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EDUCATION AND TRAINING REGARDING BENEFICIAL PROPERTIES OF KIMCHI'S PROBIOTICS AS AN EFFORT TO INCREASE HEALTH WORKERS' KNOWLEDGE

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ABSTRACT

Introduction: Kimchi is a traditional Korean dish made by fermenting various kinds of vegetables with lactic acid bacteria, such as *Lactobacillus* sp. and *Leuconostoc* sp. These micro bacteria can serve as a probiotic that can exert the human immune system. This knowledge is essential for a global society, including health professionals. The aim of this education and training activity is to increase health workers' knowledge about kimchi, probiotics, and their role so that they can conduct further research and educate their patients and also the larger community.

Methods: This education and training is carried out using lecture-based talks, with interactive communication. The audience is 25 nurses as health workers at Sultan Agung Islamic Hospital. Pre-post test questionnaire was used to evaluate participants' knowledge about probiotics and Kimchi.

Results: Before the education and training activity was carried out, a pre-test of Kimchi Knowledge revealed that 84% of the participants had good knowledge. After the education and training activity was done, the results showed an increase in knowledge where 96% of the participants had good knowledge ($p=0,018$). The results of the pre-test of Probiotic Knowledge revealed that 68% of the participants had good knowledge. After the education and training activity was done, the results showed an increase in knowledge where 84% of the participants had good knowledge ($p=0,001$)

Conclusion: Education and Training regarding the beneficial properties of Kimchi, probiotics, and their role can increase health workers' knowledge so that they can use it as a starting point to develop new studies and educate the larger community

KEYWORDS

health education; health training; immune system; kimchi; probiotic

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1. INTRODUCTION

Probiotics are living micro bacteria that offer several beneficial effects on human health. During the past years, probiotics have been used in many ways to modulate the immune system (Stavropoulou & Bezirtzoglou, 2020). Kimchi is traditional Korean food made by fermenting vegetables with lactic acid bacteria including *Leuconostoc*, *Weissella*, and

Lactobacillus (Sohn et al., 2020). Kimchi's popularity is now increasing worldwide, proven by its high demand in many supermarkets and retail stores. Despite the massive information generated by commercial enterprises about the benefit of kimchi as a probiotic-rich side dish, health professionals need to filter and understand the mechanism deeper from

reliable sources (Hasosah et al., 2021; Vecchione et al., 2018).

According to the study by Dewi et.al, the lack of knowledge about the role of microorganisms in the immune system contributes to low probiotics consumption in Indonesia (Dewi, Atifah, Farma, Yuniarti, & Fadhilla, 2021). Furthermore, Fijan et. al revealed that health professionals generally have a medium level of probiotic knowledge (Fijan et al., 2019).

Nurses are health workers who intensively interact with patients, so nurses must be equipped with adequate knowledge to educate patients and their families. Nurses should have the ability to provide health education on preventive, promotive, curative, and rehabilitative efforts (Fajriyanti, Nurmalia, & Hargono, 2020). Probiotics are well-known food with many health benefits, especially in improving the immune system of ill patients. Kimchi is chosen because it is now one of the most widespread and popular foods in Indonesia (Herdian, 2019).

Based on a preliminary study of 25 nurses in Sultan Agung Islamic Hospital, through an interview, 18 out of 25 nurses (72%) were still lacking knowledge about the role of probiotics on the immune system and various clinical conditions. The solution to the problem is to conduct community service programs in the form of education and training nurses as health workers'. This education and training activity is aimed to improve health workers' knowledge about probiotics and their beneficial effects on human health so that they can adopt them in clinical practice and plan further research.

2. MATERIAL AND METHODS

This education and training activity was carried out on 5th November 2022 at Sultan Agung Islamic Hospital. The method used in this program was conducting pre-post-test surveys, educating, and

demonstrating Kimchi as a probiotic-rich food. This method was chosen because it is an effective learning approach for professional development. PowerPoint presentations, kimchi samples as props, and questionnaires were the media used in this education and training activity.

