

Knowledge and Consumption of Probiotic Foods of Selected Students in Laguna, Philippines

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Abstract

Despite of increasing interest and research regarding the benefits of probiotics to human health, limited studies were reported on the knowledge on probiotics and the probiotic food consumption among young adults in the Philippines. Cross-sectional study was carried out to determine the level of probiotic knowledge and the amount and frequency of probiotic consumption. Results showed that the average score on the probiotic knowledge of the 364 responded was high (6.6605/8). On the other hand, the students consumed probiotics mostly from dairy products. However, less than 100 grams of probiotic products was included in their diet and consume them less frequently. Probiotic knowledge was not associated to consumption of probiotic foods at $p < 0.01$. The study also revealed that the major sources of information of probiotics of the participants were television, family/relatives and school. Therefore, educational strategies and media campaign can be an intervention to promote the beneficial effects of probiotics to human health and to increase the human consumption.

Keywords: Probiotics; Knowledge; Consumption; Benefits of Probiotics

Introduction

Probiotics and its beneficial effect to human health

Probiotics are microorganisms when consumed are helpful to improve one's well-being [1]. Although, there are many interpretations on the definition of probiotics, FAO/WHO defines probiotics as live microorganisms that can survive in gastrointestinal tract to supply healthful effects to the host when being consumed in adequate amounts [2]. Progressive interest in probiotics globally has been observed for the past years for its potential impact on probiotic food products on human health [3]. Addition of probiotics in diet improves host's gastrointestinal mucosa and immune system [4]. Also, recent studies concluded that incorporation of probiotics in food intake of hypercholesterolemic mice had significantly decreased in total serum cholesterol and triglycerides [5], as well as lowering the glucose and insulin level in pre-clinical setting and human trials [6] compared to control. However, despite of the evidences on the beneficial effects of probiotics when consumed, lack of knowledge has been observed among young adults across the world [7,8].

Consumption of probiotics

Adolescents tend to be more aware on the term of probiotics compared to adult respondents in the study conducted in India. It was also revealed that 80% of the respondents believe that consumption of probiotic products will provide health benefits to the host. Due to increased awareness of the consumers on optimizing their health through food, it was also observed in the survey conducted that

probiotic food products such as curd and yogurt are part of the daily and weekly diet among all the age groups in India, as well as their occasional consumption of cheese and commercially fermented milk like *yakult* [9]. Furthermore, students from the Namik Kemal University were the respondents of a study on assessing the probiotic consumption in Turkey. Based on the result, there was a relationship observed in the perception of the students on probiotics and their level of consuming products containing it. 38.5% of the students do not consume probiotic products because they believe that there will be no health beneficial effects in their body when they include them in their diet and 11.2% of them believe that these products are harmful, while 18.2% of the participants know that including probiotics in their diet is healthy, but too expensive [10]. The same study was conducted in Isparta Suleymen Demirel University by Aydin, *et al* [11]. The research shows that students, 51.2% of the respondents consume probiotic because they benefited from these products.

Low consumption of probiotics has been identified in spite of commercially available probiotic products like fermented milk drink and yogurt. Also, there is production of fermented vegetables, fruits, cheese, fish and fishery products, fermented meat products and rice, cassava, sugar cane and soya in each region of the country which contain probiotics [12]. The probiotic household expenditure such as probiotic supplements, yogurt and sour milk consumption in the Philippines was only 3 US dollars which ranked as the third lowest probiotic consuming country in Asia Pacific region [13].

Aim of the Study

In this regard, the study generally aimed to determine the knowledge on probiotics and consumption of probiotic foods of selected college students in Laguna, Philippines.

Methodology

Data collection

A cross-sectional study was conducted among the college students enrolled in three selected tertiary schools in Laguna, Philippines. Schools were located in Los Baños, Calamba and Siniloan, Laguna and were coded as School X, School Y and School Z, respectively. The inclusion criterion required was college students currently enrolled in School X, School Z and School Y during 2nd semester-SY 2017 - 2018, who signed the informed written consent as part of the initial agreement. Those students included in the sample list that were willing and eligible to participate became the respondents in this study. Out of the 366 sampled students from a private college school and two state universities, 364 students responded voluntarily with a response rate of 99.45%. The students were asked to complete a self-administered questionnaire composed of two parts: knowledge on probiotics and semi-quantitative food frequency on probiotic questionnaire. Descriptive statistics was used to describe the data while Fisher's exact test was utilized to determine the association among the level of knowledge and consumption of probiotics of the respondents.

