

Unraveling the Increased Preferences for Herbal Toothpastes: A Survey-based Study in India

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ABSTRACT

Background: Herbal toothpastes have gained immense popularity in India in recent times with a significant rise in number of herbal toothpaste users. This study aimed to understand the factors that motivated this change from nonherbal toothpastes to herbal toothpastes.

Methods: Four hundred and eighty-two individuals visiting the Department of Dentistry for dental consultations, who had changed their toothpaste in last 5 years, filled a structured questionnaire seeking details of the factors or complaints which led to their change of toothpaste, satisfaction level with changed toothpaste, and their opinion about herbal and nonherbal toothpaste. The change of toothpastes was divided into four categories: nonherbal to herbal, nonherbal to nonherbal, herbal to nonherbal, and herbal to herbal. The data obtained were analyzed to assess the relationship between the category of toothpaste change and socioeconomic and psychosocial factors using Chi-square tests, Spearman's correlation, and multiple regression tests.

Results: 49.79% of the participants had shifted their toothpaste from nonherbal to herbal in last 5 years. Sensitivity (43.75%) and yellowness of teeth (49.25%) were the most cited reasons for change of toothpaste by participants in all categories. Tooth sensitivity, cost, advertisement, taste, and dental advice significantly influenced the change from one type of toothpaste to another. No significant association was found between the type of toothpaste shift and improvement in symptoms.

Conclusion: Though a large number of users shifted to herbal toothpastes, the change was not associated with a significant difference from other types of toothpastes, in terms of improvement of symptoms.

Clinical significance: This study highlights the tendency of Indian population to shift their toothpaste from nonherbal to herbal, in hope of getting relief from problems like yellow teeth and tooth sensitivity. Such change, however, may not necessarily lead to resolution of their problem and can never be a substitute to professional consultation.

Keywords: Dentist, Herbal dentifrices, Oral health, Tooth discoloration.

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INTRODUCTION

Oral health problems constitute a significant health concern in India and are cause of considerable morbidity.¹ However, this increase has not seen the commensurate increase in the acceptance of professional dental services. Oral health problems, occupying the lowest position in the hierarchy of importance and treatment needs, do not provide a compelling cause for seeking professional advice and care.² Self-remedying of oral health problems is still a common phenomenon. It is because of oral health neglect and tendency to avoid professional care that over-the-counter products gain so much traction in the Indian psyche.

Recently repeated concerns have been raised about the harmful effects of nonherbal toothpaste's basic ingredients like sodium lauryl sulfate³ and fluorides.⁴ In a country like India, where "safe," "natural," and "effective" are usually taken as synonymous, any reasonably priced over-the-counter herbal product with a promise to alleviate the manifestations of dental and oral problems is expected to be readily accepted by masses. This was especially noticed after the introduction of "Dant Kanti" toothpaste by Patanjali when there was a wave of change of toothpaste from nonherbal to "Dant Kanti."^{5,6} Herbal versions of many other toothpastes like "Colgate Vedshakti" by Colgate-Palmolive India Ltd.⁷ and "Lever Ayush" by Hindustan Unilever Ltd. were also launched subsequently.⁸

In this backdrop, the reasons for high reliance upon herbal toothpastes in the era of evidence-based therapeutics are worth studying. Previous studies on preference of toothpaste in Indian

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population report media information,⁹ cavity prevention,⁹ brand,¹⁰ flavor,¹⁰ dentist advice,^{9,10} peers influence,¹⁰ tooth whitening,⁹ and cost⁹ as the main factors in selection of a toothpaste. Studies from other parts of the world also mention taste, cost, presence of fluoride, dentifrice availability,¹¹ dentist recommendation, texture, and previous experience¹² as the factors which are usually taken into consideration while selecting toothpaste. However, the specific factors which led to wide acceptance of herbal toothpastes in recent years are not thoroughly studied yet.

Hence, this study was designed with an objective to understand various factors responsible for change from nonherbal toothpaste to herbal toothpaste or vice versa by an individual.

MATERIALS AND METHODS

This study, designed as a cross-sectional, questionnaire-based survey, was conducted by the Department of Dentistry, Kalpana Chawla Government Medical College, Karnal, Haryana, India. The research was conducted following ethical principles enshrined in the World Medical Association's Declaration of Helsinki. All the patients of age-group 16–64, who visited the department for dental consultations during November 2019 to February 2020, were inquired for having changed the toothpaste in last 5 years. Edentulous patients, those who did not brush at least once daily and those who had changed toothpaste in last 1 month, were excluded from the study.

