RESEARCH ARTICLE

Association Between Socio-Behavioral Factors and Oral Health Status of 12-15 Year Old School children in Belagavi City- A Cross Sectional Study

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ABSTRACT- Background- Oral health is a multi-factorial concept, determined by knowledge, behavior, and attitude of a person. Like any behavior carried out daily like a habit, oral health behaviors are also repeated like a habit. The multidimensionality of behavioral change makes studying it, and factors associated with it, a challenge, since there are so many aspects to consider. To find an association between the oral health status and socio-behavioral factors among 12-15 years old school children of Belagavi city, India.

Methods- A descriptive cross-sectional study was conducted to find an association between the oral health status and the knowledge, attitude and behavior of adolescents. One thousand participants were selected using two-stage random sampling. Dental caries, bleeding on probing, dental trauma, enamel fluorosis, intervention urgency was recorded according to the WHO 2013 proforma and the parameters regarding knowledge, attitudes as well as behavior using a closed ended self-designed questionnaire. Mann-Whitney U test, Kruskal Wallis, and linear correlation tests were done.

Results- Among 1000 subjects, 767 (76.7%) participants were found to have dental caries and 512 (51.2%) showed the presence of gingival bleeding. Out of a total score of 41, the mean knowledge score was 34.47 (±3.84) for boys and 34.76 (±4.13) for girls. Linear correlation showed that attitude was weakly correlated (r=0.18 and 0.20 respectively) but with a strong statistical significance to knowledge as well as behavior respectively.

Conclusion- Attitude, when compared separately either with knowledge or behavior showed a weak correlation that was highly significant. Comparison of behavior with caries experience showed a weak negative correlation, which was statistically insignificant.

Key-words- Adolescents, Attitude, Behavior, Oral health, Socio-behavioral, Knowledge

INTRODUCTION

The prevalence of non-communicable diseases is significant worldwide; they represent a comprehensive burden to people and society, display large disparities across countries, disproportionately affect poor and disadvantaged population groups and they are increasing rapidly across the globe.

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Oral diseases are among the most prevalent non-communicable diseases across the globe. Increasing levels of dental caries have been found in some developing countries, especially for countries where preventive programmes have not been established [1].

Many industrialized countries have experienced a decline in dental caries prevalence among children over the past decades. This trend of caries reduction may be ascribed to several factors of which the most important are improved oral hygiene, a more sensible approach to sugar consumption, effective use of fluorides, and school based preventive programmes [2].

During the past two decades, a dramatic reduction in the prevalence of dental caries has taken place in children and adolescents of most western industrialized countries and this is primarily ascribed to changing living conditions,

adoption of healthy lifestyles, improved self-care practices, and effective use of fluorides and establishment of preventive oral care programmes [2].

In addition, the oral health status among adults has shown improvement in that more individuals are maintaining their natural teeth. In parallel to the changing oral disease patterns, oral health awareness, dental knowledge and positive health attitudes of the general public have grown. In contrast, increasing levels of dental caries have been observed in several developing countries, especially in those countries where preventive programmes have not been implemented [3].

Like any behavior carried out daily like a habit, oral health behaviors are also repeated like a habit. The multidimensionality of behavioral change makes studying it, and factors associated with it, a challenge, since there are so many aspects to consider. Adolescents represent a challenging group in terms of oral health because they have permanent vulnerable teeth erupting by the time they are establishing their independence from parental influence [4].

Socio-behavioral factors of any individual include knowledge, attitude, and behavior that contribute to oral health. Low level of knowledge can alter attitude and behavior of an individual. Knowledge of good oral health improves the oral health through practice only. Positive behavioral practices require constant reinforcement as change is mostly not long lasting [5].

Behavioral interventions are important in adolescents due to high rate of caries and periodontal disease, trauma, use of tobacco and alcohol, eating disorders and unique psychological needs [6]. Belgaum (or Belagavi) is a city situated in the Karnataka state of India. This city covers the 94Km^2 area and hosts significant number of population. As per provisional reports of Census India, the population of Belgaum in 2011 was 4,778,439 of which 24.03% live in urban areas. Here the average literacy rate is 89.82% of the total population.

Our aim was to establish an association between socio-behavioral factors of school children and their oral health status which were correlated with the knowledge, attitude, and behaviors among the adolescent school children of Belagavi city, India.

