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Consumer's attitude and awareness towards functional foods during COVID-19

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Abstract

COVID-19 is an infectious disease which was originated in Wuhan (China) and is declared a pandemic by the World Health Organization. Functional foods are gaining popularity as they have been boosting immunity and capable to fight against various diseases including the COVID-19. Functional foods are categorized under the type of food products that possess physiological benefits. These foods are essential for health and help in improving one's health by preventing and curing several chronic diseases. This study has been conducted to evaluate the consumer's awareness and their knowledge of functional foods and their health benefits. A survey method was employed using a set of questions to assess consumer's knowledge and awareness. The scientific goal of this study was to increase awareness in the population about the advantages of these foods. The survey was conducted online on sample size of 301 participants for functional foods and, the data thus obtained was magnificent. The majority of the participants were either students or working professionals. More than half of the participants knew functional foods and were regular consumers. This survey gave an idea about what people think of the new emerging foods, their health claims, and their consumption during COVID-19, therefore, moving towards a healthy future.

1. Introduction

COVID-19 (Coronavirus Disease-2019) is an infectious disease that was first identified in Wuhan in China and affected 196 countries and territories. This disease is caused by SARS-CoV-2, *i.e.*, severe acute respiratory syndrome coronavirus 2. World Health Organization (WHO) on 11 March 2020, declared COVID-19 disease as a pandemic, and till 24 July 2020, about 15,296,926 cases and 628,903 deaths have occurred (Ben Hassen *et al.*, 2020). The emergence of this pandemic ultimately affects the health and immune system of the consumers. Thus, in this situation, healthy food is a vital requirement to fight against this pandemic and the consumption of functional foods needs to boost the immunity of consumers to suppress this infectious disease.

Food plays a vital role in the overall development of a human being by fulfilling the nutritional requirement of a living being such as protein, fats, carbohydrates, vitamins, and minerals. With the advancement in scientific research, it has been claimed that food also possesses beneficial and medicinal bioactive compounds that provide health benefits beyond basic nutrition, termed as functional foods (Kumar *et al.*, 2017). World Health Organization also claimed the relationship of dietary problems with chronic diseases and quality of life. Thus, functional foods are a key necessity for

improving health by preventing various chronic diseases (Kuster-Boluda *et al.*, 2017; World Health Organization, 2000).

Japan first emerged the concept of functional food in 1984 under the legislative food category, termed as FOSHU. To be classified functional foods under FOSHU, they must satisfy the three basic requirements including safety, effectiveness, and presence of bioactive compounds in them (Martirosyan *et al.*, 2015). Different countries are involved in the production of functional foods such as Japan and the United States. Around 60% of the global functional food market of the United States and Japan is occupied with beverages and around 20% of the functional food market in the United States is equipped with cereal products whereas 15% of the functional food market in Japan is occupied with confectionary products (Jedrusek-Golinska *et al.*, 2020).

A lot of factors are responsible for the consumer willingness of purchasing functional foods which include their taste, cost, quality, convenience, and essential medicinal health benefits. Research and business should be combined and analyzed in the production of more healthy functional foods when compared to conventional food products (Urala *et al.*, 2007). There are always different segments of consumers when purchasing or consuming functional foods. The first segment can be termed as functional food lovers. This segment usually has higher trust over functional foods due to their health-conscious mentality. They are more concerned about consuming healthy food so more willing to consume functional foods. The second segment can be termed as indifferent to functional foods in which consumers depend on healthy food but they are not much convinced about the health benefits of functional foods. In

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such cases, awareness should be increased by promoting the positive health characteristics of functional foods. The third and last category is termed as suspicious about functional foods. This segment involves a higher proportion of males than females and they concern about their diet but do not consider the functional foods to be healthy or tastier to eat (Marina *et al.*, 2014). The functional food

market is one of the most widely known in the world which also helps in preventing various diseases such as cardiovascular diseases, type-2 diabetes, and cancer (Jedrusek-Golinska *et al.*, 2020). These foods are categorized into various market segments including fruits and vegetables, cereals, dairy, tea, flaxseeds, seafood, vitamins, egg, herbs, and meat as illustrated in Table 1 (Kaur *et al.*, 2011).

