Revista de Ciencias Médicas de Pinar del Río

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2023; 27(S2): e6196

ORIGINAL ARTICLE

Knowledge on the use of probiotics for dental caries prevention

Conocimiento sobre el uso de probióticos para la prevención de caries dentales

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Received: July 18, 2023
Accepted: October 15, 2023
Published: November 26, 2023

Citar como: Vásquez-Barberán SA, Mesache-Villagómez MA, Arroyo-Lalama EM, Vaca-Altamirano GL. Conocimiento sobre el uso de probióticos para la prevención de caries dentales. Rev Ciencias Médicas [Internet]. 2023 [citado: fecha de acceso]; 27(S2): e6196. Disponible en: http://revcmpinar.sld.cu/index.php/publicaciones/article/view/6196

ABSTRACT

This research focuses on analyzing the level of knowledge that dental students at the Universidad Regional Autónoma de los Andes have about probiotics as an alternative for the prevention of oral diseases, including dental caries. The research evaluated the knowledge of 82 second and third semester dental students about caries prevention methods and the use of probiotics. An 11-question questionnaire was used, and a maximum score of 45 points was considered. The data were analyzed in SPSS and a descriptive and correlation analysis with sociodemographic data was applied. The results reveal that about half of the students have minimal knowledge about foods with probiotics, and no consistent knowledge about their advantages or preventive use. The research highlights the importance of increasing education about probiotics in the dental career, since these microorganisms can reduce the amount of pathogenic microorganisms in various oral diseases and decrease the number of cases of dental diseases.

Keywords: Probiotics; Prevention; Dentistry.

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2023; 27(S2): e6196

RESUMEN

La presente investigación se enfoca en analizar el nivel de conocimiento que poseen los estudiantes de odontología en la Universidad Regional Autónoma de los Andes, sobre los probióticos como alternativa de prevención de enfermedades bucales, incluyendo la caries dental. La investigación evaluó el conocimiento de 82 estudiantes de segundo y tercer semestre de odontología sobre métodos de prevención de caries y uso de probióticos. Se utilizó un cuestionario de 11 preguntas, y se consideró un puntaje máximo de 45 puntos. Los datos se analizaron en SPSS y se aplicó un análisis descriptivo y de correlación con los datos sociodemográficos. Los resultados revelan que alrededor la mitad de los estudiantes tienen un conocimiento mínimo sobre alimentos con probióticos, y no tienen un conocimiento consistente sobre sus ventajas o uso preventivo. La investigación destaca la importancia de aumentar la educación sobre los probióticos en la carrera de odontología, ya que estos microorganismos pueden reducir la cantidad de microorganismos patógenos en diversas enfermedades orales y disminuir el número de casos de enfermedades dentales.

Palabras Clave: Probióticos; Prevención; Odontología.

INTRODUCTION

Preventive dentistry has focused especially on the implementation of preventive protocols, such as proper brushing and flossing, as this is the main way to prevent dental caries. With the evolution of both dentistry and its materials, probiotics have been included as active ingredients in mouthwashes and toothpastes, as they have remarkable effects on caries prevention.[1]

Early caries remains the most common chronic childhood disease. Around 1,8 billion new cases are reported worldwide each year. Already in three-year-old children, dental caries can be as high as 32 %.[2] Oral health affects the general condition of the body and the quality of life of the child. Long-term pathological processes, especially during the period of growth and development of the dentoalveolar system, lead to disruption of dental tissue formation and early destruction of the periodontal complex.[3,4]

In modern caries etiology, the main role is given to cariogenic microflora, as well as the level of dental knowledge of parents, and their commitment to preventive visits and treatment of primary teeth plays an important role in prevention.[5] Within the pathogenesis of dental caries it is known that it is produced by a dysbiotic state of oral microorganisms, mainly due to a diet rich in sugar, poor oral hygiene and insufficient removal of plaque, which progresses rapidly. In children at high risk of developing caries, occlusion of the dentition and problems with diction may occur later.[6]

The flora of the oral cavity includes more than 700 species/taxa of bacteria,[7] many of which regulate their joint activities and physiological processes through a mechanism called quorum sensing, in which bacterial cells interact with each other, reacting to small molecule diffusion signals, assisting in host colonization, biofilm formation, defense against competitors and adaptation to changing conditions.[8]