MATERIALS AND METHODS

Study design- A descriptive cross-sectional study was conducted among 1000 school children aged 12-15 years selected from 6 (government and private) higher primary schools of Belagavi city, Karnataka, India. The study was carried out from 10th December 2016 to 15th March 2017 in which 25–30 children were examined per day. Two-stage random sampling technique was used and sample size was calculated using the prevalence of dental caries and periodontal disease in the 12–15 year old children in Belagavi city, India. Ethical approval was taken from the Institutional Review Board and Deputy Director of Public Instructions and it was in accordance with the Helsinki Declaration of 1975, as revised in 2000. Written informed consent was obtained from parents of subjects and assent was obtained from children.

Questionnaire Preparation- A self-designed questionnaire was prepared in English, which was validated through several pilot studies. The first pilot study was done to check the comprehension of prepared questionnaire in the English language. Thereafter, the questionnaire was modified and validated. It consisted of 4 parts: Part I- Socio-demographic data, part II- Attitude questions, part III- Behavior questions, and part IV- Knowledge questions. The closed ended structured questionnaire was used to record the socio-demographic factors, oral health behavior information that had questions about oral health knowledge and attitudes, sources of dental information, oral hygiene practices, the severity of dental decay, awareness about ill-effects of tobacco, etc. Type III clinical examination was done using the WHO 2013 proforma for children for the tooth [7] and instruments were sterilized before use with Savlon.

The questionnaire was translated into local languages and back-translated into English. It was also checked for grammar, comprehension, and reliability (Cronbach's alpha was in the range of 84% to 97%).

Inclusion and Exclusion criteria of participants- The inclusion criteria consisted of participants, who gave assent and were present during the survey. Exclusion criteria consisted of participants, who were physically and/or mentally challenged, participants with systemic illness and particularly those participants, whose parents did not give informed consent. The kappa statistic was in the range of 0.8 for dental caries and 0.9 for bleeding on probing. The recording was noted down by a single recording clerk, who had been trained and calibrated prior to the start of the examination.

Statistical analysis- The statistical analysis of data obtained from questionnaires and clinical examinations was done using Statistical Package for Social Sciences (SPSS 20) (IBM, Chicago IL, USA). The prevalence of dental caries, periodontal disease, dental fluorosis, dental trauma, enamel fluorosis and the intervention urgency was expressed in terms of frequency and percentage values. Frequency distributions and means of each oral disease/condition were calculated to assess the oral health status. Mann-Whitney U-test, Kruskal Wallis test and linear correlation was done to find out the association between oral health status and the knowledge, attitude and practice.

RESULTS

Distribution of study population based on Socio-demographic characteristics- Among the total participants (n=1000), approximately 18, 24, 29 and 27% children were of age 12, 13, 14 and 15 years respectively. Further, participants were distributed according to their gender and found to have 62 and 37% boys and girls respectively. Furthermore, participants were separated according to their income. Here, 4.4, 23.9, 59.3, 8.7, 3.7 % children belonged to the Upper class, Upper middle class, Lower middle class, Lower upper class, and Lower class respectively (Table 1).

Table 1: Distribution of the study population according to sociodemographic characteristics (n=1000)

Variables	n (%)
Age (Years)	
12 years	185(18.5%)
13 years	242(24.2%)
14 years	294(29.4%)
15 years	279(27.9%)
Total (12-15yrs)	1000(100%)
Gender	
Boys	627(62.7%)
Girls	373(37.3%)
Kupppuswamy's Socioeconomic status	
I (Upper class)	44(4.4%)
II (Upper middle class)	239(23.9%)
III (Lower middle class)	593(59.3%)
IV (Upper lower class)	87(8.7%)
V (Lower class)	37(3.7%)

Distribution of study population according to oral disease/condition- Table 2 shows the distribution of the participants in relation to oral diseases/conditions.

Table 2: Distribution of study population according to oral disease/condition (n=1000)

Oral disease/condition	n (%)
Caries (Decayed teeth)	
Individuals with caries	767(76.7%)
1-5	724(72.4%)
6-11	43(4.3%)
Individuals without caries	233(23.3%)
Periodontal status	
Individuals with presence of bleeding	512(51.2%)
1-7	490(49.0%)
8-14	22(2.2%)
Without gingival bleeding	488(48.8%)
Dental Erosion	
With presence of dental erosion	129 (12.9%)
Without dental erosion	871 (87.1%)
Dental Trauma	
With dental trauma	115(11.5%)
Without dental trauma	885(88.5%)
Enamel Fluorosis	
Individuals with fluorosis	92(9.2%)
Individuals without fluorosis	908(90.8%)
Intervention Urgency	
With need of treatment	782(78.2%)
With no need of treatment	218(21.8%)

