

Impact of Sense of Coherence on Oral Health among Bus Drivers: A Cross-Sectional Study

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ABSTRACT

Aim and Objectives: To assess the sense of coherence (SOC) and the impact of SOC on oral hygiene behaviors and oral health status among bus drivers in Nellore district, Andhra Pradesh.

Materials and Methods: A descriptive cross-sectional study was conducted during August–September 2017. Cluster random sampling methodology was used for the selection of drivers. Five depots were randomly selected from the list of various Andhra Pradesh State Road Transport Corporation depots in Nellore district. The estimated sample size was proportionately divided among these five depots of Nellore district ($n = 120$). The SOC-related data were obtained using short version of Antonovsky's SOC scale. Every item was scored on a Likert scale ranging from 1 to 7. The sum of the scores for SOC was 13–91. A high score indicates a strong SOC. Clinical examination was done for recording oral health status using Oral Hygiene Index-simplified (OHI-S), dental caries, periodontal status, and oral mucosal lesions were recorded according to the WHO criteria 1997. Data were entered and analyzed using SPSS ver. 22 (SPSS Inc., Chicago, IL, USA).

Results: Majority of the bus drivers who participated in the study had a low SOC (60%). A significant ($P < 0.05$) positive correlation was observed with age ($r = 0.1420$), socioeconomic status ($r = 0.1467$), and visit to dentist ($r = 0.1912$). A nonsignificant negative correlation was observed with habits ($r = -0.0681$), OHI-S ($r = -0.0772$), dental caries ($r = -0.0874$), Community Periodontal Index ($r = -0.0642$), loss of attachment ($r = -0.0650$), and oral mucosal lesions ($r = -0.0542$).

Conclusion: Strong SOC was associated with increase in age, better socioeconomic status, good habits, increased frequency of dental visits, and a good oral health.

KEYWORDS: Drivers, oral health, sense of coherence

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INTRODUCTION

During the last three decades, theoretical approaches have been introduced to the public health literature to explain the importance of social context and its association with biological and psychological determinants of health and illness.^[1]

It is hypothesized that people with stronger sense of coherence (SOC) can better cope with existing stressors in their social life. It relies on the following three key competencies: comprehensibility, manageability, and meaningfulness. A strong association between higher

SOC and lower incidence of chronic diseases and better quality of life has been reported in several studies. In the field of oral health, the incidence of chronic diseases such as dental caries and periodontitis is not only related to biological factors but may also be influenced by the SOC concept.^[1]

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Individuals working in extremely stressful occupations are expected to have a strong SOC to cope up with their work stress. Among the various stressful occupations, professional driving is considered to be one of the extremely stressful jobs. Processing of big amount of information and signals within a very short-time segment ordinarily for 8 h per a day. Working conditions such as vibration, noise with high intensity and frequency, irregular work schedules and long hours; night and weekend shifts may not coincide with those of their families. Irregularity of shifts can have negative impacts on their family and personal life. External environmental factors, in particular, extreme temperatures; buses are heated and they frequently need to open the door. Work schedules that strain hoe life and interfere with their sleep. All these components may lead to a state of fatigue and stress.^[2]

So considering the above facts, professional drivers can be considered as a stressful job and drivers have to cope up with the stress situations as mentioned above to survive in their professional and are expected to have a strong SOC with better oral health status. Hence, this study was conducted with an aim to assess the SOC and the impact of SOC on oral hygiene behavior and oral hygiene status among bus drivers in Nellore district, Andhra Pradesh.

AIM AND OBJECTIVES

AIM

The aim of the study was to assess the SOC and its impact on oral hygiene behavior and oral health status among bus drivers.

OBJECTIVES

- To assess the SOC among bus drivers
- To assess the oral hygiene behaviors among bus drivers
- To assess the oral hygiene status using Oral Hygiene Index-simplified (OHI-S) and dental caries using dentition status index and to assess periodontal index using Community Periodontal Index (CPI) and loss of attachment (LOA) index among bus drivers
- To assess the oral mucosal lesions, using WHO criteria
- To correlate the impact of SOC with sociodemographic characteristics and oral health behaviors
- To correlate the impact of SOC on oral hygiene status among bus drivers
- To correlate the impact of SOC on dental caries prevalence among bus drivers
- To correlate the impact of SOC on periodontal status among bus drivers

- To correlate the impact of SOC with oral mucosal lesions among bus drivers.

