ORIGINAL RESEARCH

Sense of Coherence and Oral Health Status among 16 to 17-year-old Preuniversity Students of Virajpet Taluk: A Cross-sectional Study

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ABSTRACT

Background: Sense of coherence (SOC) is an important psychological factor that enables people to cope with stressors and successfully maintain and improve health. Oral health affects general health and impacts quality of life. The aim of the present study is to assess the association between SOC and oral health status among 16 to 17-year-old preuniversity students in Virajpet, Karnataka, India.

Materials and methods: A total of 361 subjects were included in the study by stratified cluster random sampling method. Sense of coherence was measured using the Kannada-translated 13-item scale proposed by Antonovsky. Oral health status was measured using oral hygiene index – simplified (OHI-S), Silness and Loe Plaque index, Community Periodontal Index (CPI) and Loss of Attachment (LA) as well as decayed-missing-filled teeth (DMFT) index. Chi-square test and analysis of variance were used to evaluate the association between SOC and oral health.

Results: There was no statistically significant association of plaque index and caries experience with SOC, whereas the SOC scores were found to be significantly associated with loss of attachment and OHI-S among the subjects. The distribution of the mean number of sextants with loss of attachment was more among males.

Conclusion: Sense of coherence has a role to play in the maintenance of oral health. There is a need to closely examine the psychodynamic factors that affect oral health.

Clinical significance: There is good evidence that SOC is a resource capable of promoting health, strengthening resilience, and developing a subjectively positive state of health.

Keywords: Adolescents, Coping, Loss of attachment, OHI-S, Stressors.

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INTRODUCTION

Sense of coherence (SOC) is an important psychological factor that enables people to cope with stressors and successfully improve health.[1] The origin of salutogenesis dates back to the interviews with Israeli women from the concentration camps of the Second World War, who stayed healthy despite the stressful situations they were in.[2] Sense of coherence is known to be capable of strengthening resilience and developing a subjectively positive state of health.[3]

The salutogenesis concept (saluto – health; genesis – origin) was proposed in 1979 by Aaron Antonovsky (1923–1994), a medical sociologist. He hypothesized that disease and stress occurred everywhere at all times, and he was surprised that organisms survived this constant exposure. He postulated that SOC was mainly formed in the first three decades of life. Thereafter, only very strong changes in life could change the SOC.[2]

Sense of coherence is defined as a "global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (i) The stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; (ii) the resources are available to one to meet the demands posed by these stimuli; and (iii) these demands are challenges, worthy of investment and engagement."[4]

Sense of coherence has three components: Comprehensibility (cognitive component), manageability (instrumental/behavioral component), and meaningfulness (motivational component).[3]

Individuals with a strong SOC have the ability to define events as less stressful (because of comprehensibility); to mobilize resources to deal with encountered stressors (manageability); and to possess the motivation, desire, and commitment to cope (meaningfulness). The salutogenic theory proposes that the individual with a stronger SOC has also the skills required to maintain and improve his/her health potential.[5]

Adolescence is a crucial point in time of assuming responsibilities, making lifestyle choices, and developing healthy habits and behaviors that will be carried through to adulthood. Adolescents are susceptible to both risk and protective factors that may either enhance or threaten their health and well-being. These factors may either buffer against stressors and challenges or support resiliency of youth.[6]

It has been suggested that the salutogenic theory is an important part of oral health promotion, as the theory focuses on both individual and social environmental factors and can be a help in understanding individuals' life choices instead of focusing on risk factors and changing health behavior.[7]

However, only a few studies have investigated the relationship between SOC and oral health status in the scientific literature. The aim of the present study was to assess the association between SOC and oral health status among 16 to 17-year-old preuniversity students of Virajpet taluk, Coorg district, Karnataka.

MATERIALS AND METHODS

The present cross-sectional study was conducted in the months of January and February 2014. Necessary permission was obtained from the authorities and the related department after explaining the procedure clearly. Data regarding the preuniversity colleges and students was collected from the office of the Deputy Director of Pre-University Education Board, Madikeri. As of January 2014, there were 18 preuniversity colleges, with a total of 3,657 students, in Virajpet taluk.

The colleges were divided into three strata – government, aided, and unaided colleges. Sample size was calculated using the relation $n = N/1 + Ne^2$, where confidence interval chosen was 95%. Thus, the sample size obtained was 361. A stratified cluster random sampling method with proportional allocation was done.

Permission to include the students in the study was obtained from the college authorities. Voluntary informed consent was obtained from the students after clearly explaining the details of the study. The subjects were selected according to the inclusion and exclusion criteria until the required sample size was obtained.