Distribution of study population according to their Oral health- When they were asked if they think "Eating sweets and sticky foods can cause tooth decay", 77.6% agreed, 14.5% disagreed and 7.9% said they didn't know. When they were asked if "Regular brushing habits help to stop tooth decay*"*, 72.5% agreed, 14.7% disagreed and 12.8% said they didn't know. When they were asked if they "Enjoyed going to the dental clinic*"*, 60.6% disagreed, 27.7% agreed and 11.7% said they didn't recall if they enjoyed their visit. When the participants were asked did they have a "Fear of going to the dentist*"*, 44.6% said never, 38.1% said sometimes and 17.3% said always. When they were asked if they "Checked their teeth in a mirror after brushing*",* 55.8% said they did so sometimes, 32.4% said they did so always and 11.8% said they never did. When they were asked if they thought "Bleeding in gums*"* is a sign of disease, 47.8% agreed to this, 28.4% disagreed and 23.8% said they didn't know the answer. When they were asked if "Gum disease can be prevented*"*, 61.2% agreed, 24% said they didn't know if it could be prevented and 14.8% said it could not be prevented (Table 3).

Separation of participants subjects according to oral health- In order to evaluate the oral health status in participating boys and girls, observations were made on the basis of their attitude, behavior, and knowledge. Table 4 represens the mean and median scores among boys and girls related to attitude, behavior, and knowledge. Table 5 demonstrated the mean and median scores of the study subjects with presence and absence of dental caries related to attitude, behavior, and knowledge and also mean and median scores of the study subjects with and without bleeding on probing related to attitude, behavior and knowledge.

Table 3: Distribution of study population according to responses to questions related to oral health (n=1000)

Questions related to attitude	Agreed (%)	Disagreed (%)
Sweet and sticky foods causes tooth decay	776 (77.6%**)**	145 (14.5%)
High amount of force is required in tooth brushing	315 (31.5%**)**	540 (54.0%)
Regular brushing habits help in preventing tooth decay	725 (72.5%**)**	147 (14.7%)
Parents tell children about dental care	928 (92.8%)	72 (7.2%)
Questions related to behavior		
Enjoyed the dental visit	606 (60.6%)	277 (27.7%)
Less than a minute taken for tooth brushing	214 (21.4%)	786 (78.6%)
Tooth brushing done twice a day	660 (66.0%)	340 (34.0%)
Tooth brushing done only in the morning	374 (37.4%)	626 (62.6%)
Past experience of tooth pain	800 (80.0%)	200 (20.0%)
Questions related to knowledge		
Bleeding in gums is a sign of disease	478 (47.8%)	284 (28.4%)
Gum disease can be prevented	612 (61.2%)	240 (24.0%)
Sweets can cause dental caries	669 (66.9%)	165 (16.5%)
Dental caries can be stopped	630 (63.0%)	177 (17.7%)
Always use toothpaste while brushing	918 (91.8%)	82 (8.2%)

Table 4: Distribution of study population according to mean scores of questions related to oral health among boys and girls (n=1000)

Questions	n	Mean (±S.D.)	Median (Range)	Z (p-value)
Attitude	627 (Boys)	14.37±1.806	15 (13-15)	-1.32 (0.895)
	373 (Girls)	14.33±1.772	15 (13-15)	
Behavior	627 (Boys)	24.09±2.749	24 (23-26)	-1.19 (0.230)
	373 (Girls)	23.90±2.703	24 (23-26)	
Knowledge	627 (Boys)	34.47±3.844	35 (32-37)	-1.25 (0.210)
	373 (Girls)	34.76±4.125	35 (32-38)	

***p-value < 0.05 is considered statistically significant according to Mann Whitney U test**

Table 5: Mean and median scores of the study subjects with absence and presence of dental caries and bleeding on probing (B.O.P.) related to attitude, behavior and knowledge (n= 1000)

