

# Perception of Middle and High School Students about Oral Health and Preventive Dentistry

Nabila A Sedky

## ABSTRACT

**Objectives:** Assessing perception and attitudes about oral health and preventive dentistry among middle and secondary school students at public schools in Buraidah, Qassim, Kingdom of Saudi Arabia.

**Materials and methods:** Systematic random sampling technique was applied to choose a total sample of 1,496 male and female students. Students were required to fulfill an anonymous self-administered questionnaire consisting of 42 questions at the same meeting. Students were asked on oral health and preventive dentistry. Statistical analyses were carried out at significance level  $<0.05$  and  $0.01$ .

**Results:** Statistically significant difference was found between male and female students concerning their knowledge about oral health. Male students had poor awareness than females about “dental caries and oral conditions” and “dental health” ( $t$  test =  $2.890^*$ ,  $p = 0.004$ ) and ( $t$  test =  $4.447^*$ ,  $p = 0.004$ ), respectively. For perception about preventive dentistry, female students had statistically significant poorer acquaintance about “Dental sealants for caries prevention” and “Concept of preventive dentistry” than males ( $t$  test =  $-4.868^*$ ,  $p = 0.000$ ) and ( $t$  test =  $-4.385^*$ ,  $p = 0.000$ ), respectively. Moreover, middle school students demonstrated statistically significant lack of awareness about all types of oral health comparing to secondary school participants ( $t$  test =  $20.774^*$ ,  $p = 0.000$ ), ( $t$  test =  $29.699^*$ ,  $p = 0.000$ ), ( $t$  test =  $23.061^*$ ,  $p = 0.000$ ), and ( $t$  test =  $25.802^*$ ,  $p = 0.000$ ). For preventive dentistry, poor insight was showed among middle school students compared to secondary school participants for the categories “fluoride as a preventive measure” ( $t$  test =  $20.367^*$ ,  $p = 0.000$ ), “Prevention of oral and dental diseases” ( $t$  test =  $15.924^*$ ,  $p = 0.000$ ), and “concept of preventive dentistry” ( $t$  test =  $29.928^*$ ,  $p = 0.000$ ), while secondary school students were statistically unaware about “dental sealants for caries prevention” ( $t$  test =  $-4.699^*$ ,  $p = 0.000$ ).

**Conclusion:** Perception about oral health among the participants was generally poor.

**Keywords:** Concept of preventive dentistry, Dental caries and oral conditions, Middle and secondary school students, Perception and attitudes.

*Journal of Oral Health and Community Dentistry* (2019): 10.5005/jp-journals-10062-0052

## INTRODUCTION

Health is a mutual theme in most societies. During the past few decades, there has been an awakening that health is an essential human right and a global social goal that it is fundamental to the satisfaction of prime human needs and to an enhanced quality of life.<sup>1</sup> In accordance with the World Health Organization (WHO), health has been described as “a state of complete physical, mental, and social well-being and not merely the absence of disease and infirmity” (1948).<sup>2</sup> For the dental field, this perception on health proposed that the ultimate goal of dental care, specifically good oral health, should no longer just be seen as the absence of caries or periodontal disease, but the mental and social welfare of the patient must also be taken into account.<sup>3</sup>

“Say Ahh: Think Mouth, Think Health” is the theme for World Health Day by WHO for 2018–2020 that promotes people to create the connection between their oral health and their general health and welfare.<sup>4</sup> Nobody can be actually healthy unless he or she is free from the essence of oral diseases and craniofacial conditions.<sup>5</sup> Dental diseases are not directly life-threatening, however have a harmful impact on quality of life during childhood through old age and can have an influence on self-esteem, ability to eat, nutrition, as well as oral and general health.<sup>6</sup> They are associated with substantial pain, anxiety, discomfort, and compromised social functioning.<sup>7–9</sup> Dental caries and periodontal problems are more prevalent among the dental diseases and this is considered as a remarkable constituent of global disease burden.<sup>10</sup> Oral health of an individual can be influenced by his awareness and attitude, where attitudes are naturally reflected through the person’s own

Department of Community Dentistry and Oral Epidemiology, Qassim University, College of Dentistry, Buraidah, Qassim, Kingdom of Saudi Arabia

**Corresponding Author:** Nabila A Sedky, Department of Community Dentistry and Oral Epidemiology, Qassim University, College of Dentistry, Buraidah, Qassim, Kingdom of Saudi Arabia, Phone: +966 538127210, e-mail: nasedky@yahoo.com

**How to cite this article:** Sedky NA. Perception of Middle and High School Students about Oral Health and Preventive Dentistry. *J Oral Health Comm Dent* 2019;13(3):90–100.

**Source of support:** Nil

**Conflict of interest:** None

experiences, his cultural perceptions, familial beliefs, and attitudes, in addition to further life conditions; furthermore, individual’s oral health has a strong influence on oral health behavior.<sup>11</sup> Several previous studies are related to the attitudes and behaviors of oral health in young adults and the relationship between their attitudes, behaviors, and the condition of their oral and dental status,<sup>12,13</sup> Oliveira et al.,<sup>14</sup> reported that children with inadequate oral health knowledge are twice as possibly to have caries than children with adequate knowledge. Additionally, previous studies revealed that there is an association between the increase in knowledge and better oral health.<sup>15,16</sup>

Dental diseases are preventable, and preventive dentistry is a form of dentistry that focuses on practices and procedures, which confirm that dental diseases do not happen or proceed to

more severe forms. It comprises two aspects of dental care both implemented to assist patients avoid or target dental diseases in their early stages that are more treatable. To some extent, it is the oral hygiene measures that the patient performed at home. Preventive dentistry also includes what the dental staff practicing at their clinics to help patients maintain good oral health. In either case, the objective of preventive dentistry is to halt the development of oral diseases or to discover at an early stage.<sup>17</sup>

Prevention of dental diseases is one of the most important and affordable methods to enhance oral health as well as to reduce the prevalence and incidence of the disease. The healthcare professional is responsible for promoting a positive attitude toward community service.<sup>18</sup> Consequently, the primary concern of dental professionals and oral health educators is the transfer of knowledge and positive behavior of oral health to the society, and there has been an expanding idea of promoting health through education, instruction, and motivation all over the world. It establishes an environment that helps shifting the burden of public health from the responsibility of healthcare professionals to the "hands of the people."<sup>19,20</sup> To achieve this, there should be an accurate knowledge and understanding of scientifically supported information and facts about oral health and preventive dentistry. The purpose of this study was to investigate the perception and opinions about oral health and preventive dentistry among middle and secondary school male and female students at public schools in Buraidah city, Qassim Province, Kingdom of Saudi Arabia.

## MATERIALS AND METHODS

A cross-sectional study was carried out in Buraidah city, Qassim Province, Kingdom of Saudi Arabia, and the target population was male and female students enrolled in public middle and secondary schools from 1st to 3rd grades.

After calculating the sample size based on the statistics of the Qassim Education Schools, a total sample of 1,496 male and female students was selected. A systematic random sampling technique was applied to choose the study sample confirming a representation which reflected gender, geographic area, and class grades followed by obtaining a list of all public schools in Buraidah city from the Ministry of Education, with each school name and the name of the district where the school was found in addition to the number of first to third grade classes, the number of the corresponding students, as well as the school identification number.

Based on the number of classes in each grade, the sampling interval was determined, with every second class was chosen to contribute. Two controlled lists were organized in each selected school by grade and geographical location, one for boys and the other for girls, and subsequently subsamples were taken from each stratum and all students from selected classes were taken into the sample. No potential bias with regard to the selection of the study population was predicted and the samples were representative of the reference population. The study protocol was approved by the Dental Ethical Committee prior to initiating the study.

Data were collected during the Fall semester of the academic year 2017/2018. The students were asked to complete an anonymous self-administered questionnaire comprising of 42 questions at the same meeting.<sup>21-23</sup> The purpose of the study was well explained in advance to the participants and the process of finishing the questionnaire was monitored by the researcher. Each student was provided with a complete description of the questionnaire as well as the method of scoring.

