25	1.96	0.79	0.158	2	27.42			
Brushing Frequency (Times/Day)	Boys	25	1.28	0.458	0.092	1	25	300	-0.306	0.760#
	Girls	25	1.32	0.476	0.095	1	26			

(# Non-significant)

The difference between genders with respect to all variables like depression score, DMFT score, sugar intake frequency and brushing frequency was statistically non-significant (p>0.05)

Table 4 Comparison of variables with depression scores grouped as >5 &<5

	depression or not	N	Mean	Std. Deviation	Std. Error Mean	Median	Mean rank	MWU	Z	p
DMFT Score	>score 5	35	4.59	1.823	0.338	4	26.12	286.5	-0.361	<0.05*
	<score 5	15	2.48	1.834	0.4	3	24.64			
Sugar Intake Frequency	>score 5	30	4	0.802	0.149	2	27.86	236	-1.464	<0.05*
	<score 5	20	1.27	0.658	0.144	2	22.24			
Brushing Frequency (times/day)	>score 5	29	1.31	0.471	0.087	1	25.76	297	-0.186	0.853#
	<score 5	21	1.29	0.463	0.101	1	25.14			

(*Significant; # Non-significant)

Discussion

Depression is a leading cause of death among a lot of adolescents. 1 Over 135 years ago, Patrick in 1883 is quoted to have asked “Are people more subject to nervous diseases now than formerly?” and if so, do such people suffer more from diseases of the teeth than those people who are not so affected?² Stress has been found to be the “missing link” in the etiology of dental caries. Increased levels of depression have been linked to the increased consumption of carbohydrates. Carbohydrates are found to increase the plasma concentration of the precursor tryptophan (TRP). An increase in the plasma TRP by carbohydrates is caused by a carbohydrate-induced rise in glucose that triggers insulin secretion and facilitates the uptake of the large neutral amino acids, but not TRP, into the skeletal muscles. Alterations in brain 5-HT play an important role in the regulation of hypothalamic pituitary axis activity and stress adaptation, by dampening sympathetic stress responses through the inhibition of HPA activation and reestablishing psychological balance.⁵ The most common assumption is that a low mood elicits carbohydrate cravings because of a serotonin deficit. This deficit promotes the consumption of carbohydrates because pure carbohydrate elevates central serotonin

synthesis, and the increased synthesis of serotonin is assumed to ameliorate the dysphoric mood which strengthens the connection between dysphoric mood and carbohydrate consumption.⁶

Since the time of Aristotle it has been considered that carbohydrates played an essential role in the pathogenesis of dental caries. A potent relationship exists between the dietary sugars and oral health. The food we consume affects the integrity of the teeth; quantity, pH, and composition of the saliva; and pH of the plaque. The fermentable carbohydrates, after being hydrolyzed by salivary amylase, provide substrate for the actions of oral bacteria, which in turn lowers the plaque and salivary pH. The resultant action is the beginning of enamel dissolution. Dental caries results from the action of specific bacteria which colonize the tooth surface and metabolize particular components of the diet. The action results in the rapid and sometimes prolonged production of acid on the tooth surface resulting in the dissolution of the enamel.⁷

The present study reveals that in adolescents (12-17 years), both DMFT and sugar intake frequency were associated with the depression score. We could not compare our results with the literature due to scarcity of studies reporting similar association. A limitation

of this study could be the small size of our sample. Severity of the level of depression needs to be determined to know more about its relation to the DMFT score. Other adolescent depression scales can be tried to get a more clear idea about the underlying causes and provide the necessary information. It could be fair to generalize the findings of the present study as the mechanism by which caries occurs due to depression would remain the same. However, studies in different settings with a larger sample size can confirm the same.

Conclusion

From the study, we conclude that a strong association exists between depression and dental caries; and also with depression and sugar intake frequency. Recommendations: Basic assessment of depression in adolescents with high caries by dentists and necessary referrals to psychologists or psychiatrists is recommended. Multicentric studies with larger and more representative samples can substantiate our claims.

Acknowledgements

None.

Conflict of interest

The author declares that there is no conflict of interest.

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