Table 1: Market segments of functional foods and their benefits (Kaur *et al.*, 2011)

Category of functional foods	Major source	Benefits
Fruits and vegetables	Polyphenols such as anthocyanins, flavonols, resveratrol	Prevent cancer, cardiovascular diseases, diabetes
Cereals	Insoluble dietary fiber, water-soluble fiber	Lowering cholesterol, act as prebiotics
Dairy	Bioactive peptides in milk	Lowers blood pressure, preventing cardiovascular diseases
Tea	Catechins (Polyphenols)	Anticancer, antioxidant, antiviral, antibacterial activities
Flaxseeds	α -linolenic acid (ALA)	Prevent cancer, cardiovascular diseases, blood pressure, immune disorders
Seafood	Omega-3 fatty acids, proteins	Anticancer, antihypertensive, antiviral, and antioxidant properties
Vitamins	Vitamin B ₆ , vitamin B ₁₂ , vitamin C, and vitamin K	Preventing cardiovascular diseases, osteoporosis, colorectal carcinoma
Egg	Omega-3 polyunsaturated fatty acids	Prevent heart disease, blood pressure, atherosclerosis
Herbs	Curcumin in turmeric, methylhydroxycalcone in cinnamon	Prevent bronchitis, asthma, cardiovascular diseases, Parkinson's diseases, obesity, AIDS, diabetes
Meat	Conjugated linolenic acid (CLA), taurine, L-carnitine, creatine, antioxidants	Reduce the risk of cardiovascular diseases, atherosclerosis, and type-2 diabetes

Functional foods can be classified into four different categories involving fortified products, enriched products, altered products, and enhanced commodities. Fortified products are those food products that are fortified with additional nutrients. For example, vitamin C fortified fruit juice. Enriched products are those in which additional new nutrients are added not normally found in that food; for example, prebiotics and probiotics. Altered products are those food products from which deleterious components are removed and replaced by beneficial components. For example, fibers in the form of fat releasers in meat products. Enhanced commodities are those in which components present in food are naturally enhanced; for example, enhanced/increased omega-3 in eggs (Bigliardi *et al.*, 2013). Ingredients such as vitamins, minerals, dietary fibers, oligosaccharides, antioxidants, lactic acid, omega-3 fatty acids, lignins, and bacteria cultures are responsible for making the foods functional. However, many of such ingredients are found in medicinal plants in India including clove, garlic, turmeric, ginger, cinnamon, fenugreek, and mustard (Lobo *et al.*, 2010). And these ingredients present in different plant foods are beneficial in reducing the COVID-19 infection risk. However, many people who possess chronic diseases and a weaker immune system are more prone to COVID-19 disease. Thus, it is essential to boost the immune system to combat viral infections.

As the concerns about healthy functional foods are increasing at a wider rate, thus there is a need for the development of standards and guidelines for the awareness and health benefits for producers

as well as consumers. The standards and guidelines play a vital role as it helps in preventing consumers from misleading and false claims about the product during new product development and its marketing. Today, due to the shift in lifestyle patterns, consumers are now well known to maintain their health to be free from various diseases (Kumar *et al.*, 2017).

The main objectives of this study was to determine consumer's attitude and awareness towards functional foods in the COVID-19 pandemic; to gather consumer's views on functional foods; to identify the factors determining consumer's purchase and consumption of functional foods and; to check consumers understanding of nutrient labeling and health claims of functional foods.

2. Materials and Methods

The survey focused on the attitude and the awareness of the consumer towards functional foods and their benefits during the COVID-19 pandemic, their demand and choice for purchasing functional food, and lastly about the health and nutritional benefits.

The survey was conducted among a sample size of 301 people from all age groups and coming from different households (Jain *et al.*, 2014). Data was collected by the means of an online questionnaire which consisted of a total of 28 questions, collecting the basic information of the consumer as well as the general questions regarding functional foods and their health benefits. Most

of the questions were multiple choice type and a few were checkbox type.