MATERIALS AND METHODS

STUDY DESIGN

A cross-sectional descriptive epidemiology study was conducted to assess the SOC and its impact on oral health among bus drivers in August–September 2017.

STUDY SETTING

The study was conducted among professional bus drivers from the selected depots of Andhra Pradesh State Road Transport Corporation (APSRTC) of Nellore district, Andhra Pradesh.

ETHICAL CLEARANCE

The ethical clearance with reference number NDC/PG/DISS/2015-16/EC/2015 was obtained from the institutional review board of Narayana Dental College and Hospital, Nellore, Andhra Pradesh, India. Official permissions from the respective depot authorities were sought, and the informed consent was obtained from all the participants before the start of the study.

INCLUSION CRITERIA

Professional bus drivers who are working in APSRTC of Nellore district of Andhra Pradesh were included in the study. Drivers who are willing to participate and who gave an informed consent and who were present on that particular day of examination were included in the study.

SAMPLE SIZE ESTIMATION

Before the start of the study, a pilot study was conducted among APSRTC drivers. Based on the prevalence (%) of dental caries reported in the pilot study, the sample size was calculated using the formula.

$$N = 4PQ/L^2$$

$$P = \text{Prevalence of dental caries} = 73.3\%$$

$$L (\text{allowable error}) = 5\% \text{ of}$$

$$P = 5 \times 73.3/100 = 3.67$$

$$N = 4 \times 73.3 \times 26.7/(3.67)^2$$

$$= 7828.44/13.4689$$

$$= 581 \approx 600$$

The sample size estimated was 581. In the current study, the sample size was rounded up to 600.

SAMPLING METHODOLOGY

Cluster random sampling methodology was used for the selection of drivers. List of various APSRTC depots in Nellore district was collected, and from the ten depots of Nellore district, five depots (Nellore, Gudur, Kavali, Atmakur, and Sullurpeta) were randomly selected. The

estimated sample size was proportionately divided among these five depots of Nellore district, and from these five depots, drivers were included till they meet the required sample size [Figure 1].

CALIBRATION OF EXAMINERS

The investigator was trained and calibrated for data recording before start of the study. Training was carried on for the examiner till he produced consistent observations. Ten participants were examined and re-examined on successive days. Intraexaminer reproductively was evaluated through percent agreement and Cohen's kappa statistics. The kappa value for various clinical parameters was assessed as follows: OHI-S was 0.85, dentition status index was 0.87, CPI was 0.88, and LOA was 0.89.

STATISTICAL ANALYSIS

Data were entered and analyzed using SPSS ver. 22 (SPSS Inc., Chicago, IL, USA). Analysis of variance was used to determine the association between the means of three variables. *t*-test was used to determine the association between the means of two variables. Pearson's and Spearman's correlation test was used to assess the correlation of SOC scores with sociodemographic characteristics, oral hygiene behaviors, and oral health status of study population.

QUESTIONNAIRE RELIABILITY

The validated SOC 13-item questionnaire was translated into Telugu language and then re-translated into English language and checked for cross-cultural sensitivity. The questionnaire was checked for reliability on 10 participants, and the test-retest result obtained was 0.86 (Cronbach's alpha value) which showed a high agreement.

DATA COLLECTION

A specially designed questionnaire was used for data collection. The questionnaire consists of three parts. The first part was used for recording sociodemographic details of the participant and oral hygiene behaviors. The second part of the pro forma was used for recording SOC of participants using validated SOC-13 scale. Finally, the third part was used for recording clinical findings.

SOC was measured by a short version of the SOC scale, which consisted of 13 items. The SOC questionnaire consists of three dimensions; comprehensibility (five items), manageability (four items), and meaningfulness (four items). Every item was scored on a Likert scale ranging from 1 to 7. The sum of the scores for SOC was 13–91. A high score indicates a strong SOC.^[3] The SOC scores were categorized as low (20–50), intermediate (51–70), and high (71–88) according to the study conducted by Gottlieb, 1988.^[4]

Clinical examination was done for recording oral hygiene status using OHI-S index. Dental caries, periodontal

status, and oral mucosal lesions were recorded according to the WHO criteria 1997.^[5]

RESULTS

Out of total of 600 respondents, majority of them (39%) were in the age range of 51–55 years and all were males. About 81% of the study population were from upper middle socioeconomic status and 37% had systemic diseases. Nearly 22% were smokers, 19% were tobacco chewers, and 20% had combined habit. About 41% never visited a dentist and all of them used toothbrush and toothpaste to clean their teeth once daily [Figures 2-4].