Preuniversity college students studying in Virajpet taluk belonging to the age group of 16 to 17 years and students who were present on the day of examination were included in the study. Subjects undergoing orthodontic treatment, those revealing a history of any systemic disease, and those unwilling to participate in the study were excluded. The ethical clearance for the present study was obtained from the Institutional Review Board of Coorg Institute of Dental Sciences, Virajpet.

Before the start of the survey, a senior faculty member carried out training of the investigator regarding the assessment proforma used in the study in the Department of Public Health Dentistry, Coorg Institute of Dental Sciences, Virajpet. Calibration of the examiner was done by examining 30 individuals conveniently selected on two successive days. Each subject was examined twice and the results compared, to know the diagnostic variability agreement. The result so obtained was subjected to assess intraexaminer variability using kappa variability test, and the mean kappa coefficient value was found to be of 0.8, which showed good agreement.

Data were collected using the 13-item standardized short version of the SOC scale proposed by Antonovsky and also by conducting clinical oral examination. Demographic as well as general information was obtained by using a self-administered questionnaire.

Sense of coherence-related data were recorded using the 13-item Antonovsky's SOC questionnaire with a seven-point Likert-type scale with descriptive end points. Every item on the seven-point Likert scale is scored ranging from one to seven. The sum of the scores for SOC is thus 13 to 91. The higher the score, the stronger the SOC. The SOC scale is a standard scale originally written in Hebrew and English to be used cross-culturally. Cronbach alpha measure of internal consistency ranged from 0.74 to 0.91 in 16 studies using SOC-13. The relatively few test–retest correlations showed considerable stability.[8] As there was no evidence of its previous use in the regional language of Kannada in India, it was necessary to translate the scale into Kannada and to test it in a pilot study.

The pilot study was conducted among 37 preuniversity college-going subjects of age 16 to 17 years (10% of the sample), on two consecutive days, to check the internal reliability and validity of the SOC-13 scale. In the present study, Cronbach alpha of internal consistency for the entire scale was 0.83. For the main study, self-administered questionnaires were distributed among the study subjects and appropriate instructions were given. Only participants who answered all the 13 items on the SOC questionnaire were included and subsequently subjected to oral clinical examination.

Oral health status was assessed on a specially designed format which included provision for recording, in the order, oral hygiene index – simplified (by John C. Greene, Jack R. Vermillion in 1964), plaque index (Loe, 1967), Community Periodontal Index (CPI, WHO, 1997) and Loss of Attachment (LA, WHO, 1997) as well as decayed-missing-filled teeth (DMFT) index (by Henry T Klein, Knutson JW, Carrole E Palmer in 1938 with modified criteria given by WHO in 1986). Clinical oral examination was done in an ordinary chair with aseptic precautions using plane mouth mirror, No. 5 explorer (Shepherd's hook) and CPI probe (which conformed to WHO specifications) under available natural light in the college premises.

All examinations were done by a single examiner, who was calibrated to make uniform judgment and also minimize intraexaminer variability. Subjects who participated in the pilot study were excluded from the main study. After the oral examination of the study subjects, they were briefly educated regarding oral health with emphasis on the importance of oral health, maintenance of oral hygiene, dietary practices, and periodic dental visits.

Statistical Analysis

Data obtained were entered in a Microsoft Excel spreadsheet and statistical analysis was done by applying appropriate statistical tests. The total SOC scores were calculated for each subject and divided into tertiles, similar to a previous study.[9] The first category was designated as low SOC, the second category as intermediate, and the third as high SOC. Descriptive tests, chi-square test, and analysis of variance (ANOVA) were used to study the association between SOC and oral health status. Analysis was carried out using Statistical Package for the Social Sciences (SPSS) package version 20. The level of significance was set at 5%.

RESULTS

A total of 361 preuniversity college students took part in the study, of which 104 were from government, 36 were from aided, and 221 were from unaided colleges. The SOC scores ranged from 29 to 71, with a mean of 53.52 [standard deviation (SD) = 6.795] and a median of 54.

Table 1 shows that females constituted 58.4% of the total 361 study subjects, whereas males comprised 41.6%. As shown in Table 2, the overall SOC scores ranged from 29 to 71.

Table 3 shows that among the 361 subjects, 31.03% of the subjects had low SOC (tertile 1), 37.94% had intermediate SOC (tertile 2), and 31.03% of the subjects had high SOC (tertile 3).

Table 4 shows that males had a higher mean SOC score than females. There was a statistically significant difference between the mean SOC scores among the subjects based on gender.

It is evident from Table 5 that 32.7% of the subjects had no caries experience, 50.7% of the subjects had fair OHI-S scores, and 56% of the subjects had fair plaque index scores. It can also be observed that the subjects had a mean number of 3.29 healthy sextants.