3. Questionnaire

The questionnaire had a set of 28 questions, out of which 6 questions were primarily focussed on getting the knowledge of the consumer and his background. A few general questions were asking about the factors considered by the consumer while purchasing any food product, their observation of the nutritional label present on the product packaging, and their choice likelihood of purchasing functional foods during the COVID-19 period (Vella *et al.*, 2014).

Apart from these were the questions based solely on the purchase of knowledge of functional foods. Those included questions like:

- For the proportion of consumers who said yes to the consumption of functional foods:
- How come you are aware of the use of functional foods?
- What are your reasons for buying functional foods?
- What kind of functional foods do you consume during COVID-19?
- What are the health claims mentioned on the package and do you believe in them or not?
- For what health benefit would you like to consume functional foods?
- For the proportion of consumers who said no to the consumption of functional foods:
- Reasons and factors leading to the non-purchasing of functional foods?
- Preferences for additional benefits in functional foods?

The remaining questions focused on the health claims and laws related to that, whether the consumer is aware of any law or any regulatory body related to the food products or not, and the consumer's judgment towards the truthfulness of the claims made by these foods.

4. Results

The study examined consumer awareness about functional foods, whether they consume them or not during the COVID-19 pandemic period, and their health claims. A total of 301 randomly chosen people took part in the survey (Table 2), out of which 54.2% were male and 45.8% were female. The results showed that both the genders were equally interested (since the percentage is nearly the same) in knowing about functional foods. Adults (25-30 years) and teenagers (15-20 years) participated the most in the survey as depicted in Table 2.

The majority of the participants were students, *i.e.*, 53.8%. Among students, those pursuing high school education were 19.3%, graduation was 42.2% and post-graduation was 31.6%, followed by working professionals, *i.e.*, 37.9%. 50% of the participants having an annual family income of 5-10 lakhs or more and around 71.8% of participants had 2-5 members in their household while 9.6% had 2 or less than 2 members and the rest 18.6% had more than 5 members (Table 2).