Questions	n	Mean (±S.D.)	Median (Range)	Z (p-value)
Attitude	233 (Caries absent)	14.37±1.824	15 (13-15)	-.315 (0.753)
	767 (Caries present)	14.36±1.785	15 (13-15)	
Behavior	233 (Caries absent)	24.21±2.686	24 (23-26)	-.826 (0.409)
	767 (Caries present)	23.96±2.755	24 (23-26)	
Knowledge	233 (Caries absent)	34.25±3.777	35 (32-37)	-1.555 (0.120)
	767 (Caries present)	34.68±4.001	35 (32-38)	
Attitude	488 (B.O.P absent)	14.48±1.811	15 (13-15)	-1.937 (0.053)
	512 (B.O.P present)	14.25±1.771	15 (13-15)	
Behavior	488 (B.O.P absent)	24.13±2.784	24 (23-26)	-0.886 (0.376)
	512 (B.O.P present)	23.91±2.695	24 (23-26)	
Knowledge	488 (B.O.P absent)	34.59±3.695	35 (32-37)	-0.457 (0.648)
	512 (B.O.P present)	34.58±4.186	35 (32-38)	

***p-value < 0.05 is considered statistically significant according to Mann Whitney U test**

Distribution of study subjects based upon dental caries and bleeding on probing- The attitude when compared separately with knowledge and behavior showed a weak correlation which was highly significant. When attitude and the caries experience were compared with one another, we found an extremely weak correlation, which was highly insignificant. When knowledge and caries experience of the participants were compared with one another, a weak and insignificant correlation was obtained. Comparison of behavior with the caries experience showed a weak negative correlation which was statistically insignificant. Knowledge and behavior, when compared with each other showed a weak correlation which was statistically insignificant. When knowledge was compared with the presence of bleeding of gums, we found a weak correlation which was statistically insignificant. When knowledge was compared with the socio-economic status of the participants, we found a weak negative correlation which was statistically insignificant. The caries experience of the study participants when compared with the presence of bleeding in gums showed a weak correlation which was again highly significant. Table 5 demonstrated the mean and median scores of the study participants with presence and absence of dental caries related to attitude, behavior and knowledge and also mean and median scores of the study subjects with and without bleeding on probing related to attitude, behavior and knowledge.

DISCUSSION

An attitude, which is a consequence of knowledge level, is a critical step in the maintenance of oral health status. Regarding oral health, the attitude of an individual determines his positive or negative behavior. Health related behavior change would reduce unhealthy such as sugar in the diet and smoking, as well as increase healthy behaviors such as flossing and dental attendance. Healthy behaviors and lifestyles developed at a young age are more sustainable. So in these young children, we can cultivate healthy lifestyles for better tomorrow.

In the present study, 77.6% of participants agreed to the fact that eating sweet and sticky foods can cause dental caries whereas 14.5% disagreed and remaining said they didn't know. Ogunrinde *et al.* [8] reported similar results where 81.8% of participants were agreed to sugary and sticky foods being unhealthy for teeth. In this study, 72.5% of participants agreed to the fact that regular brushing habits can prevent dental caries while 14.7% disagreed and 12.8% said they didn't know. This was similar to the study done by Ravaghi *et al.* [9]. The 27.7% of participants said they enjoyed going to the dentist and 60.6% disagreed while remaining couldn't recall their experience. A study done by Muttappallymyalil *et al.* [10] reported that 69.9% of participants enjoyed their dental visit. In this study, 17.3% of study participants said they always had a fear of going to the dentist whereas 38.1% said they visited sometimes and 44.6% chose never. This was much higher compared to a study done by Vega *et al.* [11] where only 15.3% of participants agreed. In the present study, 32.4% said they always checked their teeth in the mirror after brushing, 55.8% said they sometimes did so while 11.8% said never. However, it was much higher compared to a study done by Neamatollahi *et al.* [12] where only 10% of people agreed to check their teeth in the mirror after brushing and lesser than a study done by Rahman and Kawas [13] where 69.10% of individuals reported to do so. In this study, 47.2% of participants agreed to the fact that their gums can be improved by brushing teeth only. However, 26.1% disagreed and 26.7% study participants said they didn't know. This is a lower prevalence compared to a study carried out by

Neamatollahi *et al.* [12], where 60% of participants were found to have the same opinion. Our results were higher as compared to a study done by Rahman and Kawas [13] where 37.40% of participants said gum disease can be prevented with tooth brushing alone. In the present study, 47.8% study participants agreed to bleed in gums being a sign of disease while 28.4% disagreed. Our results are similar to a study done by Qaderi and Taani [14] where 51.2% of participants agreed on bleeding of gums to be a sign of disease.

Attitude scores among boys and girls showed no difference, when compared to each other. Our results were similar to a study done by Khami *et al.* [15], where no gender difference in the practices of students were observed. However, it was different than a study carried out by Sharda *et al.* [16], which showed that boys had a higher attitude score compared to participating girls. However, another study done by Ostberg *et al.* [17] showed females had higher attitude scores.

