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Sense of coherence and its association with caries experience and gingivitis in adolescents

[1]Dr. Pravallika H.N., Department of Pediatric and Preventive Dentistry, A.J. Institute of Dental Sciences, Mangalore, Karnataka, India.

[2]Dr. Ann Thomas, Department of Pediatric and Preventive Dentistry, A.J. Institute of Dental Sciences, Mangalore, Karnataka, India.

[3]Dr. Sowmya B, Department of Pediatric and Preventive Dentistry, A.J. Institute of Dental Sciences, Mangalore, Karnataka, India.

Corresponding Author: Dr. Pravallika H.N., Department of Pediatric and Preventive Dentistry, A.J. Institute of Dental Sciences, Mangalore, Karnataka, India.

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Abstract

Background: Sense of coherence (SOC) is a psychosocial factor that can help individuals to be better prepared to maintain and improve their health condition. Recent literature suggests SOC level stabilizes in mid-adolescence; and also a relationship between sense of coherence and oral health maintenance and the proponents have suggested, enhancement of adolescent oral health experience in their daily life by promoting sense of coherence.

Objectives: The objective of the study is to assess the level of sense of coherence and its association with caries experience and gingivitis in adolescents.

Material and Methods: This cross-sectional study included 332 healthy adolescents aged between11-17years. The study participants were subjected to oral examination, to assess caries experience DMFT/DEFT indices and to assess gingivitis Loe and Silness gingival Index was used. The examination was carried out under bright day light, with patients seated in upright position using a mouth mirror, explorer and UNC-15 periodontal probe. All study participants were also being subjected to a self-administered questionnaire which included Antonovsky's shorter version of SOC-13 the data was collected, coded and fed in SPSS IBM version 23, for statistical analysis. The descriptive statistics included mean and standard deviation. The inferential statistical tests included ANOVA test followed by post hoc Tukeys test and Pearson correlation test for comparison. The level of significance was set at 0.05 at 95% confidence interval.

Results & Conclusion: The mean SOC in the study population was50.18±12.77 indicating a moderate level of SOC (82.80%). The prevalence of caries and

gingivitis was of the study population was 50.30% and 42.46% Highly significant association was found between SOC and oral health, namely caries experience (p=0.006**)**, and gingival health (p= 0.00). Our findings suggest fostering strong SOC could be valuable in promoting oral health.

Keywords: Sense of coherence (SOC), gingival health, Dental caries, Adolescent oral health.

Introduction

Sense of coherence (SOC) is a psychosocial factor that can help individuals to be better prepared to maintain and improve their health condition.(1)It is the fundamental concept of Antonovsky's Health generation theory and is a personal characteristic related to patients health related quality of life.(2) It explains why some individuals stay healthy, even after they combat highly deleterious disease, while some succumb to the disease. High sense of coherence has been related with positive health outcomes and perceived good health, and also found to aid individuals to cope better, face challenges and find solutions, to stay healthy.(2) Traditionally the focus was on the 'causes of disease', however in recent years, the focus has shifted to the 'origin of health'.

The idea of salutogenesis was a fall out of Aron antonovsky's observational study in Israeli women of different ethnic groups in the world war II concentration camps (3) and found these women to have good health despite their devastating experience; which lead to further questioning its possibility.(4) Salutogenesis is the study of the origin of health, factors responsible for health and well being of an individual rather than etiology of the disease.(4)Its derived from the words 'Salus' meaning 'health', and 'genesis' meaning 'origin' it deals with the study of health rather than disease, and of personal resources essential for maintaining health and moving forward.(4)

