FOOD AND NUTRITION IN COLLECTIVE HEALTH

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Construction, development, and evaluation of educational actions via Mobile Health focusing on reduction of sodium consumption in an educational institution

Construção, desenvolvimento e avaliação de ações educativas via Mobile Health com foco na redução do consumo de sódio em uma instituição de ensino

Abstract

Objective: Describe the process of construction and development of educational actions through mHealth aiming sodium reduction and accomplishment of evaluation from the receptor's point of view. ***Methods***: Interventional study accomplished within 155 adults from 20 to 59 years old from a public institution in Vitória-ES. The participants were approached through banners, face to face invitations and electronic medias. After the first data collection the participants were randomized into two groups: Intervention (GI) and control (GC). Socioeconomic data about health and eating habits were obtained before and after the intervention. 21 messages and 3 videos focusing on the sodium reduction were prepared and sent via Whatsapp or e-mail for 3 months. Appropriate tests, according to the sample's design, were applied using the software SPSS 23 with a significance level of 5%. ***Results***: On the baseline were not observed significant differences between the allocation groups. Nearly 70% of the GI participants reported that the information was useful, clear and objective; 50% reported that the messages helped them to do healthier eating choices and 47% claimed that they followed the suggestions that were proposed to them. More than 60% of GI reported that they have adopted healthier eating habits while in GC the reports were related to the execution of "trending diets". These results show the importance of the use of educational actions based on scientific knowledge and adoption of healthy eating habits. ***Conclusion***: Most of the participants classified the mHealth strategy as a useful and easy understanding one, as well as they were exposed to health eating information.

Keywords: Health eating. Eating behavior. Mobile Device. Health education.

Resumo

Objetivo: Descrever o processo de construção e desenvolvimento de ações educativas via *mHealth* para redução de sódio e realizar avaliação do ponto de vista do receptor. ***Método****:* Estudo de intervenção com 155 adultos (20-59 anos) de uma instituição de ensino em Vitória-ES. Os participantes foram contatados por exposição a *banner*, convite *face to face* e mídia eletrônica. Após primeira coleta de dados, os participantes foram randomizados em dois grupos: Intervenção (GI) e Controle (GC). Dados socioeconômicos, de saúde e práticas alimentares foram obtidos antes e após a

intervenção. Foram elaboradas 21 mensagens e três vídeos focados na redução de sódio, enviadas por aplicativo WhatsApp® ou *e-mail*, durante três meses. Testes adequados, segundo o delineamento da amostra, foram aplicados utilizando o *software SPSS 23*, adotando-se nível de significância de 5%. ***Resultados****:* Na linha de base, não foram observadas diferenças significativas entre grupos de alocação. Cerca de 70% dos participantes do GI relataram que as mensagens foram úteis, claras e objetivas; 50% relataram que as mensagens ajudaram a realizar escolhas alimentares mais saudáveis e 47% disseram que seguiram as sugestões propostas. Mais de 60% do GI relataram que adotaram hábitos alimentares mais saudáveis, enquanto no GC as respostas foram associadas à prática de "dietas da moda". Esses resultados mostram a importância da utilização de ações educativas baseadas em conhecimento científico e na adoção de práticas alimentares saudáveis. ***Conclusão:*** A maioria dos participantes identificou a estratégia *mHealth* como de fácil compreensão e útil, bem como foram mais expostos à informação sobre alimentação saudável.

Palavras-chave: Alimentação Saudável. Comportamento Alimentar. Dispositivo Móvel. Educação em Saúde.

INTRODUCTION

Mobile health or mHealth is defined by the World Health Organization (WHO) as a medical practice with support for mobile devices, such as: devices for monitoring patients, cell phones, tablets and other wireless devices and their modalities.[1] In turn, Sim (2019)[2] defines mHealth a tool in isolation or combination, to obtain data relevant to the diagnosis, prevention and management of well-being and diseases.

The mHealth strategy is being applied in several countries, contributing to change the behavior of individuals, and can be carried out in different contexts, such as disease prevention and monitoring of chronic outcomes.[3] It is considered a promising methodology, as it can contribute to increase access to information, obtain greater adherence from users [4] and help in monitoring their own health.[2]

The technology for mobile communication can be used to support health services in more restricted and difficult to access areas, as it is, in some situations, of lower operational cost when compared to face-to-face.[5] Easy access eliminates physical and temporal obstacles, presenting space for a new form of social mobilization, ensuring greater reach of information on health education, disease prevention and control.