The questionnaire used was in a simple tick-box format, with sections for demographic items (such as age, gender, and year of study). Students were questioned on oral health and the diseases that are related to oral and dental health and also preventive dentistry as well as methods of its application. The questionnaire was reviewed to ensure its completion before administering it to participants.

The responses to the statements were based on a five-point Likert scale with response options of 1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree, and 5 = do not know. The statements of the questionnaire were categorized into 2 main categories, "Oral health" and "Preventive dentistry," where each one was subcategorized into four perceptions. For oral health, the perceptions were "Oral and general health," "Dental health," "Dental caries and oral conditions," and "oral cleansing," whereas for preventive dentistry conceptions were "Concept of preventive dentistry," "Prevention of oral and dental diseases," "Fluoride as a preventive measure," and finally, "Dental sealants for caries prevention."

Mean scores on each category were calculated to determine a "mean" perception score for each student, thus a score of 3 and above was considered as poor perception, while two and below was graded as good perception, meaning that the higher the score, the more the lack of knowledge.

The English version of the questionnaire was translated into Arabic language and pretested on randomly selected 150 samples (10%) to ensure its comprehension, practicability, validity, interpretation of responses, and reliability (Cronbach's  $\alpha = 0.890$ ).

## Statistical Analysis

Statistical analysis was conducted using the SPSS program (SPSS 22.0 for windows, SPSS Inc., Chicago, USA). All statistical analyses were carried out at a significance level less than 0.01 and 0.05. Means and standard deviations were determined for knowledge scores of individuals for each item and percentage of the lack of awareness was analyzed. Then, the independent sample t test for overall knowledge scores was used for two group comparisons as gender and level of education.

## RESULTS

The current study included 1,496 students who completed the questionnaires that were divided equally according to gender and also according to level of education with a mean age of 15.4 years ( $SD \pm 1.99$  years).

Table 1 portrays the mean score of overall knowledge about oral health listed in descending order and percentage of students who lack knowledge. In "Oral and general health" category, 81.0% of the students reported that they "disagree" or "did not know" that "All precancerous lesions of the oral cavity always lead to oral cancer even if the predisposing factors are removed" followed by 74.2% with the same responses for the statement "Cleft palate and cleft lip are developmental defects. Proper surgical and prosthetic treatment is available that will enable patients with cleft lip/cleft palate to lead a normal life." Whereas for the category "Dental health," the highest percentage of lacking knowledge registered for the items "A tooth avulsed due to trauma can be reimplanted into the tooth socket" (70.0%) and "Artificial teeth can perfectly replace the function of natural teeth. Hence, too much care for natural teeth is unwarranted" (60.1%). Additionally, 76.0% and 66.2% of the participating students did not know or disagree that

**Table 1:** Mean ( $\pm$ SD) score of overall knowledge about oral health listed in descending order and percentage of students who lack knowledge

| <i>Variables</i>   |   | <i>Mean (<math>\pm</math>SD)</i>  | <i>Percentage of students answering "Disagree and Do not know"</i> |
|--|---|---|--|
| Oral and general health  | All precancerous lesions of the oral cavity always lead to oral cancer even if the predisposing factors are removed   | 4.03 ( $\pm$ 1.33)  | 81.0   |
|  | Cleft palate and cleft lip are developmental defects. Proper surgical and prosthetic treatment is available that will enable patients with cleft lip/cleft palate to lead a normal life | 3.79 ( $\pm$ 1.44)  | 74.2   |
|  | Oral diseases have an implication on certain systemic diseases/ conditions like cardiovascular diseases, pregnancy, and low birthweight babies, etc.                                    | 3.51 ( $\pm$ 1.47)  | 68.5   |
|  | Tobacco is the greatest risk factor for oral cancer   | 3.44 ( $\pm$ 1.62)  | 65.0   |
|  | Saliva can be used in the diagnosis of oral as well as certain systemic diseases  | 3.31 ( $\pm$ 1.54)  | 59.6   |
|  | Certain systemic diseases can manifest in the oral cavity   | 2.96 ( $\pm$ 1.46)  | 51.6   |
|  | Oral health has an influence on the overall quality of life   | 2.83 ( $\pm$ 1.40)  | 49.5   |
|  | Oral health is an integral part of general health   | 2.29 ( $\pm$ 1.24)  | 34.0   |
| Dental health  | A tooth avulsed due to trauma can be reimplanted into the tooth socket  | 3.27 ( $\pm$ 1.51)  | 70.0   |
|  | Artificial teeth can perfectly replace the function of natural teeth. Hence, too much care for natural teeth is unwarranted   | 3.26 ( $\pm$ 1.32)  | 60.1   |
|  | Alignment of teeth is done both for functional as well as esthetic purpose  | 3.05 ( $\pm$ 1.60)  | 56.1   |
|  | Loss of teeth during old age is a natural phenomenon, and neither the dentist nor the patient can prevent tooth loss during this period of life   | 3.04 ( $\pm$ 1.42)  | 56.4   |
|  | Proper maintenance of deciduous dentition is as important as the permanent dentition  | 2.47 ( $\pm$ 1.38)  | 39.8   |
|  | Dental caries and oral conditions   | Microorganisms that cause dental caries are transmitted mainly from the mother to the child | 3.80 ( $\pm$ 1.40)   |
| Dental caries and periodontal disease are plaque-mediated diseases   |   | 3.61 ( $\pm$ 1.55)  | 66.2   |
| Bruxism, trauma from occlusion, and reduced vertical dimension of jaws can cause temporomandibular joint problems and pain in orofacial region |   | 3.49 ( $\pm$ 1.55)  | 63.1   |
| Frequent consumption of sugar-containing food is more detrimental than the quantity of the sugar consumed                                      |   | 3.08 ( $\pm$ 1.51)  | 55.1   |
| Soft drinks can cause erosion of dental enamel which is the hardest tissue in the human body   |   | 2.79 ( $\pm$ 1.46)  | 49.6   |
| Oral cleansing   |   | Fruits, milk, vegetables, and so on are food that contribute to clean teeth                 | 2.91 ( $\pm$ 1.59)   |
|  | Tongue cleaning removes tongue coating and eliminate bad breath   | 2.80 ( $\pm$ 1.54)  | 49.1   |
|  | When brushing teeth also cleans the tongue  | 2.73 ( $\pm$ 1.50)  | 48.3   |
|  | It is beneficial to visit a dentist for regular checkups for oral and dental health   | 2.34 ( $\pm$ 1.51)  | 36.4   |

"Microorganisms that cause dental caries are transmitted mainly from the mother to the child" and "Dental caries and periodontal disease are plaque-mediated diseases," respectively, in the category "Dental caries and Oral conditions." Finally and for the category "Oral cleansing," 50.8% of the contributors disagree or did not know that "Fruits, milk, vegetables, and so on are food that contribute to clean teeth," while 49.1% of them lack the knowledge that "Tongue cleaning removes tongue coating and eliminate bad breath."