In recent years a lot of attention has been around this psychological factor of health and wellbeing. Scientific literature has numerous reports of SOC and its correlation in various medical conditions namely women with breast cancer(5) congenital heart disease (5,6),diabetes,(7) Huntington's disease,(8) and rheumatoid arthritis (9). Sense of coherence (SOC) has also been related to oral health behaviors and oral-health-related quality of life (OHRQoL.(10,11)Some studies show a relationship of SOC with dental caries. literature suggests sense of coherence has a relationship with maintaining oral health(loss of attachment and OHI-S) (12), gingival bleeding(13),self perceived dental aesthetics(14) and Plaque and periodontal disease(14) and Lower sense of coherence has seen to be associated with dental anxiety(15), and negative perception of dental appearance.(14) However there is a paucity of studies in this emerging area of study. Individuals with a higher SOC are more likely to engage in preventive behaviors such as regular brushing, flossing, and dental check-ups and are more inclined to adopt preventive oral health practices, thereby reducing their susceptibility to dental caries. SOC can play a role in influencing oral health behaviors and outcomes, including the incidence of dental caries and gingivitis.

Adolescence is a crucial period for the development of SOC as it is hypothesized that an individual develops SOC during the first three decades of life after which only strong changes could alter it, also some researchers suggest that SOC level stabilizes in mid-adolescence (3) Adolescent patient have distinctive oral health needs due to various factors like potentially high caries rate, a tendency for poor oral hygiene, nutritional habits, negligence for routine oral health care visit, increased risk for periodontal disease and traumatic injury, an increased esthetic desire, dental phobia, unique social

and psychological needs and the Treatment can be complex and multidimensional.(16) Hence It is an essential time for, making lifestyle choices, taking up responsibilities, and inculcating healthy habits and behaviors that can be carried through adulthood.(15). It is proposed that adolescent's experience of oral health in their daily life can be enhanced by promoting sense of coherence.(11)

This study aims to find the association of SOC with oral health namely dental caries and gingival health in adolescents. It will provide a baseline data of SOC in adolescent population for planning further intervention programs to improve the SOC in individuals to promote oral health.

Materials and Methods

The sample size was estimated to be 331.7, when computed with an assumption of 95% confidence interval, 80% power, and an allowable error of ± 0.4, and on using the formula given below. For its estimation the standard deviation was taken from that of the reference article (Kantipudi JN Mrudhula et al(2),where the mean dmft among adolescents with strong sense of coherence was 1.45± 1.84. and The sample size has been rounded off to 332.

Study was conducted after receiving ethical approval (IEC/PEDO22/146/V2) from AJIDS ethics committee.The study protocol was explained in detail to the school authorities to obtain permission to conduct the study. Convenience sampling was adopted to select the school. Healthy adolescents aged between 11 to 17 years from 4 English medium Schools in Mangalore were invited to participate in the study. Over 1000 consent forms were distributed and children <12 years who provided verbal assent and parental consent, and, those >12 years who provided written assent and parental consent were included in the study. All study participants were also subjected to a self-administered questionnaire. To prevent instruction bias single instructor introduced and explained the questionnaire to the study participants to prevent ambiguity, and to reduce incorrect responses in the participants. The first 332 participants who gave the duly filled questionnaires were included in this study. The oral examination was carried out under bright day light, with patients seated in upright position using a mouth mirror, explorer and periodontal probe. Oral examination was carried out to assess the caries experience and gingival health, which was carried out by a single examiner. To assess caries experience DMFT/deft indices was used and to assess gingivitis Loe and Silness Gingival Index was used. (17, 18)The study tool namely the questionnaire was used to assess the SOC. It consisted of the Antonovsky's shorter version of sense of coherence scale consisting(SOC-13) of 13 questions (19) that is it includes five items for comprehensibility, and four each for manageability and meaningfulness. Each of the items in the scale is scored on a seven-point semantic differential scale. The total score could range between 13–91 points and the total sense of coherence score is obtained by adding the individual responses to 13 items of the scale where higher scores indicates a stronger SOC. Based on the total score the individual was categorized as one with weak, moderate, and strong SOC based on the score ranges <33, 33-36, and >66 scores respectively.(2)

The data was collected, coded and fed in SPSS IBM version 23, for statistical analysis. The descriptive statistics included mean and standard deviation. The inferential statistical tests included ANOVA test followed by post hoc Tukeys test and Pearson correlation test for comparison. The level of significance was set at 0.05 at 95% confidence interval.