Table 2: Demographic characteristics of participants

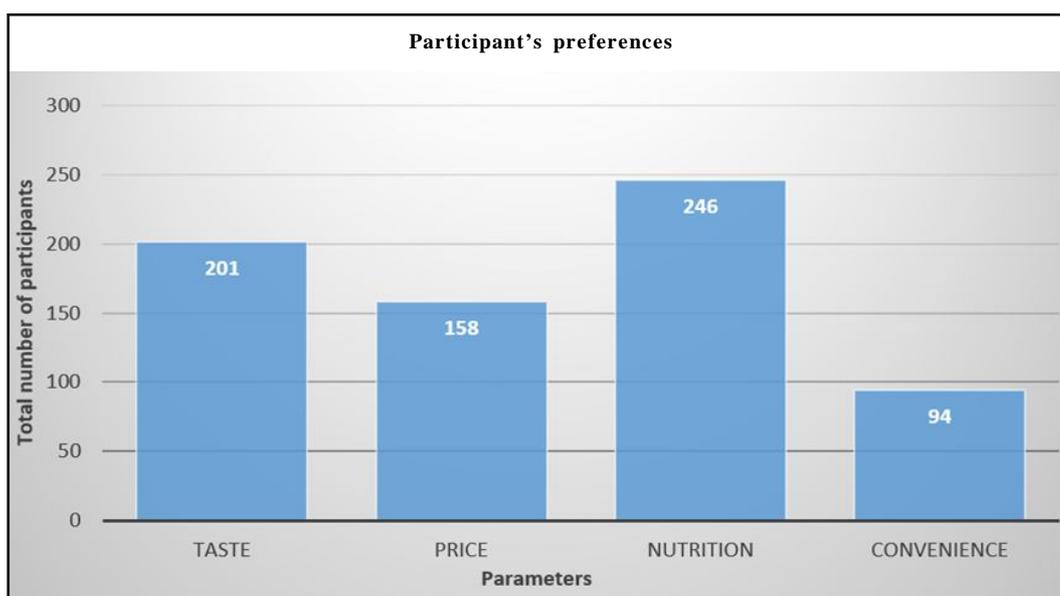
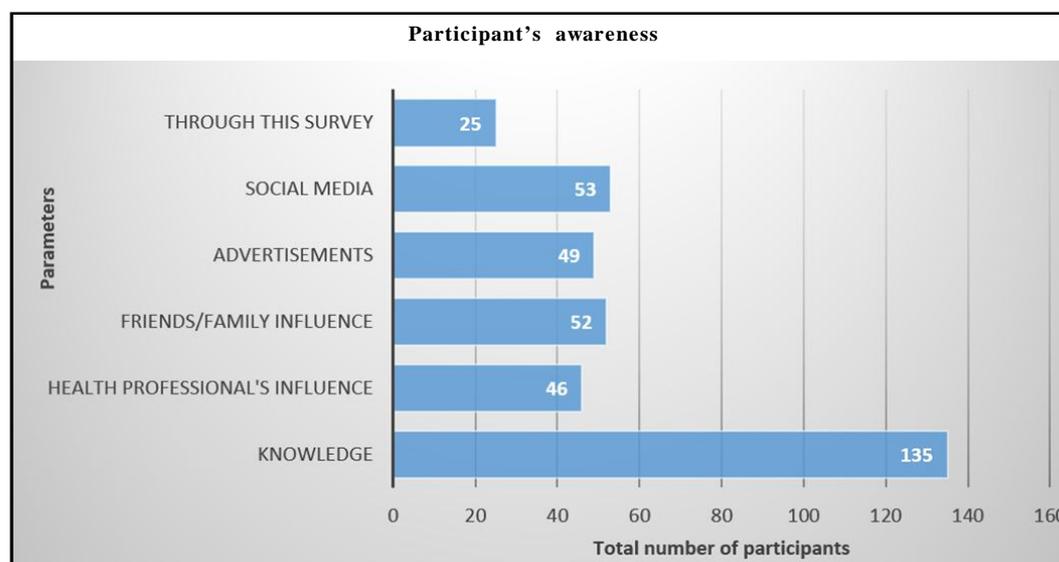
Participants	N	301	
Gender	Male	163	54.2%
	Female	138	45.8%
Age (years)	15-20	78	25.9%
	20-25	66	21.9%
	25-30	106	35.2%
	30-35	22	7.30%
	35-40	5	1.66%
	40-45	6	1.99%
	45+	18	5.98%
Family income (Lakh per annum)	<1	52	17.27%
	1-3	47	15.61%
	3-5	57	18.93%
	5-10	75	24.91%
	>10	70	23.25%
No. of family members	1-2	29	9.63%
	2-5	216	71.76%
	>5	56	18.60%
Occupation	Student	162	53.82%
	Homemaker	10	3.32%
	Working professional	114	37.87%
	Self employed	15	4.98%
Educational qualification	High school	58	19.26%
	Graduate	127	42.19%
	Post graduate	95	31.56%
	Other	21	6.97%

Table 3: Different views of participants on functional foods

Views	Yes	No	Sometimes /may be
Participants aware of functional foods	62.8%	37.2%	0%
Participants who buy functional foods	58.8%	41.2%	0%
Participants checking the nutritional label	47.8%	13.3%	38.9%
Participants believing in health claims	35%	8.5%	56.5%
Participants satisfied by health claims	31.6%	5.1%	63.3%
Participants opting for health claims over well-known brand	45.2%	9.3%	45.5%
Participants believing in high price of foods having health benefits	48.2%	6%	45.8%

Table 4: Number of participants consuming different types of functional foods

Type of functional foods	Number of consumers
Milk and dairy products (vit. A fortified milk, probiotic dahi, yakult, <i>etc.</i>)	155
Cereal Products (Fe fortified wheat flour, cereals, muesli, <i>etc.</i>)	118
Beverages (juices and energy drinks, <i>etc.</i>)	80
Oils (fortified with micronutrients)	9