ISSN: 1561-3194 **RNPS:** 1877
Rev Ciencias Médicas. 2023; 27(S2): e6196

On the other hand, probiotics are live microorganisms or food ingredients containing live microorganisms that have a positive effect on host health when used in adequate amounts.[9] Strategies to influence the microflora include dietary modification, increased consumption of nonabsorbable carbohydrates, and the introduction of live bacteria into the human body, the latter concept is often referred to as bacteriotherapy or substitution therapy. It is based on the assumption that non-pathogenic microorganisms, such as lactobacilli and bifidobacteria, can occupy space in the human biofilm, which in other circumstances could be colonized by pathogenic bacteria.[5,10]

So the importance of probiotics in oral caries is due to the fact that these microorganisms when they are in the oral cavity, generate changes in the oral microbiota and alter the balance of the environment where the pathogenic microorganisms responsible for the development of dental caries are, also these probiotic bacteria, They produce antimicrobial substances and inhibit the colonization of pathogenic bacteria, thus reducing the acids and metabolites that cause the development of caries and periodontitis.[11]

The relationship between oral diseases and probiotics has been studied over the last 20 years, where a hypothesis has been reached in the therapeutic approach, in which harmless bacteria replace a biofilm preventing it from being colonized by a pathogen.[12]

The strains considered most beneficial in oral health include: Lactobacillus reuteri, Lactobacillus salivarius, Streptococcus salivarius K12, Streptococcus salivarius M18, Lactobacillus paracasei, Lactobacillus sakei, and the diseases they can prevent or treat are: Caries, Gingivitis/periodontitis, Oral candidiasis (thrush), bad breath, respiratory infectionstonsillitis, oral cancer, as there is evidence of decreased plaque formation, increased buffering capacity of saliva and improvement of caries rates in the long term, in the same way in periodontics improves gingival and periodontal indices at any stage of the disease, also improves bleeding rate and decreases periodontal pathogenic bacteria and finally has an inhibitory effect of odoriferous bacteria.[13]

In vivo and in vitro studies have been carried out with several strains of Lactobacillus to demonstrate the mechanism of probiotics against oral pathogens, known as '' Competitive inhibition'',[14] where it was found that its mechanism of action stands out mainly, the promotion of phagocytosis, inhibition of bacterial growth, local modulation of the immune response, competitive inhibition, that is performed at the gastrointestinal level, for which reason we recommend future research more dedicated to the oral part, however, considering that the mouth represents the first part of the gastrointestinal tract, we assure that at least one of these mechanisms is generated in the oral cavity.[15]

Under the aforementioned, bifidobacteria commonly found in the oral cavity and among the predominantly anaerobic bacteria of the intestinal tract. They play a fundamental role in maintaining the balance of the natural intestinal flora,[16] Probiotics are beneficial because they can improve immunity, reduce the frequency of allergic reactions and lactose intolerance, lower blood pressure and serum cholesterol levels.[17]

Currently, the commercial industry has taken advantage of the information on the benefits of probiotics, putting on sale several toothpastes that claim to contain probiotics, among these we find USANA® (commercial house) Whitening Toothpaste and Oral Probiotic. Hyperbiotics, Toothpaste with activated charcoal and probiotics from Hyperbiotics, Toothpaste Probiotics Well-Being, from ECODENTA.[18]

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Although we know that there are few studies that support the results, it is assured that, with several investigations and information on a correct dosage, clinical effectiveness on the prevention of oral diseases will be obtained.[19]

Therefore, the main objective of this research is to determine the knowledge about the use of probiotics in oral health in the student population that is in the basic levels of the dental career.

METHODS

Type of study

This is a descriptive, observational study, since it shows the knowledge that the students of the basic level of dentistry have about the methods of prevention of dental caries as well as the use of probiotics as an alternative for the prevention of oral diseases, and also about the use of probiotics as an alternative for the prevention of oral diseases, cross-sectional because it was carried out in a determined period of time, and quantitative, since it seeks to quantify the level of knowledge of the students on the use of probiotics as caries prevention.

The study population consisted of second and third semester students of dentistry at the Autonomous Regional University of the Andes, with a sample of 82 students.

Students legally enrolled in the second and third semesters of dentistry at the Autonomous Regional University of the Andes, who accepted to be part of the study, were included in this study, after accepting the informed consent.

A test previously validated by Morales,[20] was applied; this questionnaire consists of 11 comprehensible questions, divided into two blocks, the first with two sociodemographic questions and the second block with nine polytomous questions on knowledge of oral hygiene with pro-biotics.