Results

Table 1 shows gender distribution of the study population which comprises of 168 female's and164 males making a total of 332, with a mean age of 13.39±1.77. The age distribution of the population is also presented in the table, almost 2/3rd (n=227) of them belonged to early adolescence which is between11-14 years and the rest (n= 105) were in mid adolescence period which includes 15-17years. Table 2 depicts minimum and maximum values, mean values, and standard deviation of the studied variables which includes sense of coherence, caries experience, and gingival index in the study population. Mean SOC score in the study population was 50.18±12.77 indicating a moderate level of SOC (n=275; 82.80%) while those presenting with weak SOC and strong SOC were less than 10 %.(n= 30 & n= 27 respectively). (Graph 1)The caries prevalence of the study population was 50.30%. Mean caries experience of the study population was 1.52±2.05, in this study almost half of the study population were found to be caries free (49.69%; n=165) and 10.24% (n=34) of the study population had caries experience greater than 4. The prevalence of gingivitis in the study population was found to be 42.46% Mean gingival index score of the study population was 0.27±0.44 indicating mild gingivitis (n=122; 36.74%). Moderate and severe gingivitis were present in 5.42% (n=18) and 0.60 %(n=2) of the study population respectively, while 57.53% (n=191) had good gingival health. The association of SOC with caries experience (p=0.006**)** and gingival health (p= 0.004), was found to be highly significant. (Table 3)

Discussion

Sense of coherence is the central concept of the health generation theory which deals in understanding how individuals manage stress and maintain their overall health(20,21).Various studies have assessed SOC with health and wellbeing(13,20–22). Scientific literature is flooded with studies in relation to causation of disease while there is a paucity of studies of health promotion, factors especially the psychological factor. The association of SOC with various oral health related factors is an emerging area of study and this study aims to find the association of SOC with oral health namely dental caries and gingival health in adolescents.

The prevalence of Sense of Coherence levels varies across different demographics and is influenced by a range of factors including socioeconomic status, education, social support, and individual experiences. In our study the level of SOC in majority of study population was found to be moderate (82.80%), similar results were found in other studies in adolescent population.(12,23,24) However in a study done by kantipudi JN Mrudula et al(2)in 595 adolescents had shown a weak level of SOC. In scientific literature the levels of SOC in the population has been presented without standardization of the terminologies, hence to compare our study to most of the studies available was not possible.(14, 15, 20, 25–27).

Dental caries is a multifactorial disease affecting all age groups globally(28). It results from a chronic, progressive condition resulting from a complex and dynamic interaction of microbial, behavioral, and social factors(29).The prevalence of dental caries among adolescents varies significantly across different regions due to factors such as socioeconomic status, dietary habits, access to dental care, and public health policies(30).In a systematic review by Kassebaum et al. it was estimated that globally, prevalence of dental caries was 43% among adolescents aged between 12-19 years(31). According to the National Health and Nutrition Examination Survey (NHANES) in united

states, the prevalence of dental caries among adolescents aged between 12-19 years was 58%(32).In the United Kingdom, according to the National Dental Epidemiology Programme for England in 2018 reported that prevalence of dental caries among 12 year olds was about 30%.In study conducted by Pandey et al. on Indian population the prevalence of dental caries among adolescents was found to be 52% (33). In our study the caries prevalence of the study population was 50.30% and our findings were in concurrence to the previous studies.