A pilot study on representative eligible population was first carried out to determine the percentage of the population who had changed the toothpaste in the last 5 years. It revealed this population to be approximately 40%. Assuming a similar pattern in population, and using 5% confidence level and 1.0 design effect, a minimum sample size of 369 was calculated. To compensate for incomplete or incorrectly filled questionnaires, it was decided to include a total of 500 participants.

The research questionnaire sought demographic details, data on socioeconomic factors, information on type of shift of toothpaste, i.e., from nonherbal to herbal, herbal to nonherbal, nonherbal to another nonherbal, or herbal to another herbal toothpaste, and reasons for shift of toothpaste. It also had questions relating to whether they experienced improvement in their symptoms and which toothpaste among herbal and nonherbal was better in their opinion. Confidentiality was protected by assigning a unique registration number to each participant.

Demographic details included information on age, gender, geography (rural/urban), occupation, education level of head of family, and average monthly family income. Type of shift of toothpaste was recorded by asking previous and present toothpaste and time since change of toothpaste. The question on causes of change of toothpaste included various causes mentioned by participants in the pilot study like dental symptoms related to caries, periodontitis, dentin sensitivity, cosmetic reasons like yellow teeth or ineffective cleaning, economic factors, social factors, or dentist prescription, along with an open-ended option "others" to mention any reason not included. Participants' perceived improvement in various symptoms or perceived higher efficacy in cleaning was also recorded. Most of the questions were designed to be closed-ended to ease the statistical analysis.

After obtaining written consent, the participants were asked to fill the questionnaire while they waited in the outpatient department. The questions were explained to all the respondents in their native language, and assistance in filling the questionnaire, if required, was provided to them, taking special care not to lead the respondents to any specific answers.

Incompletely filled questionnaires were not included in statistical analysis. Coding was done to categorize the data for analytical purposes. The study population was divided into six categories according to age: less than 21 years, 21–30 years, 31–40 years, 41–50 years, 51–60 years, and more than 60 years. Educational status was graded into seven categories: illiterate, primary school, middle school, high school, intermediate/diploma, graduate, and postgraduation/professional degree.¹³ Socioeconomic status was assessed and classified using the modified Kuppaswamy's socioeconomic scale.¹³

Data obtained were analyzed using Microsoft Excel 2007 and IBM SPSS Statistics for Windows, version 19.0 (Armonk, New York: IBM Corp.)

software. Descriptive statistics (frequencies, mean, and standard deviation) were calculated for the study variables. Bivariate associations were tested for statistical significance using Chi-square tests and Spearman's correlations. Multiple regression analyses were used to estimate the predictors for change from one type of toothpaste to another. In general, a two-sided *p*-value <0.05 was considered significant.

RESULTS

Four hundred and eighty-two completely filled questionnaires were obtained from the respondents consisting of 210 females and 272 males. The mean age of respondents was 32.29 ± 12.62 years. Majority of respondents were from upper-middle and lower-middle socioeconomic category, as determined by modified Kuppaswamy's socioeconomic scale (Table 1).⁹

Descriptive analysis revealed that 49.79% of the participants had changed their toothpaste from nonherbal to herbal in last 5 years, while 27.1% had changed toothpaste from one nonherbal brand to another nonherbal brand (Fig. 1). Sensitivity in teeth (43.75%) and yellowness of teeth (49.25%) were the most cited reasons which prompted the respondents to shift from one toothpaste to another. These were followed in frequency by other factors like inefficient cleaning, cavities, bleeding gums, bad smell, influence of advertisement, taste, tooth attrition, professional advice, economic reasons, peers advice, and other miscellaneous reasons (Fig. 2).

Whereas Pearson's Chi-square tests of association showed that gender, rural/urban topography, age, and socioeconomic scale did not significantly influence the decision to change from nonherbal to herbal or vice versa, multinomial regression analysis revealed that tooth sensitivity, cost, advertisement, taste, and dental advice significantly influenced the same (Table 2). However, bleeding gums, halitosis, yellow teeth, cavities, attrition, inadequate cleaning, and peers advice were not significantly associated with the decision

Table 1: Distribution of study respondents according to their gender, age-group, geographic location, and socioeconomic scale (as per modified Kuppaswamy's scale)¹³

Category	Number of participants (n = 482, %)
Gender	
Male	272 (56.43%)
Female	210 (43.57%)
Age-group	
<21	76 (15.77%)
21–30	199 (41.29%)
31–40	88 (18.26%)
41–50	73 (15.14%)
51–60	33 (6.85%)
>60	13 (2.69%)
Geography	
Rural	230 (47.72%)
Urban	252 (52.28%)
Socioeconomic scale	
Upper	20 (4.15%)
Upper-middle	176 (36.51%)
Lower-middle	194 (40.25%)
Upper-lower	90 (18.67%)
Lower	2 (0.41%)

to change the toothpaste type. It was found that a complaint of sensitivity was a significant positive predictor of shift from nonherbal to herbal toothpaste and also with shift from one toothpaste to another within herbal or nonherbal category. Cost was a significant positive predictor of the shift in all categories. Advertisements were significant positive predictor of shift from herbal toothpaste to nonherbal toothpaste.