**Figure 1: Preference of participants while purchasing functional foods.****Figure 2: Participant's source of awareness about functional foods.**

Participants as consumers gave priority to the nutrition of food items, followed by taste, price, and convenience (Figure 1). The majority of participants 47.8% (144) have the habit of checking the food label before buying the products while around 38.9% (117) sometimes check it, sometimes not and the rest 13.3% (40) do not check the label before buying the food item at all (Table 3). It was

observed that 62.8% (189) of participants were aware of functional foods, but only 58.8% (177) of the total participants buy functional foods. This can be due to more awareness and knowledge of participants. Also, many factors affect the acceptable behavior of functional foods among consumers.

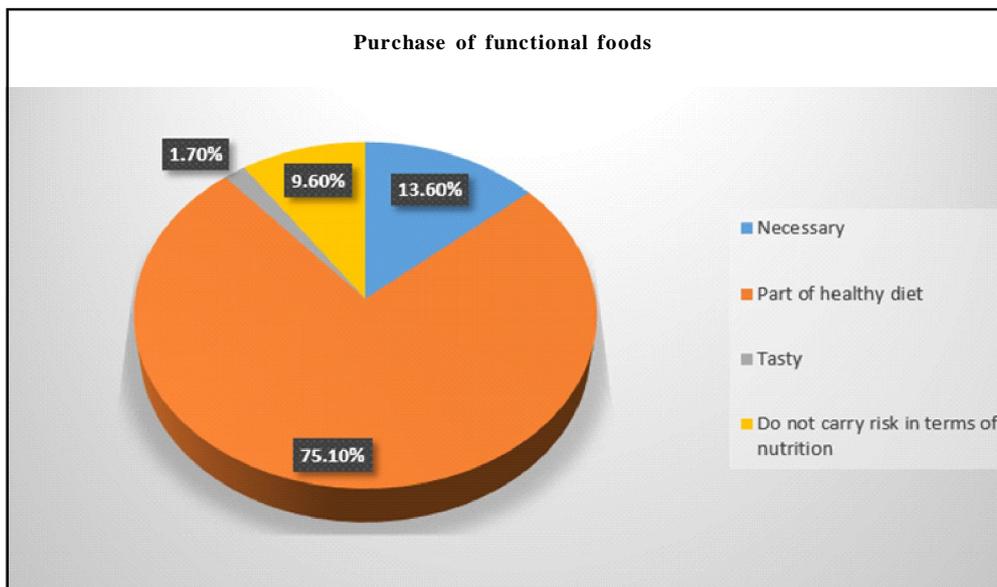


Figure 3: Reasons for purchase of functional foods by participants.