Tables 1-3 show the oral hygiene status and periodontal status of the study population. Nearly 27% of the study population had good oral hygiene status. Majority of them (61%) had fair oral hygiene status with a mean OHI-S score of 2.25. The dental caries prevalence among the study population was 86% with a mean decayed teeth (DT) score of 1.79, indicating high dental caries prevalence among study population. The prevalence of periodontitis was 79.33% with a mean

Table 1: Oral health status of study population

	<i>n</i>	%
OHI-S		
Good	162	27
Fair	366	61
Poor	72	12
Total	600	100
	Mean	SD
OHI-S	2.25	0.98
Dental caries		
With dental caries	516	86
Without dental caries	84	14
Total	600	100
DMFT	3.23	2.89
DT	1.79	1.56
Periodontitis		
With periodontitis	476	79.33
Without periodontitis	95	15.83
Excluded	29	4.83
Total	600	100
LOA		
Without LOA	469	78.17
With LOA	12	2
Not recorded	90	15
Excluded	29	4.83
Total	600	100
Oral mucosal lesions		
With oral mucosal lesions	30	5
Without oral mucosal lesions	570	95
Total	600	100

SD=Standard deviation, DT=Decayed teeth, DMFT=Decayed, missing, and filled teeth, OHI-S=Oral Hygiene Index-simplified, LOA=Loss of attachment

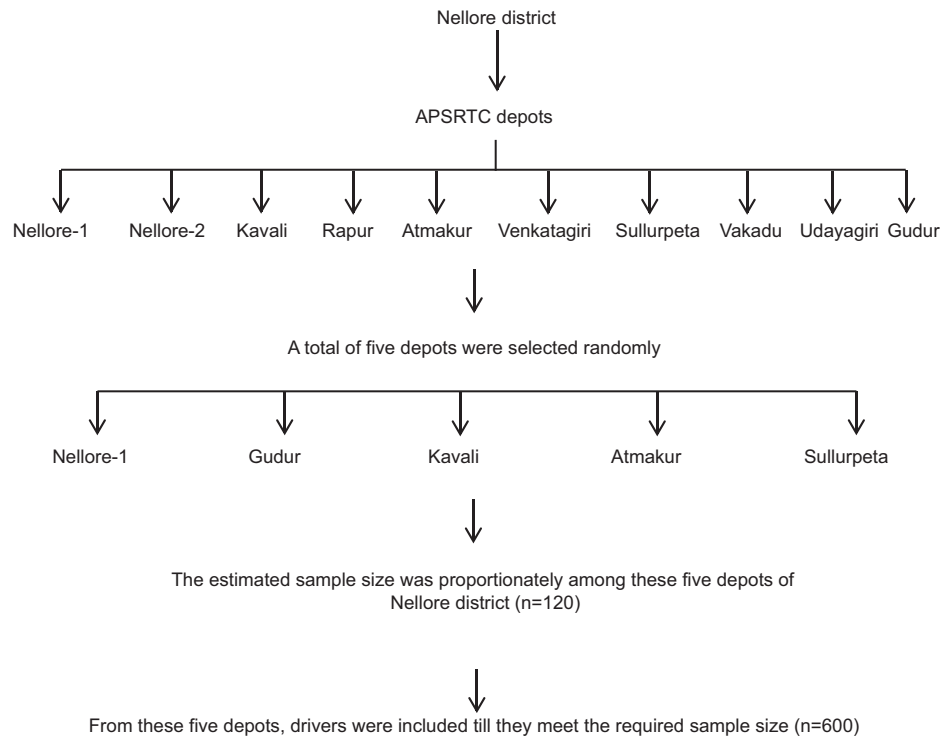


Figure 1: Sampling frame

Table 2: Community Periodontal Index scores of study population

Community Periodontal Index	Number of sextants (%)	Mean sextants
Healthy	12 (0.33)	0.02
Bleeding	528 (14.67)	0.88
Calculus	30 (0.83)	0.05
4-5 mm	2616 (72.67)	4.36
6 mm or more	240 (6.67)	0.40
Excluded	174 (4.83)	0.29