For the analysis of the level of knowledge it was considered to value the response options in the following way, the option "I know about the topic" was weighted with five points, "I have heard about the topic" with four points, "undecided" with three points, "I have not heard about the topic" with two points and "I do not know about the topic" with one point; The maximum score was 45 points; for the results, values between >=35 to 45 points were considered as "good knowledge", <35 - >=20 points as "fair knowledge", <19 - >=9 points as "poor knowledge".

The data obtained were entered into excel, and analyzed in the SPSS version 26 program, where a descriptive analysis and correlation with the sociodemographic data were performed.

RESULTS

Analysis of the internal consistency of the questionnaire

To verify the internal consistency of the questionnaire, Cronbach's Alpha coefficient was used to verify whether the measurements are stable and consistent.

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Table 1 shows the internal consistency analysis of the questionnaire used. The Cronbach's Alpha value of 0.9 is detailed, which turned out to be higher than the minimum acceptable value (0,7 reference value), indicating that the data obtained in the questionnaire are stable and consistent.

Table 1. Cronbach's alpha

Questionnaire knowledge of probiotics	Cronbach's Alpha	N° de Ítems
	0,9	22

Sources. Own Preparation

Table 1 shows the reliability test of the questionnaire used where the number of items is 9 and Cronbach's Alpha 0,9.

Sociodemographic data.

Table 2 shows the sociodemographic data of the study population, where 82,5 % of the respondents are female and 33,8 % are male, while as for the age of the participants 42,5 % are 19 years old, and the minority corresponds to 2,5 % with 18 years and 43 % belong to the second and 58 % to the third semester of the career.

Table 2. Data expressed in frequency and percentage. Own elaboration.

	Options	Frequency	Percentage
Gender	Female	53	82,5
	Male	27	33,8
	Total	80	100
Semester	Second	34	42,5
	Third	46	57,5
	Total	80	100
Age	18	2	2,5
	19	34	42,5
	20	22	27,5
	21	11	13,8
	22	5	6,3
	> 22	6	7,5
	Total	80	100

Sources. Own Preparation

Descriptive analysis of the study variables

Table number 3 shows that 41,2 % and 33,7 % of the respondents do not really know about probiotic foods and the existence of these within dairy products. Forty percent did not know about the existence of toothpastes and rinses with probiotics, demonstrating the lack of information on the subject.

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Regarding questions four and five on the benefits of probiotics, 35 % and 47,5 % said they did not know this information, affirming the need to disseminate the benefits of these microorganisms and promote their use.

In the next question about the risks of use, 50 % answered that they did not know that their consumption does not generate risks, in the same way 48,7 % are not sure if probiotics are beneficial to health, finally focusing on the preventive issue 53,7 % and 47,5 % of the students answered that they did not know about the preventive effect on caries and much less about the existence of pastes and mouthwashes that handle probiotics.

Table 3. Descriptive analysis of the study variables

Variable	Indicator	No.	%
1. Do you know what foods with probiotics are??	Totalmente en desacuerdo	14	17,5
	En desacuerdo	11	13,7
	Indeciso	33	41,2
	De acuerdo	19	23,7
	Totalmente de acuerdo	3	3,7
	Total	80	100
2. Did you know that probiotics can be found in some dairy products?	Totally disagree	11	13,7
	Disagree	12	16,2
	Undecided	27	33,7
	Agree	20	25
	Strongly agree	11	13,7
	Total	80	100
3. Did you know that probiotics can be found in the composition of some toothpastes and mouthwashes nowadays?	Totally disagree	10	12,5
	Disagree	32	40
	Undecided	13	16,2
	Agree	21	26,2
	Strongly agree	4	5
	Total	80	100
4. Do you know that probiotics improve oral health?	Totally disagree	10	12,5
	Disagree	28	35
	Undecided	22	27,5
	Agree	16	20
	Strongly agree	4	5
	Total	80	100
5. Do you know that probiotics can be used in the treatment of oral diseases?	Totally disagree	10	12,5
	Disagree	38	47,5
	Undecided	10	12,5
	Agree	19	23,7
	Strongly agree	3	3,7
	Total	80	100