In turn, high sodium consumption is a predictor of cardiovascular disease and hypertension, as well as being associated with higher overall mortality.[6] In Brazil, sodium consumption is high, mostly coming from addition salt.[7] In addition, a recent study in the city of Vitória-ES showed that greater urinary sodium excretion is associated with frequent use of industrialized spices.[8] Thus, health intervention measures are needed to reduce sodium intake in populations.

The objective of this study is to describe the process of construction and development of educational actions via Mobile Health applied to the reduction of sodium consumption, and to evaluate these actions from the point of view of the recipient.

METHODS

This is a descriptive study in the context of the research entitled "Evaluation of the impact of actions to reduce sodium consumption in adults", carried out with adults aged 20 to 59 years old from a federal educational institution in Vitória, Espírito Santo (ES).

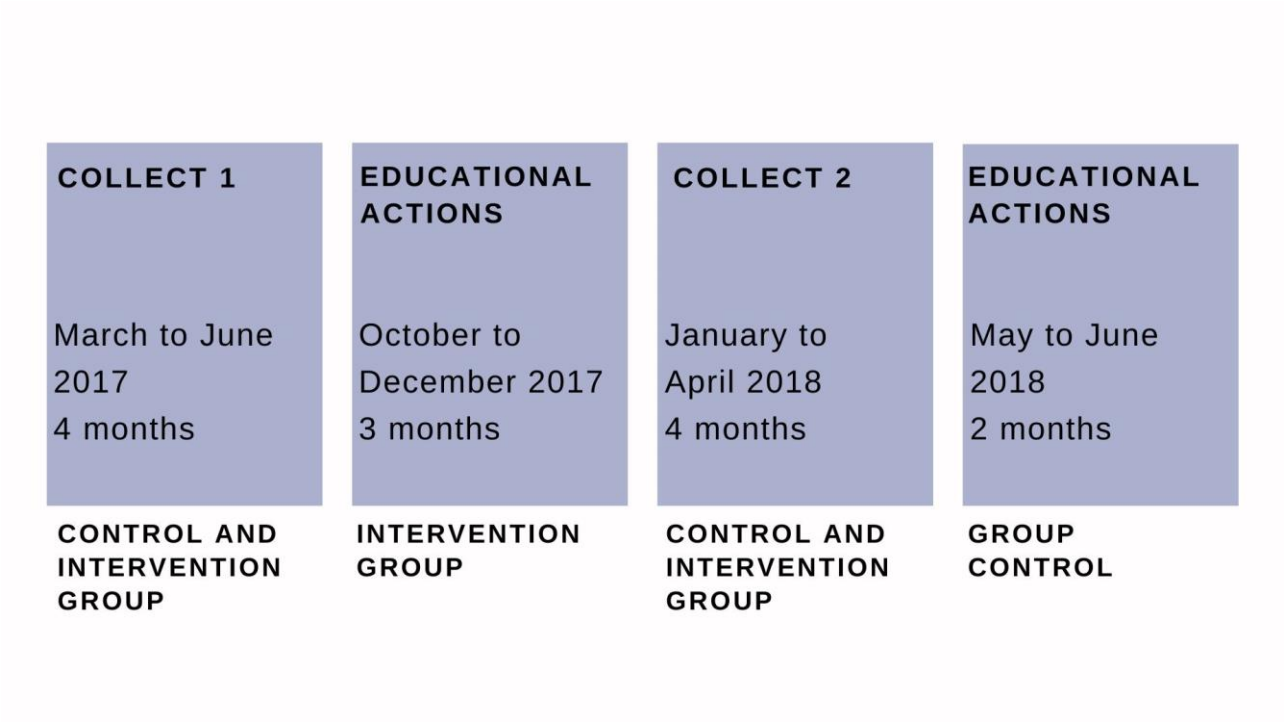
Participants were recruited based on the Brazilian platform Nilo Peçanha, which estimated about 4,112 individuals linked to the institution in 2017. The sample size was calculated according to the objectives and design of the larger study. Therefore, according to a systematic review conducted with individuals undergoing Mobile Health (mHealth) interventions, the sample ranged from 28 to 372 participants.[3]

To participate in the research, an invitation letter was sent by e-mail by the marketing team of the educational institution to students and civil servants, who were also contacted in the campus courtyard through banner exposure, face to face invitation to the project researchers. and a post on the campus page on the Facebook® social network about the survey. In case of interest, participants were scheduled to use text messages, email or telephone.