The pre-post-test surveys included probiotics and kimchi consumption, probiotics' role in human health knowledge, and the probiotic-making process. They were done before and after education. The total scores of the questionnaire were calculated and compared between the pre and post-test. The educational method used was lecture-based and talks, namely providing knowledge with interactive communication. The subjects presented were divided into 2 parts: basic probiotics information and advanced probiotics' role in human health for health professionals.

Basic probiotics information elaborated on probiotics' health function in general. It consisted of the definition and source of probiotics, the type of bacteria used in probiotics food, and the introduction of kimchi as a globally known probiotic-rich food.

Advanced subjects specifically discussed Kimchi probiotics' role in the immune system and their beneficial effect on certain clinical conditions. Moreover, in this session, the team also encouraged participants to conduct more research on probiotics and opened up the discussion of which theme or fields are able to be a research idea / question.

At the end of the presentation, the team provides a question-and-answer session to allow audiences to ask questions to the speakers. This session was in the form of an interactive discussion where the participants could share their experiences and ask directly the speakers.

3. RESULTS

Education and training activity was done on 5th November 2022. A total of 25 nurses from various

Table 1. Demographic Information

Characteristics	(n)	%
Gender		
Male	5	20
Female	20	80
Age		
30 – 40 year-old	17	68
>40 year old	8	32
Department		
Inpatient	9	36
Hemodialysis	3	12
Cardiac Intensive Care	1	4
Policlinic	1	4
Eye Center	1	4
Infection Control	8	32
Pediatric Intensive Care	2	8

Table 2. Kimchi and Probiotics Consumption Survey

Department	(n)	%
Kimchi Consumption		
Never tried	20	80
Already tried	5	20
Probiotics (other than kimchi consumption)		
Never tried	8	32
Already tried	17	68

Table 3. Result of the Pre-Test and Post-Test

Variables	Pre-test (n)%	Post-Test (n)%	p
Kimchi Knowledge			0.018
Good	21(84)	24(96)	
Poor	4(16)	1(4)	
Probiotic Knowledge			0.001
Good	17(68)	21(84)	
Poor	8(32)	4(16)	



Figure 1. Education and Training Activity



Figure 2. Question-and-Answer Session

departments of Sultan Agung Islamic University attended this education and training activity.

Before the education and training activity was carried out, a survey related to Kimchi and probiotic consumption was done. The results of the survey revealed that 20 participants (80%) never tried kimchi, and 8 of them (32%) never tried any kind of

probiotics before (Table 2). After discussing the main problem from the survey, the team planned the suitable method to solve the problem.

The education and training activity was done using direct learning in the form of lectures, educational videos, and a question-and-answer session (Figure 1 and 2). This education and training

activity was evaluated using a questionnaire to explore aspects of the participants' knowledge and experience related to Kimchi and probiotics. Questionnaires were given before and after the education and training activity (pre and post-test) to evaluate knowledge related to Kimchi, Probiotics, and their role.

The results of the pre-test of Kimchi Knowledge revealed that 84% of the participants had good knowledge. After the education and training activity was done, they were evaluated using a post-test, and the results showed an increase in knowledge where 96% of the participants had good knowledge ($p=0,018$). The results of the pre-test of Probiotic Knowledge revealed that 68% of the participants had good knowledge. After the education and training activity was done, they were evaluated using a post-test, and the results showed an increase in knowledge where 84% of the participants had good knowledge ($p=0,001$) (Table 3).

At the end of the education and training activity, a question-and-answer session was carried out. There were some participants who asked some questions related to the beneficial effect of kimchi in certain clinical conditions. The side effect of Kimchi is also asked. All questions are answered using data from the previous study collected by the team.