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6. Do you know that the use of probiotics is safe and confers no health risks?	Totally disagree	10	12,5
	Disagree	40	50
	Undecided	8	10
	Agree	19	23,7
	Strongly agree	3	3,7
	Total	80	100
7. Do you know that regular consumption (more than 3 times a week in the last month) of any food, supplement or medicine with probiotics benefits health?	Totally disagree	10	12,5
	Disagree	8	10
	Undecided	39	48,7
	Agree	20	25
	Strongly agree	3	3,75
	Total	80	100
8. Do you know that it is possible to prevent dental caries with the use of probiotics?	Totally disagree	12	15
	Disagree	43	53,75
	Undecided	4	5
	Agree	14	17,5
	Strongly agree	7	8,7
	Total	80	100
9. Do you know that the use of special substances such as probiotics in toothpastes or mouthwashes help prevent cavities?	Totally disagree	11	13,7
	Disagree	38	47,5
	Undecided	7	8,7
	Agree	17	21,2
	Strongly agree	7	8,7
	Total	80	100

Table 3 shows the descriptive analysis of the nine questions that seek to determine the knowledge on the use of probiotics in the prevention of dental caries.

Participants' knowledge of probiotics.

It can be seen in Table 4 that 76,25 % of the participants have a poor knowledge of the subject of the study, of this population the women present 75,47 % of lack of knowledge and the male sex 77,78 %, results that reveal the lack of knowledge on the subject on the part of the second and third semester dental students.

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Table 4. Knowledge of the participants about probiotics.

Options (n=80)	**Frequency**		**Porcentage (%)**	
Poor knowledge	61		76,25	
Fair knowledge	12		15	
Good knowledge	7		8,75	
Total	80		100	
	Women		**Men**	
	No.	%	No.	%
Poor knowledge	40	75,47	21	77,78
Fair knowledge	5	9,43	2	7,41
Good knowledge	8	15,09	4	14,81
Total	53	100	27	100

Table 4 shows the level of knowledge of the respondents about probiotics as a means of preventing dental caries. Frequency and percentage were obtained, considering the measurement scale of the questionnaire. Own elaboration

Correlation of study variables

Table 5 shows the application of the chi-square test regarding sex and semester of study with the knowledge of the participants. It can be seen that sex is not related to knowledge about probiotics, their use in the prevention of dental caries and the level of knowledge of the students surveyed, while the semester of study has a significant relationship with knowledge about probiotics (p=0,060) and the use of probiotics in the prevention of dental caries (p=0,028). Therefore, the semester in which the students are studying is a factor related to the students' knowledge about probiotics and their use in oral health.

Table 5. Ci-square of the variables associated with the level of knowledge.

Variable	**Qui-** squared	**gl**	**p**
Sex vs. knows what probiotics are.	3,10	4	0,541
Sex vs. use of probiotics in the prevention of dental caries	4,6	4	0,332
Sex vs. level of knowledge	30,6	27	0,288
Semester vs knows what probiotics are	9,03	4	0,060*
Semester vs. use of probiotics in the prevention of dental caries	10,87	4	0,028*
Semester vs level of knowledge	16,4	27	0,944

Shows the correlation of study variables, where *p<0,05. Own elaboration

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DISCUSSION

The present investigation showed the level of knowledge about probiotics of the second and third semester students of dentistry, UNIANDES, Ambato; Regarding the knowledge about foods with probiotics, 41,2 % assure to have minimal knowledge, and 33,7 % do not present consistent knowledge about foods that have probiotics in their content such as dairy products, these results are similar to those presented by Sharma R,[21] where the results show that although the majority of students have heard about probiotics, their knowledge about the benefits and sources is quite limited, Similarly the study by Subhan Arshad,[22] conducted on health professionals in Pakistan on their knowledge about probiotics, it was determined that only 15,1 % had a good knowledge about the correct use, and also these results differ with other countries such as Jordan as 35,6 % and India 57,6 % of professionals had better knowledge indicating that this is due to the marketing of probiotic products in their countries.

Alban E.,[23] in his study dedicated to probiotics in dentistry, states that they are used to reduce the amount of pathogenic microorganisms in the different oral diseases that we find, in addition, Morales P.,[24] mentions in his study that probiotics as a preventive method, help to reduce the number of cases of dental diseases, mainly probiotics of the Lactobacillus or Bifidobacterium genus in a continuous way.