Table 3: Loss of attachment index scores of study population

LOA	Number of sextants (%)	Mean sextants
0-3 mm	3330 (92.50)	5.62
4-5 mm	0	0
6-8 mm	0	0
9-11 mm	12 (0.33)	0.02
12 mm or more	0	0
Not recorded	84 (2.33)	0.14
Excluded	174 (4.83)	0.29

LOA=Loss of attachment

of 4.36 sextants having pocket of 4–5 mm. About 2% of the study population had a LOA and mean of 5.62 sextants having a 0–3 mm LOA. The prevalence of oral mucosal lesions was 5% with oral submucous fibrosis and lichen planus accounting the prevalence of 3% and 2%, respectively.

Table 4 shows the distribution of oral mucosal lesions among the study population. The prevalence of oral mucosal lesions was 5%, in which 3% of the respondents had oral submucous fibrosis and 2% of respondents had lichen planus.

Majority of the respondents (60%) had a low SOC, 40% of the study participants had intermediate SOC, and none of the respondents had high SOC [Figure 5 and Table 5].

Table 6 shows the comparison of mean SOC based on age groups on study participants. A significant difference was observed between mean scores of SOC based on age groups of study participants ($F = 17.7027$, $P < 0.05$). The mean SOC scores increased with increasing age. Participants belonging to 51–55 years of age group had highest mean SOC (48.22) followed by 46–50 (46.42) years, 41–45 (44.90) years, and 35–40 (37.80) years of age groups.

Table 7 shows the comparison of the overall mean SOC scores with oral health status. The mean SOC was higher in participants with good OHI-S status as compared to fair and poor OHI-S. The association of mean SOC was found to be statistically significant ($P < 0.05$). The participants with dental caries had lower mean SOC compared to participants without dental caries. The association of SOC was found to be nonsignificant ($P > 0.05$). The participants with periodontitis had lower mean SOC when compared to

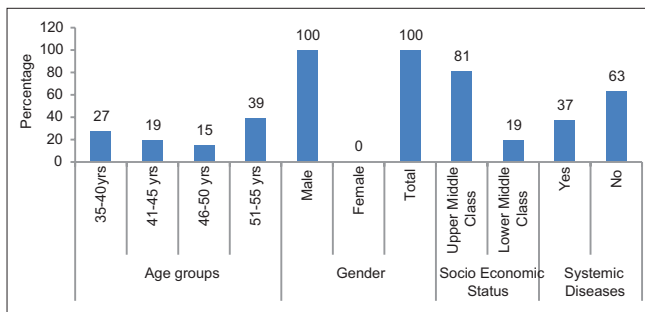
Table 4: Distribution of oral mucosal lesions among study population

Oral mucosal lesions	n (%)
No abnormal condition	570 (95)
Oral submucous fibrosis	18 (3)
Lichen planus	12 (2)
Leukoplakia	0
Acute necrotizing gingivitis mouth	0
Candidiasis	0
Abscess in the soft palate	0
Total	600 (100)

Table 5: Sense of coherence levels in the study population

SOC score	n (%)
Low (20-50)	360 (60)
Intermediate (51-70)	240 (40)
High (71-88)	0
Total	600 (100)

SOC=Sense of coherence

**Figure 2: Distribution of respondents according to their sociodemographic characteristics**

participants without periodontitis. The association of mean SOC was found to be nonsignificant ($P > 0.05$). Finally, the participants with oral mucosal lesions have lower SOC as compared to their counterparts. The association of mean SOC was found to be statistically significant ($P < 0.05$).

Table 8 shows the correlation of SOC with sociodemographic characteristic, oral hygiene behaviors, and oral health status of the study population. A significant ($P < 0.05$) positive correlation was observed with age, socioeconomic status and visit to dentist indicating strong SOC with increasing age, better socioeconomic status, and increased frequency of dental visits. A weak nonsignificant ($P > 0.05$) negative correlation was observed with oral hygiene status, dental caries, CPI, LOA scores, oral mucosal lesions, and good habits, indicating that participants with higher SOC had better good oral health habits, better oral hygiene status, periodontal condition, and fewer decayed component and did not had any mucosal lesions.