In Table 2, the mean score of overall awareness about preventive dentistry listed in descending order and percentage of students who lack knowledge was depicted. The highest percentage of

students who reported that they "disagree" or "did not know" for the inquired items was for the item "Health education has an important role to play in creating awareness about oral health among public" (51.3%) and the item "Using dental floss helps preventing dental caries" (48.4%) in the category "Concept of preventive dentistry." While 78.5% and 67.2% of the participating students reported that they did not know or disagree that "Xylitol is not only noncariogenic but also suppresses the growth of acidogenic bacteria in dental plaque" and "Dental care should be started even before the birth of a child (prenatal care)," respectively, for the category "Prevention of oral and dental diseases." Moreover, for "Fluoride as a preventive

**Table 2:** Mean ( $\pm$ SD) score of overall awareness about preventive dentistry listed in descending order and percentage of students who lack knowledge

| Variables                              |   | Mean ( $\pm$ SD)   | Percentage of students answering "Disagree and Do not know" |
|--|---|--------------------|---|
| Concept of preventive dentistry        | Health education has an important role to play in creating awareness about oral health among public   | 2.85 ( $\pm$ 1.59) | 51.3  |
|  | Using dental floss helps preventing dental caries   | 2.85 ( $\pm$ 1.53) | 48.4  |
|  | Regular brushing helps in prevention of gum problems  | 2.75 ( $\pm$ 1.54) | 47.7  |
|  | Dental caries is a complex disease but can be prevented by adopting healthy oral health behaviors   | 2.54 ( $\pm$ 1.49) | 39.6  |
|  | Proper brushing of teeth and flossing will enable to prevent both dental caries and gingival diseases   | 2.25 ( $\pm$ 1.44) | 36.7  |
| Prevention of oral and dental diseases | Xylitol is not only noncariogenic but also suppresses the growth of acidogenic bacteria in dental plaque  | 4.06 ( $\pm$ 1.45) | 78.5  |
|  | Dental care should be started even before the birth of a child (prenatal care)  | 3.45 ( $\pm$ 1.52) | 67.2  |
|  | Mouth-guards are useful in preventing sport-related injuries/trauma   | 3.18 ( $\pm$ 1.51) | 57.5  |
|  | Sugar-free chewing gum has a positive effect on dental health   | 3.13 ( $\pm$ 1.48) | 57.2  |
|  | Parafunctional habits like thumb sucking, lip biting, lip sucking, and nail biting are very common among children. These habits need to be controlled as they affect orofacial structures | 2.76 ( $\pm$ 1.47) | 48.8  |
| Fluoride as a preventive measure       | Fluoridating the drinking water is an effective, safe, and efficient way to prevent dental caries   | 3.77 ( $\pm$ 1.43) | 73.9  |
|  | Fluoride is the most important factor for decreasing the tooth susceptibility to decay  | 3.34 ( $\pm$ 1.55) | 61.0  |
|  | Fluorides have a protective role against dental caries  | 3.30 ( $\pm$ 1.64) | 58.6  |
|  | Using fluoride toothpaste is more important than the brushing technique to prevent caries   | 3.01 ( $\pm$ 1.49) | 52.9  |
|  | Brushing teeth with fluoride toothpaste prevents tooth decay  | 3.00 ( $\pm$ 1.48) | 51.4  |
| Dental sealants for caries prevention  | Sealants are not needed if patients receive topical fluorides   | 3.86 ( $\pm$ 1.39) | 85.2  |
|  | I think that sealants wear out easily   | 3.80 ( $\pm$ 1.28) | 75.1  |
|  | Sealant is effective in the prevention of pit and fissure caries in newly erupted molars  | 3.56 ( $\pm$ 1.51) | 61.2  |
|  | I think sealants, besides being a preventive method, can also have a restorative effect and can be used on incipient caries   | 3.34 ( $\pm$ 1.48) | 55.1  |
|  | I believe that fissure sealants should be checked after placement   | 2.54 ( $\pm$ 1.43) | 35.4  |

measure," 73.0% and 61.0% of the students had lack of knowledge that "Fluoridating the drinking water is an effective, safe, and efficient way to prevent dental caries" as well as that "Fluoride is the most important factor for decreasing the tooth susceptibility to decay," respectively. Finally, the contributing students registered that they disagree or did not know that "Sealants are not needed if patients receive topical fluorides" (85.2%) and also that "I think that sealants wear out easily" (75.1%) with regard to the category "Dental sealants for caries prevention."

Data in Table 3 represents the relation between students' gender and their perception about principles of oral health and preventive dentistry. A statistical significant difference was found between male and female students with regard to their knowledge about oral health, where male students had poor awareness about "Dental caries and Oral conditions" as well as for "Dental health" than their female colleagues ( $t$  test = 2.890\*,  $p$  = 0.004) and ( $t$  test = 4.447\*,  $p$  = 0.004), respectively. On the contrary, for the perception about preventive dentistry, female students had statistically significant poorer insight than their male counterparts

in the form of "Dental sealants for caries prevention" and "Concept of preventive dentistry" principles ( $t$  test = -4.868\*,  $p$  = 0.000) and ( $t$  test = -4.385\*,  $p$  = 0.000), respectively.

For enquiry about the acquaintance of principles of oral health and preventive dentistry concerning students' level of education, Table 4 demonstrates a statistically significant difference for all the studied categories, where the middle school students revealed statistically significant lack of knowledge about all the types of oral health with regard to their secondary school counterparts in the form of "Dental caries and Oral conditions" ( $t$  test = 20.774\*,  $p$  = 0.000), "Oral and general health" ( $t$  test = 29.699\*,  $p$  = 0.000), "Dental health" ( $t$  test = 23.061\*,  $p$  = 0.000), and finally "Oral cleansing" ( $t$  test = 25.802\*,  $p$  = 0.000). As well for preventive dentistry, poor perception was registered among middle school students compared to their secondary school colleagues for the categories "Fluoride as a preventive measure" ( $t$  test = 20.367\*,  $p$  = 0.000), "Prevention of oral and dental diseases" ( $t$  test = 15.924\*,  $p$  = 0.000), and "Concept of preventive dentistry" ( $t$  test = 29.928\*,  $p$  = 0.000), whereas secondary school students were statistically

**Table 3:** Mean ( $\pm$ SD) perception of principles of oral health and preventive dentistry for male students listed in descending order vs their female counterparts ( $n = 1,496$ )

| Variables                              | Mean ( $\pm$ SD)   |                    | t test  | Significance |
|--|--------------------|--------------------|---------|--------------|
|  | Male               | Female             |         |              |
| Oral health                            |                    |                    |         |              |
| Dental caries and oral conditions      | 3.42 ( $\pm$ 0.92) | 3.30 ( $\pm$ 0.78) | 2.890*  | 0.004        |
| Oral and general health                | 3.26 ( $\pm$ 0.80) | 3.26 ( $\pm$ 0.69) | 0.134   | 0.894        |
| Dental health                          | 3.10 ( $\pm$ 0.89) | 2.92 ( $\pm$ 0.73) | 4.447*  | 0.000        |
| Oral cleansing                         | 2.65 ( $\pm$ 1.28) | 2.73 ( $\pm$ 1.13) | -1.266  | 0.206        |
| Preventive dentistry                   |                    |                    |         |              |
| Dental sealants for caries prevention  | 3.32 ( $\pm$ 0.87) | 3.45 ( $\pm$ 0.86) | -4.868* | 0.000        |
| Prevention of oral and dental diseases | 3.30 ( $\pm$ 0.96) | 3.34 ( $\pm$ 0.66) | -0.893  | 0.372        |
| Fluoride as a preventive measure       | 3.28 ( $\pm$ 1.10) | 3.32 ( $\pm$ 0.98) | -0.848  | 0.396        |
| Concept of preventive dentistry        | 2.53 ( $\pm$ 1.11) | 2.77 ( $\pm$ 1.05) | -4.385* | 0.000        |

\* $p < 0.001$ **Table 4:** Mean ( $\pm$ SD) acquaintance of principles of oral health and preventive dentistry for middle school students listed in descending order vs secondary school students ( $n = 1,496$ )

| Variables                              | Mean ( $\pm$ SD)   |                    | t test  | Significance |
|--|--------------------|--------------------|---------|--------------|
|  | Middle             | Secondary          |         |              |
| Oral health                            |                    |                    |         |              |
| Dental caries and oral conditions      | 3.76 ( $\pm$ 0.70) | 2.96 ( $\pm$ 0.80) | 20.774* | 0.000        |
| Oral and general health                | 3.71 ( $\pm$ 0.62) | 2.81 ( $\pm$ 0.56) | 29.699* | 0.000        |
| Dental health                          | 3.43 ( $\pm$ 0.72) | 2.59 ( $\pm$ 0.69) | 23.061* | 0.000        |
| Oral cleansing                         | 3.36 ( $\pm$ 1.20) | 2.02 ( $\pm$ 0.75) | 25.802* | 0.000        |
| Preventive dentistry                   |                    |                    |         |              |
| Fluoride as a preventive measure       | 3.78 ( $\pm$ 0.91) | 2.81 ( $\pm$ 0.94) | 20.367* | 0.000        |
| Prevention of oral and dental diseases | 3.63 ( $\pm$ 0.85) | 3.01 ( $\pm$ 0.66) | 15.924* | 0.000        |
| Dental sealants for caries prevention  | 3.33 ( $\pm$ 0.88) | 3.54 ( $\pm$ 0.85) | -4.699* | 0.000        |
| Concept of preventive dentistry        | 3.32 ( $\pm$ 0.99) | 1.99 ( $\pm$ 0.71) | 29.928* | 0.000        |

\* $p < 0.001$ 

"disagree" or "did not know" about "Dental sealants for caries prevention" ( $t$  test = -4.699\*,  $p = 0.000$ ).