On the other hand, Fierro C.,[19] affirms that probiotics are already used as preventive, as for example in fluoride, in the short term since the daily intake of these can directly modify the oral microbiota, contributing to the reduction of pathogens and decreasing the development and growth of oral pathogens. The daily intake of probiotics can directly affect the composition of the oral microbiota by reducing the number of pathogens present, as well as indirectly by stimulating the growth of beneficial microorganisms which in the long term can reduce the development and growth of pathogens in the mouth.[19]

In this study, 35 % of the participants mentioned that they did not know that probiotics improve oral health, and 47,5 % did not know about the use of probiotics to treat oral diseases; however, the study by Álvarez G.,[25] carried out on doctors and nurses in Madrid mentions that 87 % are clear about the definition of probiotics, and more than 95 % were aware of the symbiotic benefits of these microorganisms and that this property depends on the strain, type and dose of the probiotic, and 87 % state that they habitually use probiotics in clinical practice, which obliges them to keep up to date with information on these, results that differ from those found in this study.

On the other hand, a study carried out on students by Martínez,[26] mentions that, regarding knowledge about caries prevention with probiotics, only 4,35 % of the students had good knowledge, while 53,62 % had fair knowledge and 42,3 % had poor knowledge.[26]

It was concluded that there is a lack of knowledge about caries prevention with probiotics among the students, and no significant differences in knowledge were found among students of different semesters of the dental career. In addition, it was shown that students have better knowledge about caries prevention without probiotics than with probiotics, data comparable with this study.

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On the other hand, 50 % of the respondents reported not knowing that probiotics do not present health risks. A study carried out by Precup G.,[27] in Romania on the knowledge of probiotics concludes that when participants were asked to rate their level of understanding about "probiotics" more than 22 % of them indicated that they had no knowledge at all, while about 6 % claimed to have a high level of knowledge, and the group that stood out in their knowledge were young women of which 74 % had completed or were pursuing a bachelor, master and/or doctoral degree, this minimal population had in general knowledge about the concept of prebiotics and some possible health benefits that have been evidenced in the scientific literature.

On the other hand, the study by Yücel,[28] where a total of 818 students enrolled in different departments of the academy of health sciences were taken into account, such as: audiology, nursing, nutrition and dietetics, physiotherapy and rehabilitation, child development and obstetrics indicate that 69,9 % (72 % of women and 58,2 % of men) had knowledge about probiotic products, while 85,9 % (88,3 % of women and 75,2 % of men) reported consuming them. When asking the 115 students who did not consume them about the reasons, it was found that 27 % did not find them appetizing, 24,3 % did not know about them, 24,3 % considered that they did not need them in their diet and 16,5 % did not find them natural, so although they did not prefer them as food, they knew about them.

In the current study 48,7 % claimed not to know that regular consumption improves health while in Pinka Alia Rahmah's study,[29] on 567 fourth year students of the faculties of Medicine, Pharmacy and Nursing of the University of Padjadjaran indicated that most of the survey participants (80 %) had regular knowledge about probiotics. Likewise, 90,8 % gave a correct answer when asked about the definition of probiotics. In addition, almost all of the participants (97,7 %) knew that one of the functions of probiotics is to improve the protection of the mucosal lining of the digestive system.

Regarding their use on oral health, Corrales D.,[30] mentions that currently the regular consumption of probiotics has increased, thanks to scientific evidence analyzing their benefits in the use of certain clinical pictures, on the other hand Villasanta M.,[31] indicates that having knowledge about the benefits of probiotics will help to manage them and use them correctly as a caries preventive method, however in this study, most of the respondents, did not know about probiotics, much less about their benefits, since the studied population had a low knowledge.

On the other hand Centeno D.,[32] tells us about the importance of implementing probiotics in dentistry, studying them and informing, here we emphasize the importance of our study, since it explains how probiotics would improve oral health in the long term and with the correct use, the decrease of caries, and the importance of disseminating information since by creating new thoughts, more treatments and strategies can be developed, for a healthier oral environment and protect from possible infections, this, implementing the use of probiotics, since in several studies their results are promising.

CONCLUSIONS

According to the study carried out, the data showed that the students of the second and third semester of dentistry at the Autonomous Regional University of the Andes, male and female, who were surveyed about the use of probiotics, have a deficient knowledge. This demonstrates the importance of disseminating this information, since the same study discusses the benefits both preventive and in more chronic treatments, especially in the dental area.

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Rev Ciencias Médicas. 2023; 27(S2): e6196

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