Table 6: Comparison of mean sense of coherence based on age groups on study participants

Age groups (years)	Mean	SD
35-40	37.80	11.20
41-45	44.90	11.58
46-50	46.42	9.13
51-55	48.22	11.70
Total	45.02	11.59
<i>F</i>	17.7027	
<i>P</i>	0.0001*	

* $P < 0.05$ ANOVA. ANOVA=Analysis of variance, SD=Standard deviation

Table 7: Comparison of the overall mean sense of coherence scores with oral health status

	Mean SOC (SD)	
OHI-S		
Good	52.75	7.33
Fair	43.54	12.32
Poor	44.93	10.01
<i>F</i> *	20.2288	
<i>P</i>	0.0001*	
Dental caries		
Without	44.14	10.47
With	45.16	11.76
<i>t</i> **	0.7479	
<i>P</i>	0.4548	
Periodontitis (CPI scores)		
Without	49.00	4.42
With	45.50	11.79
<i>t</i> **	-0.2070	
<i>P</i>	0.8361	
Oral mucosal lesions		
With	44.37	2.99
Without	57.40	11.51
<i>t</i> **	6.1881	
<i>P</i>	0.0001*	

* $P < 0.05$, *ANOVA, ***t*-test. ANOVA=Analysis of variance, SD=Standard deviation, CPI=Corruption Perceptions Index, SOC=Sense of coherence, OHI-S=Oral Hygiene Index-simplified

DISCUSSION

Antonovsky was confronted with the salutogenic question why some people, regardless of major stressful situations and severe hardships, stay healthy and others do not. How do people manage the lack of control of their life? The answer was formulated in terms of SOC and general resistance resources. The SOC is a resource that enables people to manage tension, to reflect about their external and internal resources, to identify and mobilize them, to promote effective coping by finding solutions, and to resolve tension in a health-promoting manner. The SOC scale has proved to be psychometrically sound.^[6]

SOC has a main, a moderating, and a mediating effect on health. Findings from cross sectional studies on

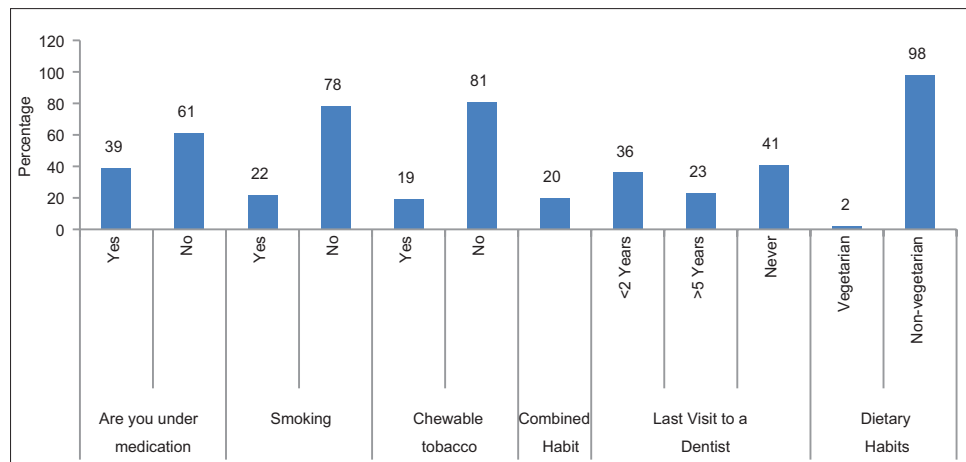


Figure 3: Distribution of respondents by different characteristics in the study

Table 8: Correlation of sociodemographic characteristics, oral hygiene behaviors, and oral health status of the study population with sense of coherence scores

	<i>r/R</i>	<i>t</i>	<i>P</i>
Age	0.1420 [#]	3.5082	0.0005*
Socioeconomic status	0.1467 [#]	3.6261	0.0003*
Habits (smoking and tobacco chewing)	-0.0681 [#]	-1.4685	0.1597
Visit to dentist	0.1912 [#]	4.7627	0.0001*
OHI-S	-0.0772 [#]	-1.8986	0.0581
DT (decayed component)	-0.0874 [#]	-1.6354	0.1854
CPI	-0.0642 ^{##}	-1.5757	0.1156
LOA	-0.0650 ^{##}	-1.5962	0.1109
Oral mucosal lesions	-0.0542 ^{##}	-1.3295	0.1842