Eligible for the study were all employees and students linked to the institution, aged 20 to 59 years old, and who agreed to participate by signing the Informed consent. Pregnant women and individuals with cognitive and physical limitations that compromised data collection were excluded from the study.

For a better understanding of the study chronology, figure 1 was available with a flow chart of the activities carried out. The total duration of the study was 16 months.

Figure 1. Timeline of the intervention study. Study AvaliaSal, Vitória-ES, 2018.



The data collection took place in two moments, in which the participants were invited to come to a room in the institution for data collection. All study data were collected by previously trained researchers. The first data collection took place between March and June 2017. Then, randomization by conglomerate was carried out in two levels of categories: sex (female and male) and age group (<40 years or ≥ 40 years), and two groups were established: Intervention (IG) and Control (CG). The socioeconomic, health, dietary and lifestyle habits variables were obtained through a questionnaire structured by the researchers. The race / color was self-reported by the participant and categorized as "white" and "non-white" (brown, black, yellow and indigenous). Schooling was categorized into "Elementary / High School" and "Higher Education / Postgraduate". For the socioeconomic classification of the participants, the criteria of the ABEP - 2015 (Brazilian Association of Research Companies) were adopted.[9]

To measure anthropometric data, the Tanita® digital scale (BF-680W) with a capacity of 136 kg and precision of 100 g was used to measure body weight. Height was measured on a Cardiomed® stadiometer, with an amplitude of 200 cm and an accuracy of 1 mm. The individual should be in a supine position, barefoot, with a fixed gaze ahead.[10] Weight and height were used to calculate the body mass index (BMI), with the value of body weight (in kg) divided by height raised to the second power (m^2). According to the BMI value, participants were classified as eutrophic (<25.0 kg / m^2) and overweight (≥ 25 kg / m^2).[11]

Process of construction and development of educational actions via Mobile Health

For the planning of educational actions, specialist nutritionists and students of Nutrition from the Federal University of Espírito Santo (UFES) were invited to hold two creative workshops lasting eight hours, in which the theme "Changing behavior in relation to salt consumption and healthy lifestyle". The Food Guide for the Brazilian Population [12] and the Reference Framework for Food and Nutrition Education for Public Policies were used to elaborate the messages and videos.[13]

The preparation of the materials took place from June to November 2017. The educational actions were carried out using the mhealth strategy, using the tools: text messages, interactive messages, email, and videos.

A total of 21 messages and three videos based on health education were prepared and focused on reducing sodium consumption and changing behavior in relation to salt consumption. Thus, the following themes were adopted in a chronological process: salt consumption in general and the importance of reducing salt / sodium in the diet, information on easy, fast and viable alternatives to reduce salt consumption, practical procedures to reduce the gradually adding salt to the diet, curiosities through the presentation of myths and facts about the consumption of salt / sodium and information about foods that contain a high salt / sodium content (Table 1).

Table 1. Description of the content of educational actions via mHealth. Study AvaliaSal, Vitória (ES), 2018.

Week	Educational Actions	Objective
1	Message: Did you know that sweet, processed foods and light and diet versions contain sodium?	Warn that diet and light foods also contain sodium.
	Message: Did you know that the Brazilian consumes twice as much salt as is recommended?	Understand about the recommendation of salt consumption.
2	Message: Did you know that excessive sodium consumption increases the risk of cardiovascular diseases, such as high blood pressure and its complications?	Inform that excessive consumption of salt increases the risk of disease.
	Message: Did you know that soft drinks and processed juices are similar in terms of the amount of sugar and calories?	Show alternative natural options instead of consuming industrialized drinks.
3	Message: Ingredients and nutritional composition of Healthy Muffin.	Healthy Muffin recipe, alternative to minimize the consumption of sweets.
4	Message: The use of natural herbal salt can contribute to reducing the daily consumption of salt. How about replacing industrialized seasoning with natural seasoning?	Show the existence of strategies to reduce salt consumption.
	Message: Six steps to reduce salt consumption gradually.	Show that it is possible to reduce salt consumption.
5	Message: Recipe for herbal salt and herbal sauce.	Alternatives to reduce salt consumption and tips on food combinations.
	Message: 5g of salt is equivalent to a shallow teaspoon. What already includes the salt present in processed foods and added to meals. This amount meets the body's daily needs.	Show where the sodium is and emphasize the recommendation of its consumption.
6	Message: Myth: Cereal bar is a great option for a small snack. Fact: cereal bar contains 10 additives, plus little fiber.	Warn about the presence of various food additives present in cereal bars.
	Message: Did you know that dried fruits also contain sodium? Many people do not know, but some dried fruits contain sodium naturally, as is the case with prunes, dried grapes, dried figs and dried apricots.	Warn that dried fruits also contain sodium.