Table 1: Distribution of the subjects according to gender

Gender	n (%)
Male	150 (41.6)
Female	211 (58.4)
Total	361

Table 2: The limit scores for the SOC tertiles

SOC tertiles	SOC scores
1 – Low SOC	29–50
2 – Intermediate SOC	51–56
3 – High SOC	57–71

Table 3: Distribution of the subjects according to SOC and gender

SOC	Gender	Overall
Low SOC	Male	59
	Female	53
	Total	112 (31.03%)
Intermediate SOC	Male	51
	Female	86
	Total	137 (37.94%)
High SOC	Male	40
	Female	72
	Total	112 (31.03%)
Total		361

Table 4: Difference in the mean SOC scores between the subjects based on gender

Gender	Mean SOC score ± SD	t-test	
		t-value	p-value
Male	54.4 ± 6.80	2.957	0.003*
Female	52.28 ± 6.61		

p < 0.05, *significant

Table 5: Distribution of DMFT, OHI-S, and plaque index scores and mean number of sextants with healthy periodontium, bleeding, and calculus among the college students

		n (%)
DMFT	0	118 (32.7)
	>0	243 (67.3)
OHI-S scores	Good	174 (48.2)
	Fair	183 (50.7)
	Poor	4 (1.1)
Plaque scores	Excellent	62 (17.2)
	Good	85 (23.5)
	Fair	202 (56)
	Poor	12 (3.3)
CPI		Mean number of sextants
	Healthy	3.29
	Bleeding	0.88
	Calculus	1.83

According to Table 6, males have a higher number of affected sextants (LA score 1, loss of attachment = 4–5 mm) than females. There was a highly statistically significant difference among the subjects regarding distribution of mean number of sextants with loss of attachment based on gender.

As can be observed from Table 7, 78 (21.6%) of the subjects with intermediate SOC had good oral hygiene.

Table 6: Distribution of mean number of sextants with loss of attachment among males and females

	Gender			t-test	
Loss of attachment	Males	Females	Overall mean	t-value	p-value
LA = 0–3 mm	5.83	5.98	5.91	4.571	0.000**
LA = 4–5 mm	0.17	0.02	0.09	–4.571	0.000**

p < 0.05, **Highly significant

Table 7: Association between SOC and oral health status among the study subjects

		SOC			
		1 (Low SOC)	2 (Intermediate SOC)	3 (High SOC)	χ^2 value p-value
OHI-S	Good	42	78	54	9.940
	Fair	69	57	57	0.041*
	Poor	1	2	1	–
Plaque index	Excellent	15	29	18	8.773
	Good	22	38	25	0.187
	Fair	72	67	63	–
	Poor	3	3	6	–
CPI	Healthy	18	33	19	6.955
	Bleeding	17	16	8	0.138
	Calculus	77	88	85	–
LA	LA = 0–3 mm	82	136	112	68.549
	LA = 4–5 mm	30	1	0	0.000**
DMFT	0	31	48	39	1.852
	>0	81	89	73	0.396

p < 0.05, *Significant, **Highly significant

Table 8: Distribution of mean DT based on SOC scores

		ANOVA	
SOC	Mean DT ± SD	p-value	f-value
Low SOC	2.13 ± 2.34	0.414	0.885
Intermediate SOC	2.04 ± 2.26	NS	–
High SOC	1.75 ± 2.17	–	–
Overall	1.98 ± 2.26	–	–

p < 0.05, NS: Non significant

Table 9: Distribution of mean DMFT based on SOC scores

	Mean	ANOVA	
SOC	DMFT ± SD	p-value	f-value
Low SOC	2.28 ± 2.38	0.578	0.549
Intermediate SOC	2.17 ± 2.34	NS	–
High SOC	1.96 ± 2.29	–	–
Overall	2.14 ± 2.34	–	–

p < 0.05, NS: Non significant

Table 10: Distribution of mean number of sextants with loss of attachment based on SOC

	Mean no. of sextants with loss of attachment ± SD	ANOVA	
SOC		p-value	f-value
Low SOC	0.27 ± 0.445	0.000*	41.956
Intermediate SOC	0.01 ± 0.085	–	–
High SOC	0.00 ± 0.00	–	–
Overall	0.09 ± 2.81	–	–

p < 0.05, *Highly significant

Overall, 30 (8.31%) of the 361 subjects with low SOC had a loss of attachment of 4 to 5 mm. Also, 88 (24.3%) of the subjects with intermediate SOC had higher calculus, although the relationship was nonsignificant. There was a statistically significant difference between the SOC scores and OHI-S among the subjects. It can also be observed that the association between loss of attachment and SOC was highly statistically significant.