4. DISCUSSION

Probiotics are living microorganisms that can exert many health benefits to the host. They have been used in various food products, such as milk, yogurt, ice cream, dietary supplements, cheese, and kimchi (Wang et al., 2020). Market demand for probiotic-containing food is expanding globally in line with the campaign for a healthy life style (Sohn et al., 2020). Most probiotics are lactic acid bacteria that belong to *Lactobacillus sp* family. Or *Bifidobacterium sp*. Furthermore, some strains like *Propionibacterium sp*. And *Bacillus sp*. Also reported to have probiotic properties (Lehtoranta, Latvala, & Lehtinen, 2020). Microbes should be non-virulent and non-pathogenic

to humans to be able to be applied as probiotics. They also have to survive in the digestive environment of the intestinal tract due to its low pH and high concentration of bile salts (Kim, Yang, & Paik, 2021).

Kimchi is traditional Korean food manufactured naturally by fermenting vegetables such as cabbage, radish, cucumber, or carrot added with salt and spices. It's also growing in popularity worldwide, where both spices and preserved products are sold in many supermarkets and retail stores. The raw ingredients play a pivotal role in becoming the bacterial culture media. Since it's fermented via lactic acid bacteria, it is regarded as one of the best side dishes to deliver probiotics (Seo et al., 2021). Previous studies revealed that the microbial composition of kimchi is affected by the vegetables and other ingredients used (Zabat, Sano, Cabral, Wurster, & Belenky, 2018). Major lactic acid bacteria used to make Kimchi include *Lactobacillus sp*, *Leuconostoc sp*, *Lactococcus sp*, and *Pediococcus sp* (Kim et al., 2021).

Consumption of probiotics in sufficient amounts and frequency can accelerate natural ways of immunity. Probiotics act through many mechanisms, such as toxin degradation, antimicrobial component production, competition with pathogens for nutrients or adhesion sites, and stimulation of the immune system (Yoon et al., 2022). Furthermore, some studies also demonstrated that Kimchi also has anti-obesity and anti-atherogenic mechanisms, indicating that kimchi is good to be consumed by metabolic syndrome patients with high Reactive Oxygen Species (ROS) with weak immune system (Choi et al., 2013). Meanwhile, for healthy people, a systematic review conducted by Barkhidarian et.al showed that the intake of probiotics may result in improvements in vitamin B12, vitamin B9, calcium, zinc, and iron status (Barkhidarian, Roldos, Iskandar, Saedisomeolia, & Kubow, 2021). Probiotics and kimchi are generally safe, but there is still little research that discusses or evaluates the risk and safety of certain probiotics in

specific. This can be a good clinical question and idea for health professionals to explore and conduct further research (Doron & Snyderman, 2015; Zawistowska-Rojek & Tyski, 2018).

Despite the globally distributed and proven health properties, knowledge about kimchi and probiotics still needs to be distributed to global society, including health professionals. Health professionals also have duties in promoting a healthy lifestyle and preventing patients and society from being ill. Health professionals will be able to transfer knowledge and provide proper information related to kimchi, probiotics, and their role in society. Education and training activity was chosen among nurses as health workers in Sultan Agung Islamic Hospital because health workers may be likely to gain new knowledge using applied methods, such as interactive discussion, practical simulations, and also reflection of real-life experiences (World Health Organization, 2016). Hence, a direct influence of the outcome has been found to be a significant correlation with the application of dietary behavior and reduced risk of illness globally (Rahmah, Khairani, Atik, Arisanti, & Fatimah, 2021).

The result of the post-test survey is in line with the aim of this education and training activity, to improve health workers' knowledge about kimchi, probiotics, and their role in health so that it can be a starting point for them to develop new studies or prepare before sharing with patients and the larger community. Further study or advanced training for other health professionals is needed to obtain the main goal of this education and training activity: to improve human health.

5. CONCLUSION

Education and Training regarding the beneficial properties of Kimchi, probiotics, and their role can increase health workers' knowledge so that they can provide adequate information and use it as a starting point to develop new studies and educate the larger community.

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