

# Oral Health Behavior and Factors Influencing the Selection of Oral Hygiene Products among the Adolescent Tobacco Consumers in Jharkhand

Ajoy K Shahi<sup>1</sup>, Subhash Chandra<sup>2</sup>, Sandeep Kumar<sup>3</sup>, Swati Sharma<sup>4</sup>, Virendra K Prajapati<sup>5</sup>, Bishnupati Singh<sup>6</sup>

## ABSTRACT

**Aim:** To identify the oral health behavior and factors influencing the selection of oral hygiene products by the adolescent tobacco consumers in Ranchi district, Jharkhand. This study will also attempt to identify the factors related to the selection of toothbrushes for oral hygiene maintenance.

**Materials and methods:** A total of 800 adolescent tobacco consumers were selected from Ranchi district. A self-administered questionnaire collected information on the oral health behavior and factors influencing the selection of oral cleansing aids. Logistic regression analysis was performed.

**Results:** Toothbrush (83.0%) and toothpaste (78.0%) were the most common oral cleansing aids. Media played an important role in the selection of toothbrushes and toothpaste. The dental visit (15.0%) for preventive dental care was reported to be less. The individuals belonging to upper class (OR = 2.8,  $p$  value < 0.001\*), of nontribal origin (OR = 3.21,  $p$  value < 0.001\*, and residing in urban areas (OR = 5.6,  $p$  value < 0.0001\*) were more likely to use a toothbrush.

**Conclusion:** The consumption of tobacco should be discouraged. Promotion of oral cleansing aids and interdental aids should be carried out using support from media.

**Clinical significance:** The oral health behavior of adolescents needs to be improved. The adolescents should be promoted to quit tobacco, and education and counseling should be provided to them for the oral health promotion. Regular dental check-up for preventive care should be encouraged.

**Keywords:** Adolescents, Interdental aids, Tobacco, Toothbrush, Toothpaste.

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## INTRODUCTION

Oral health is closely associated with health, and poor oral health can have a detrimental effect on general health.<sup>1</sup> Oral health and general health are closely interrelated; there is a global burden of oral diseases among the most common noncommunicable diseases.<sup>2</sup> Oral diseases can lead to infection, inflammation, and other serious impacts on overall health.<sup>3</sup> According to the World Health Report, 2003, oral diseases are qualified as major public health problems due to their high incidence and prevalence in all regions of the world.<sup>2</sup> Oral diseases such as dental caries, periodontal disease, tooth loss, oral mucosal lesions, oropharyngeal cancers, and dental trauma are considered as the major public health problems.

Tobacco consumption is very prevalent in the Indian population, and a number of studies conducted have shown that tobacco has a negative impact on oral health and health-related quality of life.<sup>4-6</sup>

Health behaviors are crucial indicators of oral health status. Effective and efficient oral hygiene practices are an essential tool for achieving good oral health.<sup>7,8</sup> Toothbrushes and toothpaste are the most commonly used and effective method for plaque reduction and enamel remineralization as reported by a number of studies.<sup>9,10</sup> Other oral hygiene aids include dental floss, wood stick, interspaced brush, and interproximal brush.<sup>11</sup> A number of factors determine the selection of oral cleansing aids. Socioeconomic status, information from media (advertisements), and material properties such as taste, flavor, color, and appearance have been reported to influence the choice of an oral hygiene aids product.<sup>12</sup>

<sup>1,5</sup>Department of Oral and Maxillofacial Surgery, Dental Institute, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

<sup>2</sup>Department of Orthodontics, Dental Institute, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

<sup>3</sup>Department of Public Health Dentistry, Dental Institute, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

<sup>4</sup>Department of Pedodontics, Dental Institute, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

<sup>6</sup>Department of Prosthodontics, Dental Institute, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India

**Corresponding Author:** Subhash Chandra, Department of Orthodontics, Dental Institute, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India, Phone: +91 9955393983, e-mail: drscportho@gmail.com