The percentages of patients who experienced improvement in their symptoms after change of their toothpaste from nonherbal to herbal, herbal to herbal, herbal to nonherbal, and nonherbal to nonherbal were 46.5, 46.8, 50.7, and 56.25%, respectively. No significant association was found between type of toothpaste shift and improvement in symptoms. In response to an open-ended question “which toothpaste is better in their opinion and why,” majority responded in favor of herbal toothpastes (Table 3). Among these, most common reason cited were the chemical-free nature of herbal toothpastes and their taste. Among those who preferred nonherbal toothpaste, 93.02% did so because of its taste.

DISCUSSION

Culture has a predominant effect on behavioral practices of an individual. The use of plant-based products like neem

twigs (*Azadirachta indica*), owing to its antimicrobial and astringent properties,¹⁴ is quite popular even today in rural India. Consequently, any new promising herbal oral hygiene product has a high probability of acceptance by the Indian populace.

Similar to the results by Kumar et al.,¹⁵ nearly 75% of participants of the present study responded in favor of herbal toothpastes when asked which toothpaste was better in their opinion among herbal and nonherbal ones. 44.8% of these respondents justified by saying that herbal toothpastes are safe as they are free from chemicals or side effects. Thus, concern of toxicity and side effects seems to be one of the major driving forces for the observed shift.

Though tooth sensitivity and yellow discoloration of teeth were cited as the main reasons for the shift to herbal toothpaste, no significant association was observed between type of shift and perceived improvement in symptoms, i.e., for any type of shift, approximately half of the respondents perceived an improvement in symptoms and the other half did not perceive any improvement. Previous studies have also reported equal potency of herbal and nonherbal toothpastes in reducing dental caries and gingivitis.¹⁶⁻¹⁸

Another significant finding in this study was that the major reasons cited by the users either to shift from nonherbal to herbal toothpastes or from herbal to nonherbal toothpastes were the same: tooth sensitivity and yellow teeth. This suggests that these two symptoms are the most common problems for which patients tend to seek self-treatment by trying various types of oral healthcare products.

A vast majority of respondents, who preferred nonherbal toothpastes more, did so because of their taste. Taste was also reported to be a significant factor in toothpaste selection by Opeodu and Gbadebo¹² and Kote et al.¹⁰ This suggests taste perception is an important consideration, and making a product pleasant to taste significantly increases its chances acceptance.

This study was a cross-sectional survey which only attempted to understand users’ preferences and perceptions. No attempt was made to measure the satisfaction level with the changed toothpaste prospectively, neither was any clinical examination included in study design to study the difference between the effectiveness of herbal and nonherbal toothpastes. The study was conducted in a dental hospital setup, so all participants can be presumed to have reported for some dental problems, affecting the generalizability of the results. Further studies to include the

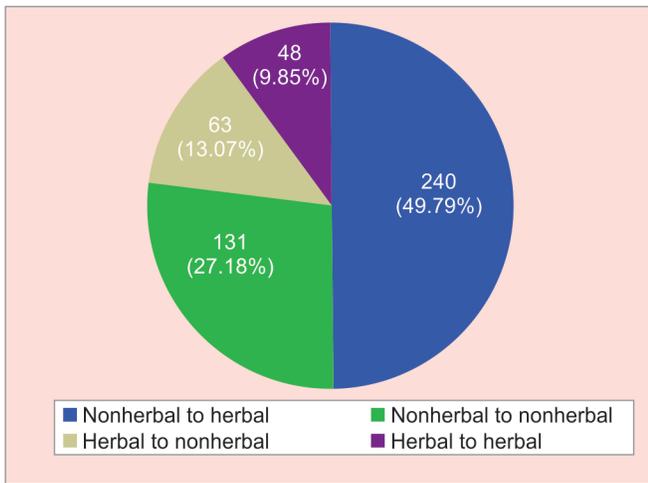


Fig. 1: Proportion of respondents in various categories of toothpaste shift (n = 482, percentage)