Gingival diseases are characterized by inflammation of the gums and it's due to poor oral health maintenance. Clinically it can cause edema and marginal bleeding which would affect esthetics and psychosocial behavior of an individual.(22)This disease can occur in younger age groups and could be carried out through adulthood.(34)Globally 60-90% of children and adolescents are affected by gingivitis according to the WHO.(35)In United States the Centers for Disease Control and Prevention (CDC) reported that about 50% of adolescents aged between 12-15 showed signs of gingivitis,(36)this was almost similar to our study where we found the prevalence of gingivitis in the study population to be 42.46%. However, our findings were contrary to that of a study conducted in adolescents aged between 12–15 years in Guangdong, China where it was found that prevalence of gingivitis was 29.6%.(36)Most of the studies have been conducted in larger age groups spanning between 6-19 years and hence comparing it with the present study would not be correct because prevalence of gingivitis in childhood is uncommon. Reports on prevalence of gingivitis in India ranges from 20.0% in children and adolescents aged between 6–19 years of Uttarakhand region(37), and 77.52% in 8 to 17 year old in region of uttarpradesh.(38) Nanaiah K et al. noted in 15- 18 year old adolescents in Mangalore city, Karnataka belonging to the lower socioeconomic status to have a high prevalence of gingivitis and periodontitis and suggested it could be the influence of environmental and behavioral factors(39).

In this study, the association between SOC and caries experience was found to be highly significant(p= 0.006) which was in accordance to the study conducted by Kantipudi JN Mrudhula et al(2), Deepak Viswanath et al(15) and C. F. Lage et al.(20) Contrastingly in a study conducted by M Shilpa et al(12) on 361 pre-university adolescents aged between 16-17 year in Virajpet, Karnataka there was no association was found between SOC and caries experience.

Also the association between gingival health and SOC was found to be highly significant (p= 0.004). In our study the mean gingival index score of the study population is 0.27±0.44 indicating mild inflammation of gingiva (n=122; 36.74%). This was in accordance to a study conducted by nagpal ruchi et al on 850 adolescence aged between 12–15 years, through assessing oral health behaviors it was concluded that SOC was associated with gingival bleeding(13).

The finding implies the importance of psychological factor SOC. These insights could serve as a foundation for public health interventions aimed at enhancing individuals' SOC, promoting self-assessment, and encouraging adolescents to improve their well-being and adopt a more positive outlook on life. Fostering a strong level of SOC in the adolescent population will be valuable in promoting oral health and overall wellbeing which will be carried throughout adulthood. As this is an emerging area of study, more data are required before definitive conclusions can be drawn. Given the psychological nature of the research, results can be influenced by participants' ethnicity, socioeconomic

status, parents' psychological health, parenting styles, and various other factors. Additionally, since it relies on self-administered questionnaires, there is a potential for bias in participants' responses. Future studies should consider larger sample sizes across broader segments of population and include other factors related to oral health and wellbeing.

Conclusion

Majority of the study population had a moderate level of SOC. Highly significant association was found between SOC and oral health, namely caries experience (p=0.006), and gingival health (p= 0.004) in the study population. This study provides a baseline data of SOC in adolescent population, for planning further interventions to improve the SOC in individual to promote oral health. Collaborative efforts from families, schools, communities, and policymakers are essential in creating environments that nurture the development of SOC in adolescents, as this would be beneficial in improving their overall wellbeing and to adopt a more positive outlook in life.

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Legend Tables and Figure

Table 1: Distribution of the study population according to age and gender

Variable		Frequency (N)	Percentage (%)
Gender	Males	168	50.6
	Females	164	49.4
Age	11	57	17.1
	12	73	21.9
	13	51	15.3
	14	46	13.8
	15	53	15.9
	16	43	12.9
	17	9	2.71

Table 2: Mean of SOC, caries experience and gingival index in the study population

Variables	N	Minimum	Maximum	Mean	Standard Deviation
Soc	332	14.00	89.00	50.18	12.77
Caries Experience	332	0.00	10.00	1.52	2.05
Gingival Health	332	0.00	3.00	0.27	0.44

Table 3: Association of SOC with caries experience and gingival index in the study population

Variables	Mean And Standard Deviation		Correlation Coefficient	Sig.
	Variables	Soc		
Caries Experience	1.52±2.05	50.18±12.77	-0.150	0.006(Hs)
Gingival Health	0.27±0.44		-0.156	0.004(Hs)

Graph 1: Pie chart depicting gender distribution of the study population