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In India, tobacco consumption is very prevalent and it has a negative impact on oral health. The consumption of tobacco by adolescents increases the risks for premalignant and malignant lesions and simultaneously impairs oral health, making an individual more prone to periodontal diseases, halitosis, development of oral mucosal lesions, and others.<sup>13-15</sup> Hence, a good oral health

behavior of adolescents is an important factor that minimizes the harmful impact of tobacco consumption on oral structures. Very limited studies have been carried out to determine the oral health behavior and factors influencing the selection of oral cleansing products by tobacco consumers. Hence, this study was carried out with the aim to identify the oral health behavior and factors influencing the selection of oral hygiene products by the adolescent tobacco consumers in Ranchi district, Jharkhand. This study will also attempt to identify the factors related to the selection of toothbrushes as a means of oral cleansing aids. The study findings will enable policymakers to improve the oral health status of tobacco consumers particularly in early age (adolescents) and also focus on strategies to implement and promote the use of toothbrushes by the general population and high-risk communities.

## MATERIALS AND METHODS

### Study Design, Study Area, and Population

This cross-sectional study was carried out in Ranchi district, Jharkhand, and included 800 adolescent tobacco consumers. It was carried out in the month of January 2018–February 2019 (13 months). For the above purpose, Ranchi district was divided into four zones. From each of these zones, two places were randomly selected for data collection. It included an equal number of rural and urban areas from each zone in order to maintain homogeneity for data collection.

### Selection of Sample, Sampling Technique, Inclusion and Exclusion Criteria

The study populations were selected using a simple random technique from each of the identified locations of the four zones of Ranchi districts. The adolescents who gave the history of tobacco consumption for more than a year, willing to participate, and signed the informed consent were included in the study.

### Sample Size Calculation

For the calculation of sample size, a pilot study was carried out on a sample of 20 individuals. These samples were selected from Dental Out-Patient Department of Dental Institute, RIMS. Based on the prevalence of dental caries, which is the most common oral disease affecting the oral cavity, the sample size was calculated using the formula recommended by the World Health Organization survey.<sup>16</sup>

$$N = \frac{Z^2 P(1-P)}{(0.05)^2} \times 100$$

Using the above formula, with the estimated prevalence of dental caries to be 50%, it was found that the minimum sample size required for the study was 384. A design effect correction of 2 is recommended for epidemiological studies. Hence, minimum sample size required would be  $384 \times 2 = 768$ . The study, however, included 800 adolescents in order to minimize the nonresponse rate.

### Ethical Approval, Informed Consent

The Institutional Ethics Committee, RIMS, Ranchi, granted ethical approval. Verbal informed consent was sought from the study subjects.

### Pretesting of Questionnaire

A questionnaire was drafted which consisted of four parts. The first part of the questionnaire collected information on

the sociodemographic characteristics, the second part of the questionnaire collected information on the oral health behavior of the respondents, the third part of the questionnaire collected information on dental visits and adverse habits, and the fourth part consisted of a series of three questions which collected information on various factors influencing the choice of products by the respondents. A similar questionnaire to assess the factors influencing the selection of the oral hygiene products has been used previously in the study carried out by Sharda.<sup>17</sup> It was, however, modified based on the responses obtained in the pilot study. The final version of the questionnaire was supplied to the respondents after being tested for complete reliability and validity.

The assessment of socioeconomic status was based on the modified Kuppuswamy scale.<sup>18</sup> Based on the income, education, and occupation which were self-reported by the respondents, it was divided into upper, middle, and lower class.

The questionnaire was fabricated in the English language. It was then translated into the Hindi language which is the common language used by the population residing in Jharkhand. The validity of the questionnaire was checked by a back-translation method involving blind retranslation into the English language. It was verified by experts in both the languages. The reliability of the questionnaire was assessed using Cronbach's alpha, and it showed that the questionnaire had high internal reliability (Cronbach's alpha = 0.92). The validity of the questionnaire was checked by a back-translation method.