Behavior scores among boys and girls showed no difference, when compared to each other. This result was unlike to that of a study done by Prasad *et al.* [18] where females scored higher than males. Hussaini *et al.* [19] reported girls to have better oral health behavior. Our results were corroborated by a study carried out by Khami *et al.* [15] where no gender difference in the practices of students was seen.

There were no significant differences observed between the knowledge scores of boys and girls. No gender differences regarding their knowledge about oral health were also reported by Khami *et al.* [15] . However, a study done by Ansari *et al.* [26] reported males have lesser knowledge related to oral health.

In the present study, no difference between attitude and behavior of the subjects with and without caries was observed. This result was not similar to a study carried out by Levi and Shenkman [21], where Low DS and DT values were significantly correlated with high behavior scores [22].

There was no marked difference observed between knowledge of the participants with and without dental caries. However, a study done by Ogundele and Ogunsile [23] reported that increase in knowledge showed a decline in dental caries in the participating individuals. The present study also showed that the improvement in attitude and practices (apart from knowledge) caused a decline in dental caries. The lack of any significant difference in our study is probably due to dental caries being a multi-factorial disease. Also, the increase in knowledge might not necessarily change the attitude and behavior. This is because attitude along with behavior might be a result of observation and habit formation. The child tends to observe and directly follow the habits of the parents and elders in the house, thus forming his attitude directly without any changes in knowledge. This was also supported a study performed by Petersen *et al.* [24], where a positive oral health attitude was correlated with low risk of dental problems among school children.

When the study subjects were categorized according to the presence or absence of bleeding on probing to assess their periodontal status, there was no significant difference found for their knowledge, attitude and behavior, which was supported by another study carried out by Jurgensen and Petersen [25].

According to health belief theory given by Broadbent et al, there are some connections between dental health beliefs and behaviors [26]. In the present study, mean score of knowledge was higher than behavior as the study participants were found to have high oral health awareness however not all of it was being put into practice (behavior). This result indicated that health behavior before developing from scientific attitude mostly is due to modeling behavior and practical education which may not be acceptable. The main disadvantage of the above mentioned behavior was that health behavior established not on scientific attitude, and with weak scientific support may not have enough stability and might be stopped sometime later which was shown by Neamatollahi *et al.* [12]. The results of our study were different from a study done by Sharda *et al.* [27] where the subjects scored highly for attitude (81%) but knowledge score was comparatively lower. Neamatollahi *et al.* [12] reported a significant association between the scores of students' oral health knowledge and behavior with the behavior scores exceeded the knowledge scores.

When we compared the socio-behavioral parameters in the present study among themselves, knowledge was higher than the attitude. The correlation between knowledge and attitude was weak but significant (r=0.18). Dental health attitudes positively improve with the level of education as reported by Al-Omiri *et al.* [28]; Kawamura *et al.* [29]. On the contrary, Coster *et al.* [30] reported the lack of improvement in oral hygiene practices of dental students regardless of having obtained information and education.

When knowledge and behavior were compared, the knowledge score was slightly higher than the score for behavior. However, these parameters were not significantly correlated to each other. This is explained by the fact that information has been delivered but without sufficient emphasis placed on the benefits of good oral behavior. This finding was similar to a finding of Levin and Shenkman [21].

When attitude scores were compared with the behavior scores, no significant difference was observed. However, there was a weak (r=0.20) but significant correlation seen between the two parameters. This is probably due to the fact that change in attitude does not always lead to a change in behavior. Evidence based effective dental awareness programs are needed to improve dental related practice as reported by Subait *et al.* [31].

CONCLUSIONS

A significant correlation (0.60) was seen between dental caries and periodontal disease, which is explained by the fact that both are seen together in the population and occur simultaneously as a result of lack of oral hygiene. Socio-economic status and dental caries experience were negatively correlated (r=-0.041) to each other due to a reduction in dental caries with better socio-economic

status. The correlation between knowledge and attitude was weak but significant (r=0.18). Knowledge may be important in forming beliefs, but helpful attitudes and behaviors do not necessarily develop. The present study also concluded that the improvement in attitude and practices (apart from knowledge) caused a decline in dental caries. Further studies need to be done to elaborate on the relationship between knowledge, attitude and behavior and how oral health promotion and preventive practices can be designed in order to derive maximum benefit for adolescents.

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