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ORIGINAL

Evaluation of chambira dental floss as a natural alternative for oral hygiene

Evaluación del hilo dental de chambira como alternativa natural para la higiene oral

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ABSTRACT

Introduction: the search for sustainable and efficient alternatives for oral care has driven the exploration of natural materials. Therefore, the present study evaluated the effectiveness of dental floss made from chambira fiber, a plant native to the Amazon region of Ecuador, as a viable and environmentally friendly option for oral hygiene.
Method: through a survey, data were collected from 366 dental students at the National University of Chimborazo through a cross-sectional descriptive study, in order to understand the opinions of the participants regarding the efficiency, usability and acceptance of chambira dental floss, contrasting them with those of traditional dental floss.
Results: the results obtained showed that chambira dental floss was perceived by participants as an effective alternative to commercial floss to improve oral health without altering the user experience.
Conclusions: the results of this study suggest that dental floss made from chambira fiber represents a promising and feasible alternative for oral hygiene. Its inherent characteristics, derived from its natural origin, together with a lower environmental impact, make it an attractive option for consumers concerned about sustainability. However, larger-scale clinical research with long-term follow-up is required in order to consolidate these results and evaluate its effectiveness in various population groups.

Keywords: Natural Dental Floss; Chambira; Waorani; Oral Hygiene.

RESUMEN

Introducción: la búsqueda de alternativas sostenibles y eficientes para el cuidado bucal ha impulsado la exploración de materiales naturales. Por lo tanto, el presente estudio evaluó la eficacia del hilo dental elaborado a partir de la fibra de chambira, una planta nativa de la región amazónica del Ecuador, como una opción viable y amigable con el medio ambiente para la higiene oral.
Método: mediante encuesta, se recolectaron datos de 366 estudiantes de odontología de la Universidad Nacional de Chimborazo mediante un estudio descriptivo transversal, con el fin de comprender las opiniones de los participantes respecto a la eficiencia, usabilidad y aceptación del hilo dental de chambira, contrastándolas con las del hilo dental tradicional.
Resultados: los resultados obtenidos mostraron que el hilo dental de chambira fue percibido por los participantes como una alternativa eficaz frente al hilo comercial para mejorar la salud oral sin alterar la experiencia del usuario.

Conclusiones: los resultados de este estudio sugieren que el hilo dental elaborado con fibra de chambira representa una alternativa prometedora y factible para la higiene bucal. Sus características inherentes, derivadas de su origen natural, junto con un menor impacto ambiental, lo convierten en una opción atractiva para consumidores preocupados por la sostenibilidad. No obstante, se requiere la realización de investigaciones clínicas a mayor escala y con seguimiento a largo plazo, con el fin de consolidar estos resultados y evaluar su eficacia en diversos grupos poblacionales.

Palabras clave: Hilo Dental Natural; Chambira; Waorani; Higiene Bucodental.

INTRODUCTION

Oral diseases represent a global challenge for public health. Together with fluorosis, irregularities in tooth growth, and temporomandibular joint problems, they negatively affect people's functional capacity and well-being and overload health services. The prevention and timely treatment of these diseases are essential to improving the oral health of the population.[1]

Bacterial plaque, the leading cause of tooth decay and periodontal disease, can be effectively controlled through regular flossing, especially in the interdental areas where the toothbrush cannot reach.[2,3]

The prevention of periodontal disease depends mainly on regular flossing; however, in Ecuador, the implementation of this practice is hampered by various factors, including a lack of knowledge and access to adequate information. Studies carried out in different population groups have revealed a low prevalence of flossing, especially in certain age groups. The lack of dental floss use is more prevalent in older adults, according to a study that found that 71 % of individuals aged 45 to 65 do not use it. This contrasts with the 20 % of young adults (18-44 years old) who do include it in their routine, which could have significant implications for periodontal health in different age groups. These findings highlight the need to implement educational and public health strategies to promote proper flossing and improve the oral health of the Ecuadorian population.[4,5]

Dental floss is an essential oral hygiene tool, complementing the action of the toothbrush. Its primary function is to remove bacterial plaque and food debris accumulating in the interdental spaces, thus preventing tooth decay and periodontal disease.[6,7] Using filaments to clean interdental spaces has its roots in the 19th century when Levi Spear Parmly introduced the concept of dental floss. However, over the years, materials and manufacturing techniques have evolved significantly, resulting in a wide variety of dental flosses tailored to the individual needs of each patient.[8,9]