Table 1. Description of the content of educational actions via mHealth. Study AvaliaSal, Vitória (ES), 2018. (Continues)

Week	Educational Actions	Objective
7	Message: Myth: Cream crackers and water and salt are good substitutes for French bread. Fact: French bread has no hydrogenated fat (trans fat) in its composition. Cream crackers and water and salt are rich in this substance, in addition to having more preservatives and more sodium.	Alert about the presence of food preservatives and sodium present in cookies.
	Message: Myth: Ready-made sauce is harmless. Fact: Ready-made sauce contains about 10 additives.	Warn about the presence of chemical additives present in industrialized sauces.
8	Message: Did you know that seasoning foods with herbs, onions, garlic and natural broths does not require the use of more salt, as they already add flavor to the food?	Alternatives such as the use of natural spices: herbs, onions, garlic and natural broths.
	Message: Myth: Cooking is time consuming and laborious. Fact: Preparing food at home can be more economical, enjoyable and healthier.	Encourage the preparation of meals at home.
9	Message: Animal foods (meat, milk and eggs) already contain sodium. When industrialized they increase their content even more.	Inform that foods of animal origin when processed increase the sodium content even more.
	Message: List of food products that contain more salt.	Message: List of food products that contain more salt.
10	Message: Consuming up to 5 grams of salt a day helps to maintain and blood pressure at normal levels, decreasing the risks of heart attacks and strokes.	Inform that consuming up to 5g will help maintain adequate pressure.
	Message: Virtually all foods have some amount of sodium. It is important to consider that of the 5g of salt recommended daily for consumption, about 2g of salt is naturally present in food. The remaining 3g can be added during food preparation.	Understand that about 2g of salt is naturally present in food and that the remaining 3g can be added during food preparation.
11	Message: Did you know that excessive consumption of salt and sodium contributes to the development of diseases?	Warn about excessive salt consumption.
	Message: Are salt and sodium the same thing? No. Sodium is one of the components of salt. However, the main source of food is sodium chloride, better known as table salt.	Clarify the main difference between sodium and table salt.
12	Video: Healthy Eating.	Show six tips on healthy eating to stay on the diet.

Participants were given two options to choose from to receive messages and videos: by WhatsApp® application or email. The educational actions were carried out from October to December 2017 with the intervention group, and only after the second collection was carried out (May to June / 2018) with the control group.

Evaluation of educational actions via Mobile Health from the point of view of the recipient

The second collection, between January and April 2018, reevaluated the parameters obtained in the first collection. In addition, a structured questionnaire was applied with questions addressed to the two allocation groups, among which: “By what means of communication did you receive the nutritional guidelines?”. The answers were later categorized into Technological means and friends / family / health professionals and "What guidance was followed?". The responses were categorized according to their relationship with healthy eating or if associated with the adoption of “fad diets”. Still, in order to assess the perception of the IG regarding the messages / videos received, as well as the methodology used, other questions were asked, such as: “Were the messages of the project useful?”; “Did they help you make healthy food choices?”; “Did the messages show clarity?”; and “Did you follow any of the proposed suggestions?”.

One month before the end of the second data collection, aiming at greater participation by the participants, an interview was made available via telephone and / or via google forms (online) to obtain the information from the questionnaire. For these participants, the researchers made contact to schedule the collection of anthropometric data (weight, height, and BMI) at the educational institution.

In the statistical analysis, for categorical variables, the Chi-square and Fisher's Exact tests were applied, and for Student's continuous t tests or Mann-Whitney test, according to the sample design. All analyzes were performed with the help of SPSS (Statistical Package for the Social Sciences), version 23. For all analyzes, the level of significance adopted was 5%.