Table 5 depicts knowledge scores concerning oral health with significant differences by gender. For oral health and with regard to "Oral and general health" category, it was found that female students had poor knowledge than male students for the items "Oral health is an integral part of general health" and "Oral health has an influence on the overall quality of life" ( $t$  test = -3.044\*,  $p = 0.002$ ) and ( $t$  test = -3.505\*,  $p = 0.000$ ), respectively, while they had better perception in the items "Cleft palate and cleft lip are developmental defects. Proper surgical and prosthetic treatment is available that will enable patients with cleft lip/cleft palate to lead a normal life" and "Saliva can be used in the diagnosis of oral as well as certain systemic diseases" ( $t$  test = 2.926\*,  $p = 0.003$ ) and ( $t$  test = 2.525\*,  $p = 0.012$ ), respectively. Moreover, for "Dental health" category, results illustrated that male students suffered more than their female colleagues from lack of awareness about the items "A tooth avulsed due to trauma can be reimplanted into the tooth socket," "Loss of teeth during old age is a natural phenomenon, and neither the dentist nor the patient can prevent tooth loss during this period of life," and "Artificial teeth can perfectly replace the function of natural teeth. Hence, too much care for natural teeth is unwarranted" ( $t$  test = 3.826\*,  $p = 0.000$ ;

$t$  test = 3.151\*,  $p = 0.002$ ; and  $t$  test = 5.382\*,  $p = 0.000$ , respectively). In "Dental caries and Oral conditions" category, female students had significantly higher better perception for the items "Dental caries and periodontal disease are plaque-mediated diseases" ( $t$  test = 4.388\*,  $p = 0.000$ ), "Microorganisms that cause dental caries are transmitted mainly from the mother to the child" ( $t$  test = 3.335\*,  $p = 0.001$ ), "Bruxism, trauma from occlusion, reduced vertical dimension of jaws can cause Temporomandibular joint problems and pain in orofacial region" ( $t$  test = 2.953\*,  $p = 0.003$ ), and "Soft drinks can cause erosion of dental enamel which is the hardest tissue in the human body" ( $t$  test = 2.388\*,  $p = 0.017$ ), and on the contrary, male students recorded significant better oral health knowledge about the item "Frequent consumption of sugar-containing food is more detrimental than the quantity of the sugar consumed" ( $t$  test = -5.419\*,  $p = 0.000$ ). Finally, for the category "Oral cleansing," female students significantly registered good awareness about the item "When brushing teeth also clean the tongue" ( $t$  test = 3.630\*,  $p = 0.000$ ), while female students significantly had poor conception about the item "It is beneficial to visit a dentist for regular checkups for oral and dental health" ( $t$  test = -6.890\*,  $p = 0.000$ ).

For the knowledge scores regarding preventive dentistry with significant differences by gender, Table 6 disclosed that the categories "Concept of preventive dentistry," "Prevention of oral

**Table 5:** Knowledge scores concerning oral health with significant differences by gender ( $n = 1,496$ )

|                                   | Knowledge scores  | Mean ( $\pm$ SD)   |                      | t test   | Significance |
|-----------------------------------|---|--------------------|----------------------|----------|--------------|
|                                   |   | Male ( $n = 748$ ) | Female ( $n = 748$ ) |          |              |
| Oral and general health           | Oral health is an integral part of general health   | 2.20 ( $\pm$ 1.20) | 2.39 ( $\pm$ 1.28)   | -3.044** | 0.002        |
|                                   | Oral health has an influence on the overall quality of life   | 2.70 ( $\pm$ 1.49) | 2.95 ( $\pm$ 1.29)   | -3.505** | 0.000        |
|                                   | Cleft palate and cleft lip are developmental defects. Proper surgical and prosthetic treatment is available that will enable patients with cleft lip/cleft palate to lead a normal life | 3.90 ( $\pm$ 1.47) | 3.68 ( $\pm$ 1.41)   | 2.926**  | 0.003        |
|                                   | Saliva can be used in the diagnosis of oral as well as certain systemic diseases  | 3.41 ( $\pm$ 1.60) | 3.21 ( $\pm$ 1.47)   | 2.525*   | 0.012        |
| Dental health                     | A tooth avulsed due to trauma can be reimplanted into the tooth socket  | 3.42 ( $\pm$ 1.55) | 3.13 ( $\pm$ 1.45)   | 3.826**  | 0.000        |
|                                   | Loss of teeth during old age is a natural phenomenon, and neither the dentist nor the patient can prevent tooth loss during this period of life   | 3.16 ( $\pm$ 1.63) | 2.92 ( $\pm$ 1.18)   | 3.151**  | 0.002        |
|                                   | Artificial teeth can perfectly replace the function of natural teeth. Hence, too much care for natural teeth is unwarranted   | 3.44 ( $\pm$ 1.26) | 3.08 ( $\pm$ 1.35)   | 5.382**  | 0.000        |
| Dental caries and oral conditions | Dental caries and periodontal disease are plaque-mediated diseases  | 3.79 ( $\pm$ 1.61) | 3.44 ( $\pm$ 1.48)   | 4.388**  | 0.000        |
|                                   | Microorganisms that cause dental caries are transmitted mainly from the mother to the child   | 3.92 ( $\pm$ 1.49) | 3.68 ( $\pm$ 1.30)   | 3.335**  | 0.001        |
|                                   | Frequent consumption of sugar-containing food is more detrimental than the quantity of the sugar consumed   | 2.87 ( $\pm$ 1.55) | 3.29 ( $\pm$ 1.43)   | -5.419** | 0.000        |
|                                   | Bruxism, trauma from occlusion, and reduced vertical dimension of jaws can cause temporomandibular joint problems and pain in orofacial region  | 3.61 ( $\pm$ 1.61) | 3.37 ( $\pm$ 1.49)   | 2.953**  | 0.003        |
|                                   | Soft drinks can cause erosion of dental enamel which is the hardest tissue in the human body  | 2.89 ( $\pm$ 1.62) | 2.70 ( $\pm$ 1.28)   | 2.388*   | 0.017        |
| Oral cleansing                    | When brushing teeth also cleans the tongue  | 2.87 ( $\pm$ 1.60) | 2.59 ( $\pm$ 1.37)   | 3.630**  | 0.000        |
|                                   | It is beneficial to visit a dentist for regular checkups for oral and dental health   | 2.07 ( $\pm$ 1.58) | 2.60 ( $\pm$ 1.39)   | -6.890** | 0.000        |

\* $p < 0.05$ \*\* $p < 0.001$ 

and dental diseases," and "Dental sealants for caries prevention" had significant difference between male and female students. Female students experienced significant poorer knowledge than their male classmates in the items "Dental caries is a complex disease but can be prevented by adopting healthy oral health behaviors" ( $t$  test =  $-5.768^*$ ,  $p = 0.000$ ), "Proper brushing of teeth and flossing will enable to prevent both dental caries and gingival diseases" ( $t$  test =  $-10.733^*$ ,  $p = 0.000$ ), "Using dental floss helps preventing dental caries" ( $t$  test =  $-4.019^*$ ,  $p = 0.000$ ), "Dental care should be started even before the birth of a child (prenatal care)" ( $t$  test =  $-4.941^*$ ,  $p = 0.000$ ), "Mouth-guards are useful in preventing sport-related injuries/trauma" ( $t$  test =  $-3.825^*$ ,  $p = 0.000$ ), "Sealant is effective in the prevention of pit and fissure caries in newly erupted molars" ( $t$  test =  $-8.606^*$ ,  $p = 0.000$ ), and "Sealants are not needed if patients receive topical fluorides" ( $t$  test =  $-7.008^*$ ,  $p = 0.000$ ). On the contrary, results revealed that the participating male students showed significant inadequate perception for the items "Health education has an important role to play in creating awareness about oral health among public" and "Parafunctional

habits like thumb sucking, lip biting, lip sucking, and nail biting are very common among children. These habits need to be controlled as they affect orofacial structures," "Sugar-free chewing gum has a positive effect on dental health," and "I believe that fissure sealants should be checked after placement" ( $t$  test =  $3.780^*$ ,  $p = 0.000$ ;  $t$  test =  $3.934^*$ ,  $p = 0.000$ ;  $t$  test =  $3.405^*$ ,  $p = 0.001$ ; and  $t$  test =  $4.521^*$ ,  $p = 0.000$ , respectively).