The history of oral hygiene reveals a rich cultural diversity. From ancient civilizations that used plant fibers such as silk to clean between the teeth to cultures that employed tree branches such as the miswak (Salvadora persica), oral hygiene practices have been adapted to the local resources and beliefs of each community. This cultural diversity has enriched knowledge about oral care and laid the foundations for developing modern oral hygiene products.[7,10]

Growing environmental awareness has driven the search for sustainable alternatives in oral care. Organic dental floss, made from various natural materials such as silk, bamboo, corn, and cotton, offers an environmentally friendly alternative to synthetic products. These biodegradable flosses, free of harsh chemicals, can be a gentler option for the gums and reduce the risk of allergic reactions.[9,11,12]

The search for sustainable alternatives in oral health has led to the exploration of natural materials such as the fiber of the chambira palm (Astrocaryum chambira), native to the Ecuadorian Amazon.[13] Thanks to its fibers' strength and flexibility, Indigenous communities have traditionally used this palm to make various textile products.[13,14,15]

A. chambira is a botanical species of great importance to the Waorani communities of the Amazon, who have taken advantage of its many properties since ancient times.[15] Its fruits, rich in bioactive compounds, have traditionally been used as anti-inflammatories and painkillers. In addition, the oil extracted from these fruits has been used for healing wounds and burns. The roots of this palm have been used in infusions to relieve fevers. The versatility of chambira also extends to the production of a wide range of handicrafts, from fibers for fabrics and ropes to elements for house construction.[16]

This study focused on evaluating the potential of chambira in oral hygiene by determining the effectiveness of dental floss made from this natural fiber. The results will contribute to knowledge about sustainable oral care alternatives and promote local resource use."

METHOD

A mixed cross-sectional study was designed to discern the value of dental floss made from chambira fiber

in promoting oral health. Both quantitative and qualitative data were collected through surveys of a group of dentistry students. This design allowed us to compare the participants' perceptions of chambira dental floss's effectiveness and ease of use with those of the available commercial options.

The sample consisted of 366 dentistry students from the National University of Chimborazo, selected through stratified random sampling during the 2024-2S academic period. Thus, students from all academic levels were guaranteed to be included, ensuring the representativeness of the student population.

An online data collection instrument was designed to evaluate the perception and acceptance of Chambira dental floss as an alternative for oral care. This instrument included closed questions to quantify aspects such as the frequency of flossing, the type of floss preferred, and knowledge about the benefits of natural materials in oral hygiene. Recognizing the importance of subjectivity in evaluating the user experience, questions were incorporated that allowed participants to freely express their impressions and evaluations of Chambira dental floss.

Descriptive statistical techniques were used to interpret the numerical data. Frequencies and percentages were calculated to provide a detailed profile of the characteristics of the sample studied. The chi-square test was applied to identify significant associations. The qualitative data obtained through the open responses were analyzed through coding and categorization, following a thematic analysis approach.

RESULTS

Of those surveyed, 35 % reported flossing between 1 and 3 times a week, 30 % floss daily, 25 % floss 4 to 6 times a week, and the remaining percentage did not floss.

When investigating the frequency of flossing, 32 % of respondents reported consistent use between 1 and 5 years. Some 23 % indicated sporadic use, while the rest reported using it less than 6 months or not at all. Although there was a range of opinions, 80 % of respondents, including children, adults, and people with specific dental problems, were in favor of widespread flossing.

The study showed a marked preference for nylon and waxed floss (194 and 115 participants, respectively), which reflects current oral hygiene practices. However, a niche market for natural products was detected, with 25 % of participants reporting using organic floss. These results highlight the need for further research into the effectiveness and acceptance of new oral hygiene alternatives, such as chambira dental floss.

When analyzing the data on the motivation for using natural dental floss, it was found that 87 % of the participants mentioned concern for the environment as a motivating factor for using chambira dental floss. A similar percentage (93 %) indicated that their dentist's recommendations influenced their decision. Recommendations from family members and advertising obtained lower percentages, with 20 % and 11 %, respectively. 15 % of those surveyed indicated that none of the above factors applied to their case.

Regarding the participants' perception of the floss cost, a diversity of preferences was revealed since 59 % indicated their willingness to pay a price similar to that of conventional dental floss. In comparison, 28 % showed interest in paying a higher price for chambira dental floss, valuing its ecological and natural attributes. The rest of the respondents prioritized cheaper options or expressed no interest in this product.