This study was approved by the Research Ethics Committee of the Health Sciences Center of the Federal University of Espírito Santo, under number 1.789.812/2016, registered with the World Health Organization under UTN - U111112146330, and in the Brazilian Registry of Trials Clinicians under number RBR-9s6jpc. All study participants signed the Informed consent.

RESULTS

Of the 200 participants recruited, 155 (77.5%) performed the second collection, 74 from the intervention group (47.7%) and 81 from the control group (52.3%). Of the 45 participants who did not attend the second collection, the reasons were: not answering the phone / changing the phone number (n = 11); considered dropouts after three attempts to return (n = 28) and dropout (n = 6).

The messages and videos were sent to the participants weekly, two messages a week over a period of three months for the intervention group, and two months for the control group, containing the same type and content.

In addition, the messages were sent through two communication channels (WhatsApp® or e-mail), that is, it was adapted to the best way to receive educational actions for the participant. In this way, a rapprochement between participants and researchers was established from the beginning of the intervention, probably enabling a relationship of greater commitment and trust in research. This strategy may also have contributed to greater interaction, as the participants had the opportunity to clarify their doubts and request more information about the issues addressed.

Table 1 shows the characteristics of the participants according to the allocation group in the baseline. There were no statistically significant differences between groups for any of the sociodemographic, health and anthropometric variables.

Table 1. Distribution of participants, according to allocation group, in the line of base. Study AvaliaSal, Vitória-ES, 2018.

VARIABLES	Intervention n =74		Control n = 81		Value of p
	n	%	n	%	
Sex					0.628
Male	33	(50.0)	33	(50.0)	
Female	41	(46.1)	48	(53.9)	
Education					0.480
Elementary / High School	38	(50.7)	37	(49.3)	
Higher education / Postgraduate	36	(45.0)	44	(55.0)	
Race / color					0.818
White	37	(46.8)	42	(53.2)	
Not white	37	(48.7)	39	(51.3)	
Socioeconomic class					0.356
A	27	(45.8)	32	(54.2)	
B	35	(45.5)	42	(54.5)	
C	12	(63.2)	7	(36.8)	
Use of industrialized condiments					0.779
Yes	50	(48.5)	53	(51.5)	
No	24	(46.2)	28	(53.8)	
Use of natural spices					0,226*
Yes	72	(47.1)	81	(52.9)	
No	2	(100)	0	(0.0)	

VARIABLES	Mean ± SD	Mean ± SD	Value of p
Age years	33.8±11.4	34.5±11.9	0.647**
Weight (kg)	72.7±14.9	68.9±12.6	0.106**
BMI (kg / m^2)	25.5±4.6	24.1±4.3	0.067

* Chi-square test or Fisher's exact test;
** Student t-test or Mann-Whitney. BMI: body mass index. n = 155.

In Table 2, it can be seen that the IG participants had greater access to dietary guidance in the last six months (p <0.001), reported greater follow-up of nutritional guidelines (p = 0.046), and 67.6% received information by technological means. The intervention group also showed a positive response of around 60% for changing healthy habits, while in the CG, a higher percentage referred to changes that suggest the adoption of "fad diets" (58.3%).

Table 2. Variables related to the participants' percption of actions educational activities, according to allocation group. Study AvaliaSal, Vitória-ES, 2018.

VARIABLES	Intervention n = 74		Control n = 81		Value of p
	n	%	n	%	
Had access to guidance on feeding in the last 6 months					0.001
Yes	41	(63.1)	24	(36.9)	
No	33	(36.7)	57	(63.3)	
(If yes) What was the means of Communication?					0.270
Technological means	25	(67.6)	12	(32.4)	
Friends / family / Health professionals	14	(53.8)	12	(46.2)	
Followed some of these guidelines received					0.046**
Yes	26	(55.3)	21	(44.7)	
No	15	(83.3)	3	(16.7)	
(If yes) What guidance?					0.270
Changing habits Healthy	21	(60.0)	14	(40.0)	
Fashionable diets	5	(41.7)	8	(58.3)	

* Chi-square test; ** Fisher's exact test. n = 155.