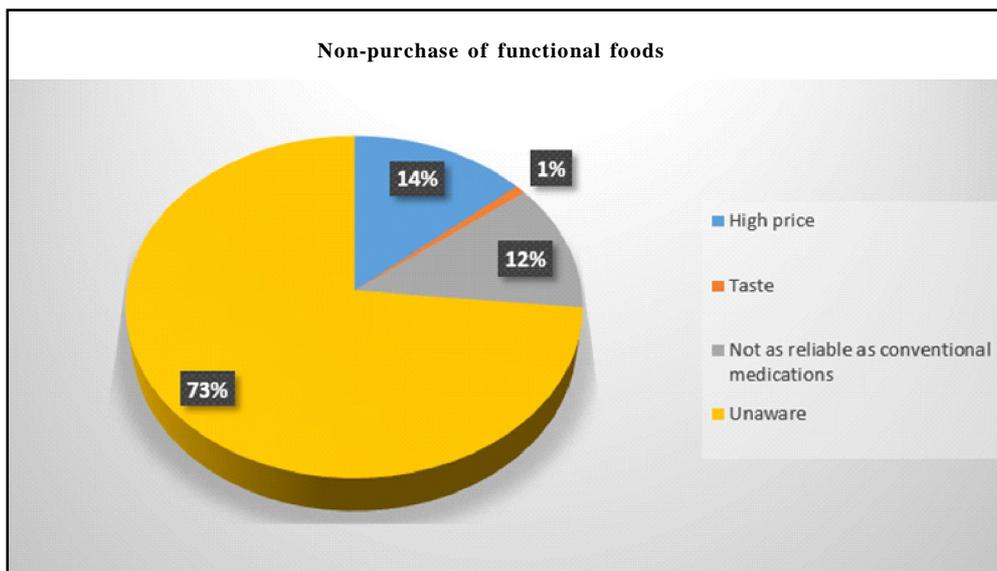


Figure 4: Factors influencing non-purchase of functional foods.

Yet around 37.2% (112) of participants do not know about functional foods and 41.2% (124) of participants do not buy functional foods (Table 3). The majority of participants who consume functional foods knew functional foods. Most of them were made aware through health professionals, social groups, social media, and a few with the help of this survey (Figure 2). The majority of the functional food consumers purchase it because of its health benefits, *i.e.*, 94.4% and a mere 5.6% because they are fond of the product. A vast majority of consumers believe functional foods to be part of a healthy diet. Some believe it to be necessary and not carrying risk in terms of health. Only a few consider it to be tasty. All these reasons for purchasing the functional foods by participants are depicted in Figure 3.

Out of 177 consumers, 35% believe in the health claims mentioned, and 56.5% do believe it sometimes as shown in Table 3. However, only 31.6% of consumers were satisfied by the mentioned health claims, 63.3% of consumers could not figure out whether they are satisfied or not and the rest did not get the desired outcome. Out of the 177 consumers, 87% consume it to increase immune power, followed by 61.6% to reduce the risk of any heart disease, 51.4% to boost bowel health, 47.5% to reduce the risk of diabetes, and 29.4% to reduce the risk of disease like cancer. Thus, this can give evidence that the success of functional foods depends upon the taste, convenience, and impact it possesses on the health of the consumers (Verschuren *et al.*, 2002).

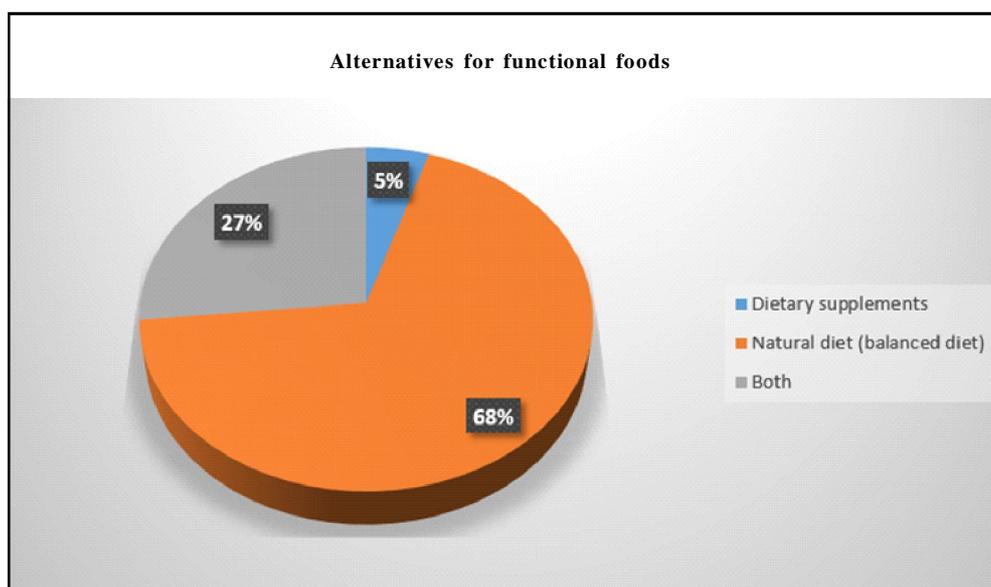


Figure 5: Participant's alternatives for functional foods.