Table 7 presents knowledge scores considering oral health with significant differences by level of education. Results demonstrated significant difference in the perception about oral health between middle and secondary school students for almost all items studied represented in the following categories: "Oral and general health," "Dental health," "Dental caries and Oral conditions," as well as "Oral cleansing;" where middle school students had significant poor perception about oral health than middle school students.

Similarly, the conception of middle school students about preventive dentistry was significantly lower in comparison to their secondary school classmates for all the items investigated except for the category "Dental sealants for caries prevention," the items

**Table 6:** Knowledge scores regarding preventive dentistry with significant differences by gender ( $n = 1,496$ )

|  | Knowledge scores  | Mean ( $\pm$ SD)   |                      | t test   | Significance |
|--|---|--------------------|----------------------|----------|--------------|
|  |   | Male ( $n = 748$ ) | Female ( $n = 748$ ) |          |              |
| Concept of preventive dentistry        | Dental caries is a complex disease but can be prevented by adopting healthy oral health behaviors   | 2.32 ( $\pm$ 1.60) | 2.76 ( $\pm$ 1.33)   | -5.768*  | 0.000        |
|  | Health education has an important role to play in creating awareness about oral health among public   | 3.00 ( $\pm$ 1.71) | 2.69 ( $\pm$ 1.43)   | 3.780*   | 0.000        |
|  | Proper brushing of teeth and flossing will enable to prevent both dental caries and gingival diseases   | 1.87 ( $\pm$ 1.38) | 2.64 ( $\pm$ 1.39)   | -10.733* | 0.000        |
| Prevention of oral and dental diseases | Using dental floss helps preventing dental caries   | 2.69 ( $\pm$ 1.67) | 3.01 ( $\pm$ 1.37)   | -4.019*  | 0.000        |
|  | Dental care should be started even before the birth of a child (prenatal care)  | 3.26 ( $\pm$ 1.55) | 3.64 ( $\pm$ 1.47)   | -4.941*  | 0.000        |
|  | Parafunctional habits like thumb sucking, lip biting, lip sucking, and nail biting are very common among children. These habits need to be controlled as they affect orofacial structures | 2.91 ( $\pm$ 1.66) | 2.61 ( $\pm$ 1.25)   | 3.934*   | 0.000        |
|  | Mouth-guards are useful in preventing sport-related injuries/trauma   | 3.03 ( $\pm$ 1.63) | 3.32 ( $\pm$ 1.35)   | -3.828*  | 0.000        |
|  | Sugar-free chewing gum has a positive effect on dental health   | 3.26 ( $\pm$ 1.66) | 3.00 ( $\pm$ 1.26)   | 3.405*   | 0.001        |
| Dental sealants for caries prevention  | I believe that fissure sealants should be checked after placement   | 2.71 ( $\pm$ 1.41) | 2.37 ( $\pm$ 1.43)   | 4.521*   | 0.000        |
|  | Sealant is effective in the prevention of pit and fissure caries in newly erupted molars  | 3.23 ( $\pm$ 1.52) | 3.89 ( $\pm$ 1.42)   | -8.606*  | 0.000        |
|  | Sealants are not needed if patients receive topical fluorides   | 3.61 ( $\pm$ 1.47) | 4.11 ( $\pm$ 1.25)   | -7.008*  | 0.000        |

\* $p < 0.001$ 

"I think that sealants wear out easily," "Sealant is effective in the prevention of pit and fissure caries in newly erupted molars," and "Sealants are not needed if patients receive topical fluorides" demonstrated a significant lower knowledge among secondary school students in comparison to the middle school participants ( $t$  test =  $-3.080^*$ ,  $p = 0.002$ ;  $t$  test =  $-8.127^*$ ,  $p = 0.000$ ; and  $t$  test =  $-11.342^*$ ,  $p = 0.000$ , respectively) (Table 8).

## DISCUSSION

Oral health is an essential component of health throughout life. Poor oral health and untreated oral diseases and conditions can have a significant impact on quality of life. They can affect the most basic human needs. Oral health knowledge creates a sense for each individual to adopt self-care practices.<sup>16</sup>

Results of the present study revealed that the participating students had low overall conception about oral health and preventive dentistry, and these results are consistent with that of Oliveira et al.,<sup>14</sup> where they found that many children revealed lack of important knowledge about oral health and preventive manners.

With regard to oral health, these findings are in accord with the results of Priya et al.<sup>24</sup> and Gouri et al.,<sup>25</sup> where they reported that overall knowledge about oral health was found to be low among school students. Additionally, Vishwanathaiah<sup>26</sup> stated that knowledge, attitude, and practice among secondary school students concerning oral health were less than the adequate level. On the contrary, results of Ogunrinde et al.<sup>27</sup> are in contrast with that of the present study where they concluded that the vast majority of the participants demonstrated good oral health knowledge.

For oral and general health, results of this study revealed poor awareness about the link between oral and general health, where middle school students reported lack of perception compared with secondary school students. These results are in contrast with that of Al-Omiri et al.<sup>28</sup> and Al-Qahtani and Abdulrazq<sup>29</sup> where a high perception of the link between oral and systemic health was reported among schoolchildren in their studies. Additionally, Nagesh<sup>30</sup> and Reddy et al.<sup>31</sup> evidenced in their studies a high awareness of the studied group of students regarding the link between oral health as well as general health. Emphasis on the link between oral and general health might assist foster oral healthcare and personal practices concerning oral health among schoolchildren and the community. However, educational oral health programs conveyed on community basis in schools and educational institutions by certain medical/dental institutes and dental schools might help in improving the awareness of the public about the importance of oral health in relation to general health.

The knowledge about sweets as cariogenic food was reported by the majority of schoolchildren in various populations,<sup>29,32-34</sup> but in the current study, the participating students were asked about "frequent consumption of sugar-containing food is more detrimental than the quantity of the sugar consumed," where more than half of the contributing students did not know or disagree with this statement, meaning that they had low awareness about the frequency of sugar consumption.