### Data Collection

The self-administered questionnaire was distributed to the randomly selected respondents by a single trained investigator. The respondents were not permitted to confer with each other. Any doubt during the filling of the questionnaire was clarified by the investigator himself. All the filled proforma were collected by the investigator after 15–20 minutes and sent for data analysis.

A health talk was provided to the tobacco consumers focusing on various harmful effects of tobacco and the methods of quitting them. The adolescents were referred to the Dental Institute, RIMS, Ranchi, for further management.

### Statistical Analysis

Data were analyzed using SPSS v 20. Frequency distribution analysis was performed. Logistic regression analysis was performed to identify the factors affecting the selection of the toothbrushes by the study population. *p* value <0.05 was considered statistically significant.

## RESULTS

There was almost a nearly equal (50%) representation of males and females, adolescents of tribal and nontribal origin, and residents of rural and urban areas in the study population. Nearly one-third of the adolescents (32.5%) belonged to the upper class, 34.5% belonged to the middle class, and 33% belonged to the lower class. Thus, it showed that there was an equal representation from all sections of the society (Table 1).

A majority of the study population used the toothbrush (83.0%) and toothpaste (78.0%) for oral hygiene maintenance. Very few of the adolescents (22.0%) reported to brush with frequency twice or more daily. More than half of the adolescents (65.0%) brushed their teeth using a combination of vertical and horizontal scrub technique. Mouthwash (8.0%) was the most commonly used oral

hygiene aid by the study population. The use of other oral hygiene aid like a toothpick (3.5%) and dental floss (2.5%) reported by the adolescents was negligible (Table 2).

Smokeless form of tobacco consumption (61.5%) was most prevalent among adolescents with a majority of them (80.0%) reporting the habit to be present for more than 5 years of duration. Only 15% of the adolescents reported to have visited a dentist for preventive care (Table 3).

The media (35.5%) were identified as the most common factor influencing the selection of the toothbrushes by the adolescents.

**Table 1:** Sociodemographic characteristics of the study population

Variables	Categories	n (%)
Age	<15 years	386 (48.3)
	≥15 years	414 (51.7)
Gender	Male	430 (53.8)
	Female	370 (46.2)
Socioeconomic status	Upper class	260 (32.5)
	Middle class	276 (34.5)
	Lower class	264 (33.0)
Origin	Tribal	396 (49.5)
	Nontribal	404 (50.5)
Residence	Urban	400 (50.0)
	Rural	400 (50.0)

**Table 2:** Oral health behavior of the study population

Variables	Categories	n (%)
Oral hygiene aid used	Toothbrush	664 (83.0)
	Finger/other methods	136 (17.0)
Materials used	Toothpaste	624 (78.0)
	Toothpowder	144 (18.0)
	Others	32 (4.0)
Frequency of brushing	Once daily	624 (78.0)
	Twice or more	176 (22.0)
Brushing technique	Vertical scrub	76 (9.5)
	Horizontal scrub	84 (10.5)
	Combination of these techniques	520 (65.0)
	Circular method	120 (15.0)
Any other oral hygiene aid used	Mouthwash	64 (8.0)
	Toothpick	28 (3.5)
	Dental floss	20 (2.5)
	None of the above	688 (86.0)

**Table 3:** Dental visit and adverse habits present in the study population

Variables	Categories	n (%)
Type of tobacco consumed	Smoke form	184 (23.0)
	Smokeless form	492 (61.5)
	Combination of both	124 (15.5)
Duration of tobacco consumed	<5 years	640 (80.0)
	≥5 years	160 (20.0)
Dental visit	Yes	120 (15.0)
	No	680 (85.0)

The cost of the toothbrush (26.8%) followed by the brand name of the toothbrushes (18.0%) were other factors influencing the selection of toothbrushes. Dentists (6.0%), peers (2.4%), and parental guidance (3.0%) had less influence on the selection of toothbrushes by adolescents.