Out of 124 participant's majority, 73.38% were unaware of such food products. Hence, they do not consume functional foods (Figure 4). A vast majority of non-consumers, *i.e.*, 68.54% preferred taking a natural balanced diet instead of functional foods. A small proportion of 4.83% opted for dietary supplements as shown in Figure 5.

As it is shown in Table 3, consumers are more attracted to health claims and they are not giving preference even to the products of the companies having big name in the market, it proves that health claims and their appropriate presentation can critically impact the market structure of the whole product and it needs to be regulated. Table 3 also clearly showed that products with health claims carry a higher price in the market and become a beneficial factor for manufacturers and companies that can exploit this opportunity unethically and there again comes a need for it to be regulated. Most people are confused about health claims and they can not completely understand them. Not so, many peoples in India are aware of laws and regulations related to health claims more than 30% of them are completely unaware and more than 20% are uncertain. More than 95% of consumers support the idea of maintaining a list of authorized health claims and making it available for information to the general public. Consumers are finding some health claims hard to digest and it needs to be backed by scientific evidence and those scientific evidence needs to be displayed on packets of products in a fully easily understandable manner. Consumers want that there must be some online platforms or methods for judging the truthfulness of health claims.

5. Discussion

A survey study was also conducted in Belgium for 215 individuals in determining the acceptability of functional foods. Bivariate and multivariate analyses were conducted. The results revealed that according to bivariate analysis, women and older individuals showed more acceptability towards functional foods. Out of the total participants, 46.5% accepted the functional foods and this acceptability increased due to the presence of an ill member in the family (Verbeke *et al.*, 2005).

One survey study was conducted among college students of Canada, the United States, and France for the acceptance of functional foods. The survey results obtained revealed that sex, country of origin, culture, health beliefs, and awareness affect the acceptability of functional foods among students. It was inferred from this survey that education awareness and labeling of the products help in increasing the acceptability of functional foods (Kolodinsky *et al.*, 2008). The acceptance of functional foods in comparison with unhealthy food is important as the consumption of unhealthy food which comprises of usually increase fat and carbohydrate content, leads to the development of obesity and results in chronic and serious conditions of COVID-19 (Aday *et al.*, 2020).

Different types of functional foods such as milk, dairy products, cereal products, beverages, and oils are consumed by a different number of participants as shown in Table 4 (Cakiroglu *et al.*, 2018). A study conducted by Karelakis *et al.* (2019) also involved a survey regarding the consumer attitude in Greece towards consuming functional foods. According to this survey, consumers were conscious about their health and willing to pay more for functional foods that can help them in preventing the risk of infections and chronic diseases (Karelakis *et al.*, 2019). As viral infections are responsible for an increasing number of chronic diseases and death worldwide including COVID-19 disease. Thus, functional foods are a safe and economical way to improve immunity to tackle viral infections (Alkhatib *et al.*, 2020).

6. Conclusion

People think that the food they consume influences their body's physical and mental health. Hence, nowadays with the emergence of the pandemic COVID-19, people are very much inclined towards consuming new types of food and are open to trying new variants of the foods which would support their health. Hence, functional foods came to light. The functional foods industry is progressing worldwide. The outcome of our survey is vital to functional foods developers and marketers to contribute to fighting against COVID-19 disease. According to our study, we found that people prefer functional foods to boost their immune system and thus back up

their health. Adding to this result, young individuals and educated people (both female and male) consume these products for health benefits, especially during this pandemic situation, and to prevent the risk of chronic diseases. But, a lot of people still need to learn more about functional foods. Price, taste, and convenience are the three basic key driving factors for anyone to try and consume any new product. Therefore, the price needs to be lowered and production needs to be increased for it to reach everyone. People also need to be made aware of functional foods and the health claims provided to move forward towards a healthy future. Overall, the results provide valuable information regarding the needs and perceptions of nutrition and health information on functional foods and their consumption to stop spreading the COVID-19 disease by enhancing the immune system.

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Conflict of interest

The authors declare no conflicts of interest relevant to this article.

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