Ethical consideration

The research was non-invasive which did not include vulnerable population and a preliminary study, therefore upon following initial agreement, informed written consent was obtained to each participant as who was willing and eligible to be a part of the survey. Codes were given to each respondents. All identities of the participants were kept in pure confidentiality.

Results and Discussion

Probiotic knowledge

It was revealed that among the three hundred sixty-four (364) participants in the study, majority of the college students in selected schools in Laguna (88.19%) were aware on the term probiotics. Three hundred thirty-two (332) students (91.81%) were aware that they consume food items with probiotics. Moreover, 75.55% of them correctly identified the constituents of probiotics are living

microorganisms. It was also observed in the survey that students (80.77%) have positive belief that probiotics can improve one’s over all well-being. In the same study conducted in Turkey, it was concluded that most college students in Namik Kemal University were aware on functional food containing probiotics [10]. Also, in a recent study in Selcuk University, high awareness on probiotics was identified among the students in the university, however half of their respondents mentioned that they were not aware on the correct composition of probiotic food item [14].

Based on the result, the respondents (81.04%) knew that probiotics were safe for consumption. The same outcome was observed in the survey done by Thirunavakarasu [15], 80% of the respondents believed that probiotics are safe. In connection to this, most of the respondents from the three schools believed that probiotics can improve food digestion (89.84%) and can increase immune function (78.30%). The top 2 answers of the students on the benefits of probiotics were proven and already well documented in several studies [16]. Immunomodulation includes harmonization of immune response and prevention of respiratory diseases. Improvement of digestive process, performance, colonization of resistance, and suppression of pathogens are beneficial effects of the changes in intestinal microbiota. However, despite of the enumerated benefits of the probiotics, most of the students did not use probiotics as treatment for health conditions. This might be due to the areas of uncertainties on the use of probiotics as pharmaceutical product because there were still lack of sufficient evidences on the effects and mechanism of actions of probiotics in human body [17].

Also, in the survey conducted, it was mentioned by most of the students that they believe that probiotic foods were best consumed through food and drinks (78.85%). Dairy products are considered as the most common source of dietary probiotic supplements. Furthermore, most recent studies also incorporated dietary probiotics with non-dairy fermented food products as cited in the review of Kerry, *et al* [8]. In relation to this conclusion, the respondents (88.74%) believed that that dairy products were source of probiotics. However, non-probiotic food source like meat (28.85%), cereals/wheat (60.16%), fruits/vegetables (59.07%) and sweet (34.34%) were also included in the answers of the respondents. In contrast to the result, fermented food products which are known as one of the major source of probiotic food, only 44.51% of the students identified it correctly. Table 1 summarizes the knowledge on probiotics of the college students enrolled in three selected schools in Laguna.

Questions	Response
1. Are you aware of the term probiotics?	
A. Yes	321 (88.19%)
B. No	43 (11.81%)
2. Do you consume food products with probiotics?	
A. Yes	332 (91.21%)
B. No	32 (8.79%)
3. What do you think are the constituents of probiotics?	
A. Live microorganisms	275 (75.55%)
B. Synthesized drugs	6 (1.65%)
C. Chemical found in food	23 (6.32%)
D. Do not know	60 (16.48%)
4. Do you think probiotic improve your health?	
A. Yes	294 (80.77%)
B. No	3 (.82%)
C. Do not know	67 (18.41%)