The media (40.0%) followed by the parental guidance (38.0%) had nearly equal influence on the selection of toothpaste by the adolescents. The role of dentists (1.5%), peers (1.5%), and parental guidance (2.0%) were negligible.

The parental guidance (50.0%) was the most common factor followed by the advice from the dentists (26.7%) in the selection of other oral hygiene aids other than toothbrushes. The role of media (5.4%) was negligible (Table 4).

The results of bivariate analysis showed that of the various factors tested, socioeconomic status ( $p$  value < 0.001\*), the origin of the study population ( $p$  value < 0.001\*), and the place of residence ( $p$  value < 0.0001\*) were found to be significantly associated with the use of toothbrushes by the study subjects.

These factors that were found to be significant were then entered into the logistic regression model with the use of toothbrush as the dependent variable. It was found that individuals who belonged to the upper class (OR = 2.8,  $p$  value < 0.001\*) were significantly more likely to use toothbrushes than lower-class communities. The individuals of nontribal origin (OR = 3.21,  $p$  value < 0.001\*) were more likely to use toothbrush compared to the tribal origin. It was found that the use of toothbrushes was significantly higher by the urban population (OR = 5.6,  $p$  value < 0.0001\*) compared to the rural population. Age and gender did not influence the use of toothbrushes by the Indian adolescent population (Table 5).

**Table 4:** Factors affecting the selection of oral cleansing aids by the study population

Variables	Categories	n/total (%)
Factors influencing selection of toothbrush	Brand name	120 (18.0)
	Advised by dentist	40 (6.0)
	Appearance	54 (8.13)
	Cost	178 (26.8)
	Advice of peers	16 (2.4)
	Parental guidance	20 (3.0)
	Media	236 (35.5)
Factors influencing choice of toothpaste/toothpowder	Brand name	15 (2.0)
	Parental guidance	292 (38.0)
	Advice of peers	12 (1.5)
	Advised by dentist	12 (1.5)
	Cost	23 (3.0)
	Color	38 (5.0)
	Medicated/nonmedicated	54 (7.0)
	Media	307 (40.0)
	Flavor	15 (2.0)
	Parental guidance	56 (50.0)
Factors influencing choice of other oral hygiene aids used other than toothbrush/toothpaste	Advice of peers	4 (3.6)
	Taste/flavor	4 (3.6)
	Brand name	12 (10.7)
	Advise of dentist	30 (26.7)
	Information from media	6 (5.4)



**Table 5:** A bivariate analysis followed by logistic regression analysis to identify the factors associated with the use of toothbrushes (dependent variable) by the study population

Variables	Categories	Unadjusted odds ratio (confidence interval)	p value	Adjusted odds ratio (confidence interval)	p value
Age <sup>#</sup>	<15 years	1.32 (0.62–2.81)	0.468		
	≥15 years				
Gender <sup>#</sup>	Male	1.05 (0.56–2.62)	0.388		
	Female				
Socioeconomic status	Upper class	2.8 (1.63–2.88)	<0.001*	2.9 (1.66–2.82)	<0.001*
	Middle class	2.2 (1.52–2.76)		2.4 (1.60–2.80)	
	Lower class				
Origin	Nontribal	3.21 (1.58–6.49)	<0.001*	3.3 (1.63–6.43)	<0.001*
	Tribal				
Residence	Urban	5.6 (3.53–7.28)	<0.0001*	6.3 (3.81–7.44)	<0.0001*
	Rural				

\*p value < 0.05: statistically significant difference

<sup>#</sup>Not included in the logistic regression model as nonsignificant in bivariate analysis

## DISCUSSION

This study included a total of 800 adolescents. This age group was selected as adolescents are more likely to get addicted to tobacco consumption. The oral health behavior of the adolescents, if intervened at an early stage, can improve the oral health-related quality of life. The use of tobacco needs to be discouraged from the early stages. The incorporation of good oral habits using advanced cleansing aids would definitely play a vital role in improving the oral health status. In the present study, every attempt was made to have equal representation from all sections of the society (upper/middle/lower class), an equal number of males and females was included, and the selection of a sample from rural and urban areas was carried out equally. Also, individuals in equal number having tribal and nontribal origin were included. This ensured a homogenous population, thereby improving the accuracy of results obtained in comparison to other similar studies. The other advantage of this study was that it was the first of its kind carried out in the population of Jharkhand, and tribal populations were included in this study. The study findings will throw light on the factors which influence the selection of oral cleansing aids in this mixed population, and it will enable policymakers to develop ways to improve the oral health status of the communities residing in the state.