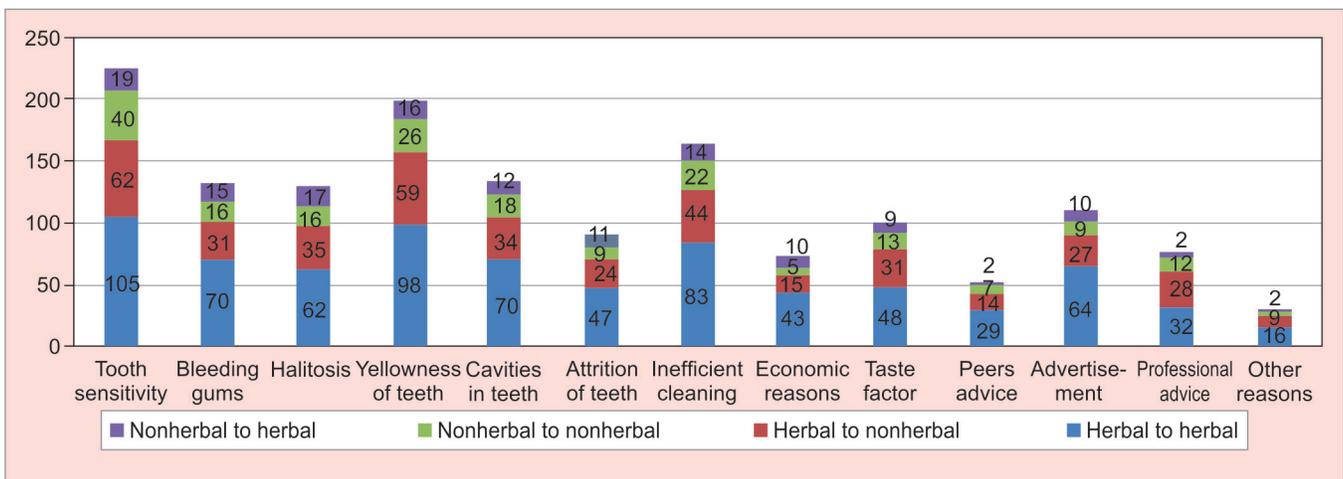


Fig. 2: Factors which prompted the respondents to shift from one toothpaste category to another

Table 2: Statistical details of significant positive predictors of category of toothpaste shift in comparison to various reference categories on the basis of multinomial regression analysis

Type of shift	Predictor variables	B	SE	p	β	CI (95%)	Reference category
Nonherbal to herbal	Taste	0.606	0.317	0.056	1.833	0.986, 3.411	Nonherbal to nonherbal
	Dentist advice	0.730	0.310	0.018	2.074	1.130, 3.806	
Nonherbal to nonherbal	Cost	0.895	0.381	0.019	2.447	1.159, 5.164	Nonherbal to herbal
Herbal to nonherbal	Cost	1.162	0.569	0.041	3.195	1.047, 9.751	Herbal to nonherbal
	Advertisement	1.239	0.449	0.006	3.453	1.433, 8.319	
Nonherbal to herbal	Sensitivity	1.134	0.321	0.000	3.108	1.657, 5.828	Herbal to nonherbal
Nonherbal to nonherbal	Sensitivity	0.728	0.340	0.032	2.070	1.063, 4.029	Herbal to herbal
Herbal to herbal	Sensitivity	1.456	0.444	0.001	4.288	1.795, 10.244	
Nonherbal to herbal	Cost	1.284	0.546	0.019	3.610	1.238, 10.529	Herbal to herbal
Herbal to nonherbal	Cost	1.550	0.691	0.025	4.714	1.217, 18.262	Herbal to nonherbal
	Advertisement	1.237	0.583	0.034	3.446	1.098, 10.811	

B, regression coefficient; SE, standard error; p, significance; β , standard estimate; CI, confidence interval

Table 3: Response of respondents to the question "Which toothpaste is better in your opinion and why?"

Preferred toothpaste	Percentage of respondents	Reason given	Percentage of respondents
Herbal	74.4%	Chemical-free/safe/free from side effects	44.8%
		Sensitivity	11.2%
		Efficient cleaning	4%
		Taste	33.6%
		Symptomatic improvement	4%
		Indigenous	2.4%
Nonherbal	25.6%	Symptomatic improvement	6.98%
		Taste	93.02%

above-mentioned parameters can help to understand these dynamics more precisely.

CONCLUSION

It was found that a tendency to change toothpaste from nonherbal to herbal or vice versa is a part of the quest of patients to seek solution to their dental problems and thus defer the dental visit. However, the same does not seem to provide the much-needed solution of dental problems.

Clinical Relevance

This study highlights the disposition of the patients toward changing their toothpastes from nonherbal to herbal and, in some cases, vice versa, in hope of getting relief from chronic problems like tooth sensitivity and yellow teeth. Whereas the change was not associated with any significant improvements in symptoms, which had driven the toothpaste change, majority of patients still preferred herbal toothpastes because of their chemical-free nature.

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