5. Do you think the following health benefits enumerated below can be taken from consuming probiotics?	Yes	No
Decreased risk of hypertension	186 (51.1%)	178 (48.9%)
Decreased risk of diabetes	181 (49.73%)	183 (50.27%)
Increased immune function	285 (78.3%)	79 (21.7%)
Improve food digestion	327 (89.84%)	37 (10.16%)
5. Do you think the following health benefits enumerated below can be taken from consuming probiotics?	Yes	No
Improve oral health	242 (66.48%)	122 (33.52%)
6. Do you think the enumerated products are source of probiotics?	Yes	No
Dairy products	323 (88.74%)	41 (11.26%)
Fermented food	162 (44.51%)	202 (55.49%)
Meat sources	105 (28.85%)	259 (71.15%)
Cereals/Wheat	219 (60.16%)	145 (39.84%)
Fruits and Vegetables	215 (59.07%)	149 (40.93%)
Sweet	125 (34.34%)	239 (65.66%)
8. Do you think probiotics are safe?		
A. Yes	295 (81.04%)	
B. No	3 (.82%)	
C. Do not know	66 (18.13%)	
9. It is better to consume probiotics from?		
A. Food and drinks	287 (78.85%)	
B. Supplements	23 (6.32%)	
C. Do not know	54 (14.84%)	
10. Have you used probiotics as therapeutic drug for?	Yes	No
Gastrointestinal condition	120 (32.97%)	244 (67.03%)
Autoimmune condition	69 (18.96%)	295 (81.04%)
Respiratory condition	66 (18.13%)	298 (81.87%)
Oral health condition	76 (20.88%)	288 (79.12%)

Table 1: Knowledge on probiotics of college students (n = 364).

The level of the knowledge on probiotics of the students were identified based on their answers on the survey about probiotics. Overall, the 364 respondents have a mean knowledge score of 6.1605 points (eight points as perfect score) which was considered as good level of knowledge on probiotics.

In terms of the top three source of information on probiotics, respondents gathered their first information on probiotics (Figure 1) through television (37.56%), family or relatives (16.48%) and school (14.84%). This information mostly came from the product advertisement in the television. According to the annual report of a well-known producer of probiotic product in the Philippines, television commercial has been a part of their strategies in promoting their products. The company will continue to use intensive TV commercials to strengthen their marketing and sales strategy due to the positive feedback on their revenue. The company’s total selling, general and administrative expenses was amounted to 1,595,931 US dollars [18]. Also, a study in Kuwait showed that the main source of the information on natural health products, in which probiotics are included, were family members and mass media [19].

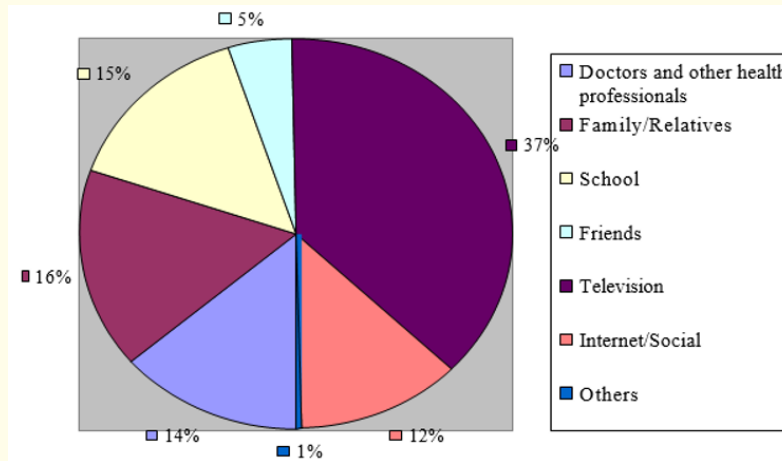


Figure 1: Sources of first information of probiotics of the respondents.

Probiotic consumption

The amount and frequency of probiotic intake of the respondents were measured using modified food frequency questionnaire. Dairy and non-dairy products were the food items included in the questionnaire. The food products containing probiotics available in the Philippines were enumerated in the study of Banaay, *et al* [12]. Among the listed food items, the students were more unfamiliar to non-dairy products like balao-balao, agos-os, burong babi, burong kalabi, tapuy and basi. In general, students were more aware on the dairy products listed in the FFQ. The most frequently consumed dairy products were milk and cultured milk (*e.g. Yakult, Chaymito*). Moreover, in non-dairy products, steamed rice cake, longganisa, and condiments (*bagoong, alamang, fish sauce, vinegar and soy sauce*). In terms of amount of the amount of intake, there is still no recommended intake of each probiotic product. According to Rezac, *et al.* [20], assuming that the probiotic food product has viable microorganisms amounted to $10^8 - 10^{10}$ cfu/g, the intake of 100g per day can influence the microbiota environment in the digestive system thus can provide the benefits expected to the human body.