The results obtained, with a statistical significance of $p<0,05$, indicate that using chambira dental floss is associated with a perceived improvement in oral health. This supports the idea that this sustainable option could represent a benefit both for the natural environment and for people's oral hygiene.

Table 1. Results of the Chi-square test: Influence of dental floss on the perception of oral health

	Value	Gl	Asymptotic sig. (2 sides)	Sig. Monte Carlo		
				Sig.	99 % confidence interval	
					Lower limit	Upper limit
Pearson's chi-square	31,261[a]	6	,000	,000[b]	,000	,000
Likelihood ratio	31,850	6	,000	,000[b]	,000	,000
Fisher's exact test	30,547			,000[b]	,000	,000
N of valid cases	366					

The statistical evidence provided by the chi-square test ($p<0,05$) in table 2 supports a significant relationship between the perception of the importance of the composition of dental floss and the perception of the effectiveness of chambira floss. Participants who considered the natural composition of dental floss relevant were more likely to evaluate chambira floss's effectiveness positively.

Table 2. Results of the Chi-square test: Composition of dental floss vs. perception of organic effectiveness

	Value	gl	Asymptotic sig. (2 sides)	Sig. Monte Carlo		
				Sig.	99 % confidence interval	
					Lower limit	Upper limit
Pearson's chi-square	30,568a	6	,000	,000b	,000	,000
Likelihood ratio	28,510	6	,000	,000b	,000	,000
Fisher's exact test	28,897			,000b	,000	,000
N of valid cases	366					

Table 3 shows a clear association between the perception of effectiveness and the ease of use of chambira dental floss (p<0,05). The combination of effectiveness and enjoyment in the experience of use indicates that chambira dental floss has the potential to establish itself as a viable option for sustainable oral care.

Table 3. Results of the Chi-square test: Influence of dental floss components on the evaluation of its organic effectiveness

	Value	Gl	Asymptotic sig. (2 sides)	Sig. Monte Carlo		
				Sig.	99 % confidence interval	
					Lower limit	Upper limit
Pearson's chi-square	203,724a	9	,000	,000b	,000	,013
Likelihood ratio	196,274	9	,000	,000b	,000	,013
Fisher's exact test	192,717			,000b	,000	,013
N of valid cases	366					

DISCUSSION

The present research results reveal a favorable perception of chambira dental floss as a viable and sustainable alternative for oral care. The analysis of the participants' responses showed a clear tendency to favor chambira dental floss over commercial products in terms of efficacy and ease of use. This positive perception is based on the widespread belief that natural materials are safer and more environmentally friendly.

The high rating of Chambira dental floss can be attributed to several factors. On the one hand, its natural and biodegradable composition positions it as an attractive option for consumers conscious of environmental issues. On the other hand, the perception of softness and effectiveness in removing bacterial plaque contributed to a positive user experience.

The one-off nature of the data collection, inherent to the cross-sectional design, provides a snapshot of the relationship between the use of Chambira dental floss and oral health. However, longitudinal studies are required to trace the temporal course of this relationship and rule out possible confounding factors.

Although the study has certain limitations, its findings open up new lines of research in natural materials applied to oral health. Future long-term research, with more robust experimental designs, is needed to confirm the results obtained and evaluate the impact of chambira dental floss in preventing periodontal disease. Likewise, it is recommended that comparative studies be carried out with other natural materials and that the acceptability of chambira dental floss be evaluated in different age groups and sociocultural contexts.

The results of this study suggest that chambira dental floss has the potential to become a viable and sustainable alternative to commercial products. However, additional research is needed to confirm these findings and explore its market potential.

CONCLUSIONS

The conclusions of this research underline the capacity of Chambira dental floss to introduce a revolutionary and sustainable alternative in the field of oral care, making a palpable difference in reducing the ecological impact. The acceptance of this product by the participants suggests that consumers are willing to adopt new oral hygiene options that are respectful of the environment.

However, further research is required to fully evaluate the efficacy of chambira dental floss compared to commercial products and to determine its long-term impact on oral health. In addition, marketing and distribution strategies must be developed to promote consumer adoption of this product.

Large-scale production of chambira dental floss could generate economic and social benefits by promoting the development of sustainable agriculture and creating new employment opportunities. In addition, it could reduce dependence on plastic products and mitigate the environmental impacts associated with producing and

consuming oral hygiene products.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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