A majority of the study population reported the use of toothbrush and toothpaste for oral hygiene maintenance. This is similar to the findings reported by Logaranjani et al.<sup>19</sup> and Durrani et al.,<sup>20</sup> in which they found that the use of toothbrush and toothpaste for oral hygiene maintenance is very popular among the masses. The toothbrush is the principal instrument in general use for accomplishing plaque removal as a necessary part of disease control.<sup>21</sup>

However, unlike other studies, it was found that the use of toothpowder in conjunction with toothbrush or finger is very much prevalent. A number of studies have reported about the harmful effects of toothpowder on dental structures. Toothpowder leads to early wear of teeth making an individual more prone to abrasion and sensitivity.<sup>22</sup> Dental health education needs to be provided and the use of toothpowder should be discouraged.

Majority of the adolescents brushed their teeth once daily. This is similar to the findings reported by Logaranjani et al.<sup>19</sup> and

Goryawala et al.<sup>23</sup> To maximize the oral health, the American Dental Association (ADA) and US Surgeon General recommend that individuals should brush twice and floss at least once a day and have regular prophylactic dental visits.<sup>24</sup> The habit of brushing the teeth twice daily needs to be inculcated among the adolescents.

A majority of the study population were unaware of the correct brushing technique. A combination of the vertical and horizontal scrub technique was practiced by the adolescents. The incorrect brushing technique has a detrimental effect on oral structures leading to early wear of teeth. Improper tooth brushing technique can cause injury to the teeth as well as the supporting tooth structure.<sup>25</sup> The modified bass technique<sup>26</sup> is recommended for oral hygiene maintenance which needs to be demonstrated and promoted among the adolescents.

The use of other oral hygiene aids such as mouthwash, dental floss, and the toothpick was not very popular among the masses. The chemical plaque control is used as an adjunct to mechanical plaque control and helps to improve oral health.<sup>27</sup> The use of interdental cleaning aids can remove plaque and accumulated food debris from areas inaccessible to toothbrushes, deliver chemotherapeutic agents, and reduce interdental gingivitis.<sup>28</sup> However, in the present study, it was found that the use of interdental cleaning aids is not into much practice by the adolescents. The use of chemical plaque control and interdental cleansing aids needs to be promoted among the population.

More than half of the adolescents reported consuming a smokeless form of tobacco with a duration of more than 5 years. Tobacco contains a number of harmful chemicals which have adverse effects on the oral health.<sup>29,30</sup> The long-term consumption of tobacco can lead to the development of premalignant and malignant lesions.<sup>29–32</sup> The adolescents' age group is the most common age group at which this habit is initiated and continues lifelong. The consumption of tobacco is harmful. Hence, the habit of tobacco consumption needs to be intercepted at an early stage by counseling the patients and educating them about the harmful effects of tobacco consumption.

Media were the most important factor for the selection of toothbrushes by the adolescents. Similar findings were reported in studies carried out by Dilip<sup>33</sup> and Sharda.<sup>17</sup> In the present study, the cost of the toothbrush was another important factor that

influenced the selection by the adolescent. This warrants the need for the development of efficient and cost-effective disposable toothbrushes which can easily be procured and used by the general population.