Table 8 indicates that subjects with low SOC had a slightly higher mean decayed teeth (DT) of 2.13. There was no statistically significant difference between the SOC scores and mean DT.

Table 9 indicates that subjects with low SOC had a slightly higher mean DMFT of 2.28. There was no statistically significant difference between the SOC scores and mean caries experience.

Table 10 indicates that the subjects having low SOC were affected more, with a mean of 0.27 sextants having loss of attachment of 4 to 5 mm (LA score 1). There was a highly statistically significant difference between the mean number of sextants with loss of attachment based on SOC scores.

DISCUSSION

There are few studies that have previously assessed the association between SOC and oral health among adolescent children. In the present study, it was found that the male subjects had a higher mean SOC score than female subjects. But 64.3% of the subjects in the high SOC category were females. The results are in contrast to the findings of a Finnish study, which was conducted among adults aged 25 to 64 years, wherein the SOC was found to be broadly sex-neutral among the respondents.[10]

There was a statistically significant association between SOC and the OHI-S scores (p = 0.041). The subjects with intermediate SOC had good oral hygiene. This is in accordance with the results of a study by Savolainen et al,[11] where the 30 to 64-year-old subjects with strong or moderate SOC values had significantly fewer oral health-related problems than those subjects with a weak SOC.

There was no association found between the calculus and plaque levels with SOC in the present study. This is in accordance with a study by Freire et al[8] done on adolescents aged 15 years, where the hypothesis that high SOC in adolescence improves oral cleanliness and plaque levels was not supported by their results. In contrast, a study by Lindmark U et al,[9] on 20 to 80-year-old adults, concluded that higher SOC was a protective determinant of plaque and periodontal disease, indicating an association between SOC and oral health.

There was a statistically significant difference between the SOC scores and loss of attachment. Also, there was a highly statistically significant difference among the subjects regarding distribution of mean number of sextants with loss of attachment based on gender, with the males having a higher number of affected sextants (LA score 1, loss of attachment = 4–5 mm) than females. There are no studies in the literature indicating the relationship between SOC and loss of attachment among adolescents. However, in the study by Lindmark U et al,[9] done on 20 to 80-year-old adults, the SOC score was a statistically significant predictor of a periodontal pocket depth of ≥4 mm. In contrast, the results of a 4-year prospective study on adults suggested that SOC measured in adulthood does not explain the change in the number of teeth with periodontal pocketing ≥4 mm.[12]

Even though there was no statistically significant difference between the SOC scores and mean DT, the low SOC tertile had slightly higher mean DT of 2.13 and a DMFT of 2.28. The overall correlation between DMFT and mean SOC scores was negative in the present study. In the study by Friere et al,[8] it was found that adolescents with higher SOC were less likely to have caries experience in anterior teeth than those with lower SOC scores.

Social desirability bias while answering the questionnaire could have been possible, as the children could have been motivated to score stronger scores, reminiscing the previous possible events that were depicted by the questionnaire.

Studies conducted in the past to check the relation between mothers' SOC with the oral health status of children in the literature[13,14] have shown that mothers' SOC is an important determinant of the oral health status of children and that family environment plays a crucial role in the oral health of young people. More studies should be conducted in this region to check the effect of parents' SOC on the oral health of children among this particular age group.

Sense of coherence is hypothesized as a stable disposition of personality that serves as a major coping resource for the preservation of health. It has been reported to be fully developed by the age of 30 and then strongly resistant to change. Notion of SOC is of a disposition that, once formed, determines perceptions and interpretations of the social world. By definition, SOC is assumed to have high stability over time and situations.[15] This should be taken into account to understand that health in general, and oral health in particular, may have a protective effect by SOC if strongly founded in the early years of life.

Sense of coherence was found to be the most important psychosocial predictor of oral health status in adolescence according to Baker et al.[16] Thus, SOC is definitely a concept that must be delved into deeper, with more parameters being included to minutely assess the relationship between different oral health patterns and the three components of the SOC theory, that is, comprehensibility, manageability, and meaningfulness, which was not done in the present study. Further, intervention-based studies should be carried out, with this sensitive age group of children in mind, which may give a clear idea about the impact of SOC on the oral health status and oral health behaviors among adolescent children.

CONCLUSION

Sense of coherence was found to have an impact on some of the oral health parameters that were examined among the 16 to 17-year-old preuniversity college students in Virajpet taluk. Overall, there was a statistically significant difference between the SOC scores and OHI-S as well as between the SOC scores and loss of attachment among the 361 preuniversity college students. The present study, conducted in Virajpet taluk, has shown mixed results. But the concept that SOC has a role to play as far as oral

health is concerned has been upheld by some of the results of the present study. Further studies must be carried out to minutely assess the different aspects of SOC and its impact on the oral health of adolescents.

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