Enquiry about the concept of cleaning the tongue revealed that almost half of the participating students had low perception about the statements "Tongue cleaning removes tongue coating

**Table 7:** Knowledge scores considering oral health with significant differences by level of education (n = 1,496)

| Knowledge scores                  |   | Mean ( $\pm$ SD)   |                     | t test  | Significance |
|-----------------------------------|---|--------------------|---------------------|---------|--------------|
|                                   |   | Middle (n = 748)   | Secondary (n = 748) |         |              |
| Oral and general health           | Oral health is an integral part of general health   | 2.68 ( $\pm$ 1.25) | 1.90 ( $\pm$ 1.11)  | 12.833* | 0.000        |
|                                   | Oral health has an influence on the overall quality of life   | 3.27 ( $\pm$ 1.33) | 2.39 ( $\pm$ 1.32)  | 12.824* | 0.000        |
|                                   | Certain systemic diseases can manifest in the oral cavity   | 3.59 ( $\pm$ 1.39) | 2.34 ( $\pm$ 1.25)  | 18.342* | 0.000        |
|                                   | Oral diseases have an implication on certain systemic diseases/conditions like cardiovascular diseases, pregnancy, and low birthweight babies, etc.                                     | 3.87 ( $\pm$ 1.30) | 3.15 ( $\pm$ 1.53)  | 9.812*  | 0.000        |
|                                   | Cleft palate and cleft lip are developmental defects. Proper surgical and prosthetic treatment is available that will enable patients with cleft lip/cleft palate to lead a normal life | 4.16 ( $\pm$ 1.21) | 3.42 ( $\pm$ 1.56)  | 10.318* | 0.000        |
|                                   | Tobacco is the greatest risk factor for oral cancer   | 4.08 ( $\pm$ 1.31) | 2.79 ( $\pm$ 1.65)  | 16.650* | 0.000        |
|                                   | All precancerous lesions of the oral cavity always lead to oral cancer even if the predisposing factors are removed   | 4.22 ( $\pm$ 1.21) | 3.84 (1.41)         | 5.570*  | 0.000        |
|                                   | Saliva can be used in the diagnosis of oral as well as certain systemic diseases  | 3.83 ( $\pm$ 1.36) | 2.78 ( $\pm$ 1.53)  | 14.006* | 0.000        |
| Dental health                     | Proper maintenance of deciduous dentition is as important as the permanent dentition  | 2.93 ( $\pm$ 1.35) | 2.01 ( $\pm$ 1.26)  | 13.603* | 0.000        |
|                                   | Alignment of teeth is done both for functional as well as esthetic purpose  | 3.69 ( $\pm$ 1.38) | 2.42 ( $\pm$ 1.56)  | 16.674* | 0.000        |
|                                   | A tooth avulsed due to trauma can be reimplanted into the tooth socket  | 3.58 ( $\pm$ 1.37) | 2.97 ( $\pm$ 1.58)  | 8.058*  | 0.000        |
|                                   | Loss of teeth during old age is a natural phenomenon, neither the dentist nor the patient can prevent tooth loss during this period of life   | 3.72 ( $\pm$ 1.32) | 2.36 ( $\pm$ 1.17)  | 21.174* | 0.000        |
| Dental caries and oral conditions | Dental caries and periodontal disease are plaque-mediated diseases  | 3.99 ( $\pm$ 1.36) | 3.23 ( $\pm$ 1.64)  | 9.747*  | 0.000        |
|                                   | Microorganisms that cause dental caries are transmitted mainly from the mother to the child   | 3.97 ( $\pm$ 1.34) | 3.63 ( $\pm$ 1.44)  | 4.686*  | 0.000        |
|                                   | Frequent consumption of sugar-containing food is more detrimental than the quantity of the sugar consumed   | 3.46 ( $\pm$ 1.39) | 2.70 ( $\pm$ 1.53)  | 9.969*  | 0.000        |
|                                   | Bruxism, trauma from occlusion, and reduced vertical dimension of jaws can cause temporomandibular joint problems and pain in orofacial region  | 4.02 ( $\pm$ 1.31) | 2.97 ( $\pm$ 1.60)  | 13.876* | 0.000        |
|                                   | Soft drinks can cause erosion of dental enamel which is the hardest tissue in the human body  | 3.49 ( $\pm$ 1.34) | 2.10 ( $\pm$ 1.24)  | 20.685* | 0.000        |
| Oral cleansing                    | When brushing teeth also cleans the tongue  | 3.36 ( $\pm$ 1.45) | 2.11 ( $\pm$ 1.27)  | 17.709* | 0.000        |
|                                   | Tongue cleaning removes tongue coating and eliminate bad breath   | 3.38 ( $\pm$ 1.47) | 2.22 ( $\pm$ 1.39)  | 15.715* | 0.000        |
|                                   | Fruits, milk, vegetables, and so on are food that contribute to clean teeth   | 3.49 ( $\pm$ 1.50) | 2.33 ( $\pm$ 1.45)  | 15.255* | 0.000        |
|                                   | It is beneficial to visit a dentist for regular checkups for oral and dental health   | 3.25 ( $\pm$ 1.15) | 1.42 ( $\pm$ 0.78)  | 29.466* | 0.000        |

\* $p < 0.001$ 

and eliminate bad breath" and "When brushing teeth also clean the tongue," and these findings are less than what recorded by Vishwanathaiah,<sup>26</sup> as about 99.14% of the contributing children were aware about methods of cleansing the tongue, noting that they had good perception about the concept of tongue cleaning.

Prevention of dental problems prior to their commencement is among the most important principles to be followed. Corresponding to Zhu et al.,<sup>35</sup> preventive oral health approach is better than the curative one where programs of oral health education constituted the initial and mostly important role in preventive dentistry and the

schools are the most effective settings for this type of education. It is essential that intensive efforts have to be made to apply measures for preventive dentistry, thus addressing the predicted future dental problems.<sup>24</sup> It was proved that good oral health is closely related to positive oral health attitude and behavior.<sup>36</sup> Results of this study demonstrated overall low perception about preventive dentistry among the studied group with regard to the different investigated variables.

For preventive dentistry, the simplest way is to follow daily brushing and flossing that subsequently will reduce

**Table 8:** Knowledge scores for oral health with significant differences by level of education ( $n = 1,496$ )

|  | Knowledge scores  | Mean ( $\pm$ SD)  |                         | t test             | Significance |
|--|---|---|-------------------------|--------------------|--------------|
|  |   | Middle ( $n = 748$ )  | Secondary ( $n = 748$ ) |                    |              |
| Concept of preventive dentistry        | Dental caries is a complex disease but can be prevented by adopting healthy oral health behaviors   | 3.17 ( $\pm$ 1.49)  | 1.91 ( $\pm$ 1.19)      | 17.999*            | 0.000        |
|  | Health education has an important role to play in creating awareness about oral health among public   | 3.73 ( $\pm$ 1.30)  | 1.96 ( $\pm$ 1.34)      | 25.956*            | 0.000        |
|  | Proper brushing of teeth and flossing will enable to prevent both dental caries and gingival diseases   | 2.89 ( $\pm$ 1.46)  | 1.62 ( $\pm$ 1.08)      | 19.090*            | 0.000        |
|  | Regular brushing helps in prevention of gum problems  | 3.55 ( $\pm$ 1.38)  | 1.95 ( $\pm$ 1.26)      | 23.539*            | 0.000        |
|  | Using dental floss helps preventing dental caries   | 3.23 ( $\pm$ 1.51)  | 2.47 ( $\pm$ 1.46)      | 9.832*             | 0.000        |
| Prevention of oral and dental diseases | Parafunctional habits like thumb sucking, lip biting, lip sucking, and nail biting are very common among children. These habits need to be controlled as they affect orofacial structures | 3.32 ( $\pm$ 1.51)  | 2.19 ( $\pm$ 1.19)      | 16.060*            | 0.000        |
|  | Mouth-guards are useful in preventing sport-related injuries/trauma   | 3.44 ( $\pm$ 1.48)  | 2.91 ( $\pm$ 1.49)      | 6.794*             | 0.000        |
|  | Sugar-free chewing gum has a positive effect on dental health   | 3.57 ( $\pm$ 1.41)  | 2.68 ( $\pm$ 1.41)      | 12.129*            | 0.000        |
|  | Xylitol is not only noncariogenic but also suppresses the growth of acidogenic bacteria in dental plaque  | 4.41 ( $\pm$ 1.16)  | 3.71 ( $\pm$ 1.62)      | 9.732*             | 0.000        |
|  | Fluoride as a preventive measure  | Brushing teeth with fluoride toothpaste prevents tooth decay      | 3.41 ( $\pm$ 1.43)      | 2.60 ( $\pm$ 1.42) | 11.051*      |
| Fluoride as a preventive measure       | Fluorides have a protective role against dental caries  | 3.82 ( $\pm$ 1.53)  | 2.78 ( $\pm$ 1.59)      | 12.912*            | 0.000        |
|  | Using fluoride toothpaste is more important than the brushing technique to prevent caries   | 3.51 ( $\pm$ 1.46)  | 2.51 ( $\pm$ 1.33)      | 13.829*            | 0.000        |
|  | Fluoride is the most important factor for decreasing the tooth susceptibility to decay  | 4.02 ( $\pm$ 1.30)  | 2.65 ( $\pm$ 1.48)      | 19.163*            | 0.000        |
|  | Fluoridating the drinking water is an effective, safe, and efficient way to prevent dental caries   | 4.04 ( $\pm$ 1.34)  | 3.49 ( $\pm$ 1.47)      | 7.532*             | 0.000        |
|  | Dental sealants for caries prevention   | I believe that fissure sealants should be checked after placement | 2.72 ( $\pm$ 1.42)      | 2.36 ( $\pm$ 1.41) | 4.892*       |
| Dental sealants for caries prevention  | I think that sealants wear out easily   | 3.70 ( $\pm$ 1.31)  | 3.90 ( $\pm$ 1.24)      | -3.080*            | 0.002        |
|  | Sealant is effective in the prevention of pit and fissure caries in newly erupted molars  | 3.25 ( $\pm$ 1.47)  | 3.87 ( $\pm$ 1.48)      | -8.127*            | 0.000        |
|  | Sealants are not needed if patients receive topical fluorides   | 3.47 ( $\pm$ 1.44)  | 4.25 ( $\pm$ 1.21)      | -11.342*           | 0.000        |