Table 3 shows the evaluation of educational actions via mHealth, according to the perception of individuals in the IG, according to gender. Among women, 73.2% reported that the messages sent by the project were useful; 48.8% said they helped to make healthy food choices; 80.5%, that the messages were clear; and 53.7% reported that they followed some of the proposed suggestions. In males, 57.6% reported that the messages sent by the project were useful; 51.5%, who helped to make healthy food choices; 60.6%, that the messages were clear; and 39.4% reported following some of the proposed suggestions.

Table 3. Evaluation of educational actions via mHealth, according to sex, in the group intervention. Study AvaliaSal, Vitória-ES, 2018.

VARIABLES	Male n = 33		Feminine n = 41		Total n = 74	
	n	%	n	%	n	%
Useful messages	19	(57.6)	30	(73.2)	49	(66.2)
Contributed to make healthier food choices	17	(51.5)	20	(48.8)	37	(50.0)
Clear messages and lenses	20	(60.6)	33	(80.5)	53	(71.6)
Followed any of the proposed suggestions	13	(39.4)	22	(53.7)	35	(47.3)

DISCUSSION

In general, the messages and videos containing information about food received by the participants were obtained by technological means and, according to the point of view of the recipient, were clear, objective, and useful. The greater access to information through technological means is justified by the exponential increase in the use of mobile devices worldwide, which has already exceeded 2.2 billion global mobile phone subscriptions.[6] In addition, such a result was already expected, because the methodology used in the present study aimed at the use of technological means.

Technological means can make a difference in people's lives as they often serve as content aggregators. On the one hand, technological evolution has contributed to the burden of chronic diseases, but on the other hand, it can be an ally in promoting healthy behaviors.[14] However, research aimed at changing eating behavior, especially focused on sodium reduction, using mHealth, is still scarce in the literature. Public health interventions, which highlight the need to incorporate healthy lifestyle habits,[15] they are the trigger for the introduction of the mHealth strategy in health care for populations. Food and nutrition education can become effectively useful for individuals, enabling the awakening of critical awareness and autonomy for healthier eating practices, resulting in changes in lifestyle through educational actions via mHealth.[15-17]

The IG showed a positive response to change healthy habits, while the highest percentage of the control group was related to following suggestions for the adoption of "fad diets". Although the CG was not asked about the characteristics of such diets, it is possible that they are based on the restriction of specific foods or nutrients to lose body weight.

In turn, it is worrisome that such diets do not follow basic nutrition precepts, including nutritional assessment, individualized recommendations and adequate dietary technique, which are fundamental for the success of nutritional treatment.[18] Therefore, the importance of using educational actions based on scientific knowledge and healthy practices for health promotion is emphasized. It is suggested that the changes found may be the result of messages and videos having been clear and easy to understand, as reported by most of the participants in the IG.

The studied sample showed positive responses regarding compliance with the guidelines sent via technological means, which may result in changes in behaviors related to food and health.

This study is a pioneer in carrying out educational health actions via the mHealth strategy, from the sending of messages and videos, carried out in the state of Espírito Santo in adults, with a focus on reducing sodium consumption and changing salt-related behaviors. Thus, health intervention performed by mobile devices is an innovative, low-cost, well-accepted technology that can be easily reproduced in other populations and social groups.

One of the limitations of this study was the intervention period, as changes in behaviors related to food are complex and take time to establish. Although the content covered was broad and diverse, the intervention lasted three months. It is noteworthy, however, that the focus of the study was to describe the process of construction and development of educational actions via mhealth and evaluate the perception of the recipient, demonstrating, therefore, that the time for completion was satisfactory.

It should be noted that the sample studied is not representative of the Brazilian population, as they are students and civil servants belonging to an educational institution in Vitória-ES. On the other hand, the present study contributed to a better understanding of the use of innovative and easily applied technologies in the health education process.

CONCLUSION

Educational actions via mHealth were well accepted by the participants due to their usefulness, but especially for the clarity of the messages, resulting in a change in some behaviors related to food and health. Therefore, this proposal can be identified as an alternative to carry out health interventions, since it is easy to apply and because it is a low-cost strategy. Its effectiveness, however, still needs to be assessed in more detail with a focus on changing healthy eating behavior.

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Colaboradoras

Teixeira ILRD and Costa RT participated in the analysis, data interpretation and writing of the article. Martins HX and Porto AS participated in the interpretation of the data and critical review of the article. Molina MCB participated in the study design, data interpretation and critical review of the article.

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