Milk, native delicacies (steamed rice cake, bibingka and cassava) and condiments were the most frequently consumed probiotic food of the students. This might be due to the availability and accessibility of the food products in the area. Laguna has been known as one of the major producers of fresh milk and other milk products and native delicacies in the Philippines [21-23]. Furthermore, as cited by Delos Reyes [24], consumption of condiments in region where Laguna is located, was higher compared to the other important food groups. Based on the survey, students from the selected schools in Laguna consumed probiotic foods. However, it was recorded that in general, respondents had diet low probiotic (less than 100 grams) and consume them less frequently (never to once per week) in terms of amount and frequency of their intake.

Association of knowledge of probiotics and probiotic consumption

According to Stanczak and Heuberger [25], knowledge on probiotics played an important role in awareness and consumption of probiotic food. The association of the level of knowledge on probiotics was identified using Fisher’s test (Table 2).

Variable	Knowledge on Probiotics (p-value)
Awareness of Probiotic Food	0.3590
Amount of Probiotic Intake	0.6770

Table 2: Association of knowledge on probiotic to awareness of probiotic food and frequency and amount of probiotic intake.

Results showed that the level of knowledge on probiotics was not statistically related to the awareness of probiotic products as well as amount of probiotics intake at $\alpha=10\%$. It was revealed in the study that despite of good level of knowledge on probiotics in terms of its nature and beneficial effects on human body, most of the students were not aware that aside from dairy products, fermented non-dairy products were also sources of probiotics. Moreover, all of the students, in average, consumed less than 100g per day of probiotic food items. In terms of frequency of intake, respondents were regarded to consume these products less frequently (never to only once per week). Contradictory of this results, studies conducted in Jordan, in Punjab region in India and in Tamil Nadu concluded that level of knowledge and awareness on probiotics were correlated to the amount of intake of the respondents in the study [26,27]. Most likely, the reasons for this different results were due to the factors connected to personal preferences and cultural background of the respondents in the Philippines to the participants of the other countries, this could be explained by the different determinants of food choices [28]. In purchasing and consuming functional food products, people consider the price, the presentation of the food and the sensory characteristics of the products [29,30]. Furthermore, it was also stated in the study of Bilgic and Yuksel [31], the amount of intake of functional food was due to its availability and the need to consume. Also, young adult Croatian students tend to purchase and consume functional food based on its availability on supermarkets, taste and price-quality ratio and not according to the level of their knowledge and awareness [32].

The areas of the study only focused in Laguna. The probiotic food items included in FFQ were food products found not solely in Laguna but all over the Philippines, hence students were unaware of some listed food products. Moreover, according to Elegado., *et al.* (2016), fermented products specifically available in the Southern Luzon were fermented milk, *kesong puti*, *burong isda*, and *burong talangka*. Also, food products like steamed rice cake, *bibingka* and fermented condiments were widely accessible in the whole country hence reason for the respondents’ awareness and intake of the enumerated products compared to the other probiotic food listed in the FFQ.

Conclusion

In this study conducted in three selected schools in Laguna, good level of knowledge was observed in the college students. Most of them knew the beneficial effects of probiotics to human body in terms of food digestion and immunity. Also, in general, they were aware that dairy products were food source of probiotics. However, they still lack on information on the other health benefits of probiotics as well as food source of probiotics aside from dairy foods. It was also revealed in the study that despite of high level of knowledge and awareness on probiotics, consumption of probiotic food products of the students was less frequent and they had a low intake of less than 100 grams per day. However, knowledge on probiotics of the students was not related to the frequency and amount of intake of probiotics, behavioral change and improving their attitudes and perception can be a possible solution toward to the improvement of probiotic consumption. Moreover, educational strategies like nutrition education and media campaign can be a good intervention to address the correctness of information about probiotics and probiotic products as well as to promote the increase of probiotic consumption among young adults.

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