\* $p < 0.001$ 

the dental diseases.<sup>37-39</sup> In the current study, the participating students registered better conception about proper brushing and flossing of teeth as only 36.7% of the contributors reported that they disagree or did not know that "Proper brushing of teeth and flossing will enable to prevent both dental caries and gingival diseases," indicating students' awareness about the importance of proper teeth brushing as well as flossing procedure. On the contrary, these results are not in accord with the findings of Al-Sadhan,<sup>40</sup> which registered that only 5.1% of the studied students were using dental floss, concluding underestimation of the importance of the use of dental floss among this group of students.

With regard to fluoride as a preventive measure, the contributing students demonstrated low perception about the different methods and routes of fluoride administration and

its protective effects against dental caries starting with water fluoridation where about three quarters of the participants disagree or did not know that "Fluoridating the drinking water is an effective, safe, and efficient way to prevent dental caries," passing by "Fluoride is the most important factor for decreasing the tooth susceptibility to decay," and "Fluorides have a protective role against dental caries," as more than half of the students were unaware about these items, and ending by the effects of fluoridated toothpastes where almost half of the students were inexperienced about that "Using fluoride toothpaste is more important than the brushing technique to prevent caries" and that "Brushing teeth with fluoride toothpaste prevents tooth decay." These findings support the need to promote the health education programs in schools to educate students so as to improve their familiarity about fluoride and its benefits for

the prevention of dental caries. The results of the current study are to somewhat higher than that of Al-Qahtani et al.,<sup>29</sup> where they reported that about two-thirds of the schoolchildren did not identify the substance fluoride. Moreover, many previous studies are also in accord with the findings of this study where they discovered that most of the children had no idea about the benefits of fluoride in teeth strengthening and dental caries prevention.<sup>33,34,41-43</sup> On the contrary, findings of Smyth et al.<sup>44</sup> and Priya et al.<sup>24</sup> differ from the results of this study where they discovered that students recognized about fluoride and that it could reinforce the teeth and prevent dental caries.

Concerning the enquiry about dental sealants for caries prevention, the participants exhibited low acquaintance about the use of pit and fissure sealant and its effects in caries prevention, which is in accord with a previous study conducted by Hou et al.,<sup>45</sup> as they reported lack of awareness among the participants for the benefits of pit and fissure sealant.

To sum up, in the current study, overall perception about oral health and preventive dentistry is considered to be below the satisfactory level among middle and secondary school students. Perception on the importance of oral health and prevention should be encouraged, and as students spend all their day in the school, schools are considered to be the suitable place for both educating and fostering oral healthcare. Al-Omiri et al.<sup>28</sup> in their study concluded that a need is required to decrease reliance on oral health personnel and students should be encouraged to take the responsibility regarding their own oral health. It is important to incorporate into the school curriculum programs of oral health education so that it will be engaged as a part of life.

## LIMITATIONS

Despite strengths and advantages of this study, some limitations have to be mentioned.

First, this study was reliant on self-reported data originated from school-age students with varying levels of familiarity about the importance of understanding and completing the questionnaires. Accordingly, measurement errors due to misunderstanding of questions are subjected to arise. However, to overcome this limitation, the questions were worded obviously, and a pilot study was implemented prior to conduct the study. Additionally, the researcher committed to be available all the time during the completion sessions of the questionnaire, and the students were always motivated to contact the researcher whenever they required explanation and clarification of any points.

Second, oral examination was not performed in this study, as it could be important for objective assessment of the link between knowledge and the practice of oral health. Therefore, further studies should be conducted with oral examination to investigate the relationship between perception about oral health and preventive dentistry and related practices.

## CONCLUSION

Based on the findings of the current study, perception about oral health among the studied population was generally found to be poor. Similarly, most of the participating students were not aware enough about preventive dentistry. Both male and female students had significant poor awareness about "Oral and general health," whereas, male students had significant poorer acquaintance about "Dental health" than their female colleagues. For "Dental

caries and Oral conditions," female students had significant better insight than their male classmates except for information about frequent consumption of sugar-containing food. Concerning "Oral cleansing," male students had significant inadequate opinion about brushing teeth and cleaning the tongue, whereas they had significant better knowledge about regular visits of the dentist. Moreover, female students registered significant lack of awareness about the "Concept of preventive dentistry" except for the role of health education in creating awareness about oral health among the public. Additionally, equally male and female students revealed significant modest perception about "Prevention of oral and dental diseases," while female students were significantly experiencing less perception about "Dental sealants for caries prevention." On the contrary, there is a general trend toward lack of knowledge about oral health and preventive dentistry among middle school students in relation to secondary school students where middle school students exhibited significant low perception in all items of oral health and preventive dentistry except for the items concerned with easily wearing of sealants, the preventive effect of sealants in newly erupted teeth, as well as no need of sealants in presence of topical fluorides.

## RECOMMENDATIONS

- A comprehensive national health educational program is recommended to increase the awareness about oral and dental health as well as preventive dentistry to foster good oral health and to ensure a healthy individual along with a healthy community.
- Raise the awareness among middle school students about all aspects of oral health and preventive oral care to have a prospective individual with sufficient knowledge about these features of oral care.
- This study may not be representative of the middle and secondary school students' perception about oral health and preventive dentistry, and accordingly more detailed studies investigating deeply the knowledge and attitude about oral health and preventive oral care in addition to the practices of oral health should be planned in other areas of the Saudi community.

## REFERENCES

1. <https://www.npr.org/2008/12/21/98460202/>, health-is-a-human-right, 2008.
2. Park K. Park's textbook of preventive and social medicine: Concept of health and disease, 19th ed., Jabalpur: M/s Banarasidas Bhanot Publishers; 2005. pp. 12-13.
3. Inglehart MR, Bagramian RA. Oral health-related quality of life: An introduction. Chicago: Quintessence Publishing Co, Inc.; 2002. p. 1.
4. <https://www.fdiworlddental.org/news/20170831/say-ahh-announced-as-world-oral-health-day-2018-2020-theme>, 2017.
5. U.S. Department of Health and Human Services (HHS). Oral Health in America: A Report of the Surgeon General. Rockville, MD: HHS, National Institutes of Health, National Institute of Dental and Craniofacial Research; 2000.
6. Khairnar MR, Dodamani AS, Karibasappa GN, et al. Knowledge, attitude and behavior towards preventive dentistry among health care students in Dhule city. *J Oral Health Community Dent* 2015;9(3):115-119. DOI: 10.5005/johcd-9-3-115.
7. Chen M, Andersen R, Barnes DE, et al. Comparing oral health systems: a second international collaborative study. Geneva: World Health Organization; 1997.