* $P < 0.05$ (significant); $P > 0.05$ (nonsignificant), ^{##}Spearman's correlation test, [#]Pearson's correlation test. LOA=Loss of attachment, CPI=Corruption Perceptions Index, OHI-S=Oral Hygiene Index-simplified, DT=Decayed teeth

Finnish, Swedish, English, Canadian populations, French, students, employees, health social workers patient's with rheumatic diseases or depressive disorder and immigrants support a direct or an indirect relation between perceived good health and a strong SOC.^[7]

The individuals working in extremely stressful occupations are expected to have a strong SOC to cope up with their work stress. Among the various stressful occupations, professional driving is considered to be one of the extremely stressful jobs. Therefore, the present study was designed to investigate the level of SOC and correlation of SOC with sociodemographic characteristics, oral hygiene behaviors, and oral health status among bus drivers. This study was conducted among 600 professional bus drivers from the selected depot of APSRTC.

In the present study, we have used SOC-13 item questionnaire which is a short version of SOC 29-item. To the best of our knowledge, this is the first study to

access the correlation of SOC with oral health in bus drivers.

OHI-S, dentition status, CPI, and LOA indices were established measures for the assessment of oral hygiene status, dental caries, and periodontal status in population (WHO).^[5] The major advantages are simplicity and international uniformity; therefore, in the present study, these indices were used to determine the oral health status.

In the present study, oral health behaviors were taken into account to know whether SOC influences oral health behaviors among bus drivers. Interestingly, in our study, all the study participants used toothbrush and toothpaste for cleaning teeth, brushed once daily, and did not use any oral hygiene aids. Since all the participants had similar oral hygiene behavior, it was not possible to correlate the oral hygiene behavior with SOC in the present study.

In the present study, the mean SOC scores increase with increasing age in participants. A significant positive correlation was observed with age indicating high level of SOC with increasing age. Similar findings were reported in a study conducted by Viswanath and Krishna^[8] in which SOC scores increased with increasing age. They were able to cope up more effectively tension and external and internal resources, find solutions, and resolve tension in a health-promoting manner.

In the present study, most of the drivers were from upper middle and lower middle socioeconomic status. A significant positive correlation was observed between SOC and socioeconomic status indicating high level of SOC with better socioeconomic status. Similar findings were observed in a study conducted by Reddy *et al.*^[9] Socioeconomic status is determined by education, occupation, and income of an individual. The participants

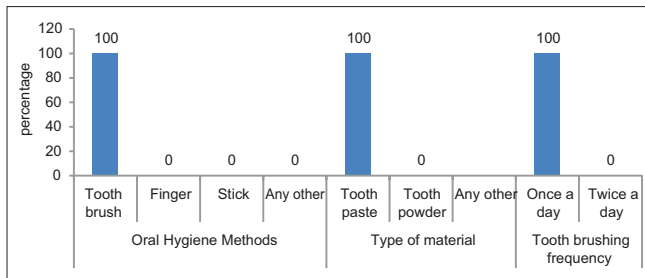


Figure 4: Distribution of respondents by different characteristics in the study

with better education and who are secured will be able to manage tension from external and internal resources and will be able to resolve tension by coping and finding solution in a health-promoting manner.

In the present study, 22% were smokers, 19% were tobacco chewers, and 20% had combined habit. SOC was negatively correlated with habits, indicating that participants with high level of SOC had good habits. Similarly, a study conducted by Glanz *et al.*^[10] and Lindmark *et al.*^[11] showed that SOC is strongly associated with ever-smoking participants. In contrary, a study conducted by John *et al.*^[12] showed that majority (76%) of the transport drivers had smoking habit. Participants with high SOC may be better prepared to cope with peer pressure, less susceptible to advertising appeals, and/or less tempted to experiment with tobacco out of curiosity and rebelliousness.