Media also served as an important factor for the selection of toothpaste by the adolescents which are similar to the findings reported by Singh.<sup>34</sup> The parental guidance was the second most influential factor in the selection of toothpaste by the adolescents which is similar to the findings reported by Kote et al.<sup>35</sup>

A very few of the adolescents reported to have visited the dentist for a regular dental check-up. This type of phenomenon has been termed by Okunseri et al.<sup>36</sup> as "healthy person nonvisitor effect" and also reported in a study carried out by Kumar et al.<sup>37</sup> As per this concept, a person visits the dentist only when in pain or suffering from any oral disease which warrants urgent care. If the person does not have any oral emergency, he does not visit a dentist for a routine check-up. This may be one of the reasons due to which "advice of the dentist" had very little influence on the selection of toothbrush and toothpaste by the adolescents. Very few of the adolescents have visited the dentist and most of the individuals have attempted to manage the oral emergencies through home remedies. A regular dental check-up is an effective means to inhibit the disease at its incipient stage and thus prevent its further progression. Hence, adolescents should be encouraged for a routine dental check-up.

Parental guidance was the most important factor affecting the selection of other oral hygiene aids by adolescents. The role of media was found to have very little influence on adolescents. This may be attributed to the fact that the use of interdental cleaning aids such as dental floss, toothpicks, and others is seldom advertised. However, interdental cleansing aids play a significant role in improving oral health and should be promoted by the media and used by adolescents.

Socioeconomic status, origin, and place of residence were significantly associated with the use of the toothbrush. Age and gender did not seem to have a significant influence on the use of toothbrush by adolescents.

It was found that individuals belonging to the upper class were more likely to use a toothbrush as compared to the lower class. The cost of the toothbrush was an important factor reported by the individuals in the selection of toothbrushes for oral hygiene maintenance. It is obvious that toothbrushes being costly are afforded by higher class whereas the lower class still prefers to use a finger or other indigenous methods for oral hygiene maintenance.

Studies carried out by Al-lafi and Ababneh<sup>38</sup> and Chawla<sup>39</sup> have found that indigenous oral hygiene aids reduce the bacterial load considerably. The adolescents of tribal origin reported the use of indigenous oral hygiene aids for oral hygiene maintenance. The use of toothbrush was less prevalent by the tribal population which is similar to the findings of Singh et al.<sup>40</sup> However, comparative studies have shown that chewing sticks are equal and sometimes even better than toothbrushes in removing plaque scores and improving gingival health.<sup>41,42</sup>

The use of toothbrush was more prevalent in urban areas compared to the rural population. Similar findings were reported in the study conducted by Kaur et al.<sup>43</sup> This may be attributed to the fact that the adolescents residing in urban areas are educated and more aware of the oral hygiene maintenance than their rural counterparts. Also, individuals residing in urban areas have better socioeconomic status and can readily afford using a toothbrush for oral hygiene maintenance.

Socioeconomic status, the origin of an individual, and the place of residence had a significant impact on the use of toothbrush by the study population. The age and gender did not influence the use of toothbrush by the study population.

Although every effort has been taken to ensure to include a homogeneous population in order to improve the accuracy of the results, there were certain limitations of the study as well. Further longitudinal studies with representations from all age groups need to be carried out before the results can be generalized.

## CONCLUSION

Toothbrush and toothpaste were the most common oral hygiene aid used by adolescents. Most of the adolescents were unaware of the correct brushing technique. The use of interdental cleansing aid like dental floss, the toothpick was not into much use by the adolescents. Most of the adolescents consumed a smokeless form of tobacco with a duration of more than 5 years. The dental visit reported was less. Media was the most important factor in the selection of toothbrush and toothpaste by adolescents. Parental guidance was the most important factor in the selection of other oral hygiene aid other than the toothbrush. It was found that adolescents belonging to upper class, of nontribal origin, and residing in urban areas were more likely to use toothbrushes.

## CLINICAL SIGNIFICANCE

The oral health behavior of adolescents needs to be improved. The adolescents should be promoted to quit tobacco, and education and counseling should be provided to them for the oral health promotion. Regular dental check-up for preventive care should be encouraged.

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