8. Kelly M, Steele J, Nuttall N, et al. Adult dental health survey: oral health in the United Kingdom 1998. London: The Stationery Office; 2000.
9. Moynihan P, Petersen PE. Diet, nutrition and the prevention of dental diseases. *Public Health Nutr* 2004;7(1A):201–226. DOI: 10.1079/PHN2003589.
10. Joshi M, Tailor M, Pala A. Prevalence of dental caries, periodontal diseases, and periapical pathoses among patients attending a Tertiary Dental Care Center in Central Gujarat: a hospital-based cross-sectional study. *Int J Exp Dent Sci* 2016;5(2):89–92. DOI: 10.5005/jp-journals-10029-1132.
11. Locker D. Measuring oral health: a conceptual framework. *Community Dent Health* 1988;5(1):3–18.
12. Kawamura M, Sasahara H, Kawabata K, et al. Relationship between CPITN and oral health behaviour in Japanese adults. *Aust Dent J* 1993;38(5):381–388. DOI: 10.1111/j.1834-7819.1993.tb05520.x.
13. Honkala E. Oral health promotion with children and adolescents. In: Cohen LK, Gift HC, ed. *Disease prevention and oral health promotion*. Copenhagen: Munksgaard; 1995. pp. 169–187.
14. Oliveira ER, Narendran S, Williamson D. Oral health knowledge, attitudes and preventive practices of third grade school children. *Pediatr Dent* 2000;22(5):395–400.
15. Linn EL. Teenagers' attitudes, knowledge, and behaviors related to oral health. *J Am Dent Assoc* 1976;92(5):946–951. DOI: 10.14219/jada.archive.1976.0100.
16. Freeman R, Maizels J, Wyllie M, et al. The relationship between health related knowledge, attitudes and dental health behaviours in 14-16-year-old adolescents. *Community Dent Health* 1993;10(4):397–404.
17. Carneiro TV, Lucena RB, Ribeiro ILA, et al. Quality of life of paediatric oncology patients. *Braz Res Pediatr Dent Integr Clin* 2016;16(1):457–467. DOI: 10.4034/PBOCI.2016.161.48.
18. Folan MO, Khami MR, Folaranmi N, et al. Determinants of preventive oral health behaviour among senior dental students in Nigeria. *BMC Oral Health* 2013;13:28. DOI: 10.1186/1472-6831-13-28.
19. Kaira LS, Srivastava V, Giri P, et al. Oral health-related knowledge, attitude and practice among nursing students of Rohilkhand Medical College and Hospital: a questionnaire study. *J Orofac Res* 2012;2(1):20–23.
20. Ahamed S, Moyin S, Punathil S, et al. Evaluation of the oral health knowledge, attitude and behavior of the preclinical and clinical dental students. *J Int Oral Health* 2015;7(6):65–70.
21. Nilchian F, Kazemi S, Abbasi M, et al. Evaluation of Isfahan's dental students' awareness about preventive dentistry. *J Dent (Shiraz)* 2014;15(1):1–5.
22. Park M-K, Jin H-J, Lee M-K. Investigation of knowledge and awareness of dental health in Chinese Students' Studying in Korea. *Biosci Med Res* 2014;68:17–21. DOI: 10.14257/astl.2014.68.05.
23. Sujatha BK, Yavagal PC, Gomez MSS. Assessment of oral health awareness among undergraduate medical students in Davangere city: a cross-sectional survey. *J Indian Assoc Public Health Dent* 2014;12(1):43–46. DOI: 10.4103/2319-5932.138958.
24. Priya M, Devdas K, Amarlal D, et al. Oral health attitudes, knowledge and practice among school children in Chennai, India. *J Educ Ethics Dent* 2013;3(1):26–33. DOI: 10.4103/0974-7761.126940.
25. Gouri MS, Sunita Sreerigi S, Madhavi BD. Knowledge & practices of oral health among secondary school students in Visakhapatnam City. *IOSR J Dent Med Sci* 2016;15(4 Ver. IX):7–10. DOI: 10.9790/0853-1504090710.
26. Vishwanathiah S. Knowledge, attitudes, and oral health practices of school children in Davangere. *Int J Clin Pediatr Dent* 2016;9(2):172–176. DOI: 10.5005/jp-journals-10005-1358.
27. Ogunrinde TJ, Oyewole OE, Dosumu OO. Dental care knowledge and practices among secondary school adolescents in Ibadan North Local Government Areas of Oyo State, Nigeria. *Eur J Gen Dent* 2015;4(2):68–73. DOI: 10.4103/2278-9626.154171.
28. Al-Omiri MK, Al-Wahadni AM, Saeed KN. Oral health attitudes, knowledge, and behavior among school children in North Jordan. *J Dent Educ* 2006;70(2):179–187.
29. Al-Qahtani SM, Abdualrazq P. Oral health knowledge & practice of preventive measures among male intermediate school children in Abha. *J Health Med Nurs* 2017;36:27–35.
30. Nagesh H. Oral health related knowledge, attitude and practice (KAP) among 16-18 year old students of 4 pre-university colleges in Bangalore south India. *RGUHS J Dent Sci* 2008;2:12–18.
31. Reddy V, Bennadi D, Gaduputi S, et al. Oral health related knowledge, attitude, and practice among the pre-university students of Mysore city. *J Int Soc Prev Community Dent* 2014;4(3):154–158. DOI: 10.4103/2231-0762.142012.
32. Al-Ansari J, Honkala E, Honkala S. Oral health knowledge and behavior among male health sciences college students in Kuwait. *BMC Oral Health* 2003;3(1):2. DOI: 10.1186/1472-6831-3-2.
33. Farsi JM, Farghaly MM, Farsi N. Oral health knowledge, attitude and behaviour among Saudi school students in Jeddah city. *J Dent* 2004;32(1):47–53. DOI: 10.1016/j.jdent.2003.08.002.
34. Ahmed NA, Astrom AN, Skaug N, et al. Dental caries prevalence and risk factors among 12-year old schoolchildren from Baghdad, Iraq: a post-war survey. *Int Dent J* 2007;57(1):36–44. DOI: 10.1111/j.1875-595X.2007.tb00116.x.
35. Zhu L, Petersen PE, Wang HY, et al. Oral health knowledge, attitudes and behaviour of children and adolescents in China. *Int Dent J* 2003;53(5):289–298. DOI: 10.1111/j.1875-595X.2003.tb00762.x.
36. Sharda A, Shetty S, Ramesh N, et al. Oral health awareness and attitude among 12-13 year old school children in Udaipur, India. *Int J Dent Clinics* 2011;3(4):16–19.
37. JamMoum H. Preventive oral health knowledge and practice in Jeddah, Saudi Arabia. *Alexandria Dent J* 1999;24:7.
38. Al Turck KA. Self-reported dental care and dietary habits of Saudi pregnant women in a prenatal clinic in Riyadh. *Pak Oral Dent J* 2005;25:75–80.
39. Al-Attas S. The effect of socio-demographic factors on the oral health knowledge, attitude and behavior in a female population. *Saudi Dent J* 2007;19(1):27–36.
40. Al-Sadhan SA. Oral health practices and dietary habits of intermediate school children in Riyadh, Saudi Arabia. *Saudi Dent J* 2003;15:81–87.
41. Kaneko M, Ogawa H, Yoshihara A, et al. A survey of oral health in Vientiane, Lao PDR. *Int J Oral Health* 2010;6:1–7.
42. Hebbal M, Ankola AV, Vadavi D, et al. Evaluation of knowledge and plaque scores in school children before and after health education. *Dent Res J* 2011;8(4):189–196. DOI: 10.4103/1735-3327.86036.
43. Al-Darwish MS. Oral health knowledge, behaviour and practices among school children in Qatar. *Dent Res J* 2016;13(4):342–353. DOI: 10.4103/1735-3327.187885.
44. Smyth E, Caamano F, Fernandez-Riveiro P. Oral health knowledge, attitudes and practice in 12-year-old schoolchildren. *Med Oral Patol Oral Cir Bucal* 2007;12(8):E614–E620.
45. Hou R, Mi Y, Xu Q, et al. Oral health survey and oral health questionnaire for high school students in Tibet, China. *Head Face Med* 2014;10:17. DOI: 10.1186/1746-160X-10-17.