In the present study, 41% never visited a dentist. A significant positive correlation was observed between SOC and visit to dentist, indicating increasing frequency of dental visits with better SOC. Similarly, a study conducted by Reddy *et al.*^[9] reported that there was a positive correlation between SOC and visit to dentist. According to the SOC concept, individuals with higher SOC face their daily life challenges in a manner that they are more manageable and predictable. Therefore, attending routine checkups may be more feasible for this people compared to those with a lower SOC.

In the present study, the mean SOC was higher in participants with good oral hygiene status followed by fair and poor. A nonsignificant negative correlation was observed with OHI-S indicating that participants with higher SOC had better oral hygiene status. Similarly, studies done by Lindmark *et al.*^[13] Bernabé *et al.*^[14] and Savolainen *et al.*^[15] reported that strong SOC is associated with good oral health. In the present study, participants with dental caries had lower mean SOC when compared to participants without dental caries. A nonsignificant negative correlation was observed with dental caries, indicating that participants with higher SOC had fewer DT. Similarly, studies conducted by Bernabé

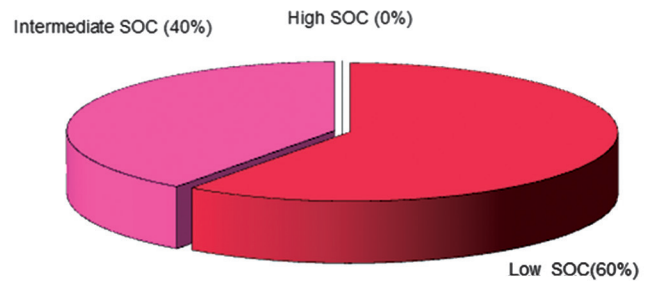


Figure 5: Sense of coherence levels in the study population

et al.^[16] and Lindmark *et al.*^[11] reported that SOC was related to having fewer DT. The individuals with a high internal locus of control who placed a high value on having their own teeth had less visible plaque and fewer decayed surfaces and root caries surfaces. It means that the participants with high internal locus of control had a strong SOC.^[16]

In the present study, the participants with periodontitis had lower mean SOC when compared to participants without periodontitis. A nonsignificant negative correlation was observed with CPI scores, indicating that participants with higher SOC had better periodontal condition. Similarly, a study conducted by Cyrino *et al.*^[17] showed that higher SOC scores may be a protective determinant of plaque and periodontal diseases indicating an association between SOC and oral health. In the study, majority of the study participants had LOA <0–3 mm. A nonsignificant negative correlation was observed with LOA scores, indicating that the participants with higher SOC had better periodontal condition. These findings were similar in a Reddy *et al.*^[9] Similarly, a study conducted by John *et al.*^[12] reported that majority of the study participants had LOA <0–3 mm. Most people in the society do not experience gingivitis or periodontitis as stressful situations. It has been advocated that SOC is more often related to psychological symptoms.^[17]

In the study, the participants with oral mucosal lesions had lower SOC as compared to the participants without oral mucosal lesions. A nonsignificant negative correlation was observed with oral mucosal lesions, indicating that participants with higher SOC did not have any oral mucosal lesions. As far as the literature available, there is no study done on transport drivers comparing with oral mucosal lesions.

CONCLUSION

Majority of the bus drivers who participated in the study had a low SOC. In the present study, SOC was positively correlated with age, socioeconomic status, and visit to dentist. The overall SOC was negatively correlated with habits, oral hygiene status scores, dental caries

prevalence, periodontal status scores, and oral mucosal lesions which indicates a good oral health in participants with strong SOC.

The present study concluded that the strong SOC was associated with increasing age, better socioeconomic status, good habits, increased frequency of dental visits, and a good oral health.

LIMITATIONS

Since all the participants had similar oral hygiene behaviors, it was not possible to correlate the oral hygiene behaviors with SOC. The cross-sectional nature of the study does not permit us to check for causality. Since there are no studies conducted on bus drivers comparing with clinical parameters, it was not possible to compare oral health status with SOC among bus drivers.

RECOMMENDATIONS

Since the sample size is small, the study should be done among large group of populations to know how SOC is related to oral health. The cross-sectional nature of the study does not permit us to check for causality. Hence, longitudinal studies are recommended. To the best of our knowledge, there is limited literature reported on SOC among drivers. Hence, within the limited constraints, comparison was done.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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