

# Emerging Demands of Nutraceuticals (Functional Foods) Among the Women During Pandemic: An Intensive Exploratory Study

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## Abstract

Corona pandemic resulted in huge burden on health care service sectors. Although pharmaceutical is the one of the largest industry in the world and predominant in health care services yet sudden outbreak of disease has questioned our ability of fighting back. The people across the globe have become more aware regarding health and wellness, hence they looking for other natural, reliable,

affordable and available options. The nutraceuticals or functional foods are expected to have various health benefits and people are looking for more advance nutraceuticals for better immunity. An intensive exploratory study was conducted in one of the most reputed Banerjee's Clinic located at Khamtarai region, Raipur, Chhattisgarh where 237 female participated in the questionnaire survey. The study result revealed that majority of women (52%) age 34-41 years use nutraceuticals for better health and to boost their immunity. Furthermore, the females who are working both public and private sectors and are financially independent are aware of health benefits of nutraceuticals/functional foods and spend on nutraceuticals for overall wellness. Moreover, the women preferred tablets form of nutraceuticals rather than powder or liquid form as mode of consumption. The study further shows that women who are professionals prefer to take daily functional foods or nutraceuticals for good health, immunity and beauty.

## Background

The post-Corona pandemic people are rigorously working towards better health and immunity and searching for different options of functional foods and nutritional benefits for enhancing health and preventing disease. Furthermore, in the present situation buyers are aware of the significance of a healthy diet and

lifestyle [6, 7]. The nutraceuticals or functional foods are essentially required for our health and overall wellbeing [2]. According to [18] research, the nutrients, herbals and dietary supplements are major constituents of the nutraceuticals or functional foods. Furthermore these nutraceuticals required in small quantity in maintaining the health, act against various disease conditions and thus promote the quality of life. According to [15] review paper, the nutraceuticals have proven health benefits and their consumption (within their acceptable Recommended Dietary Intakes, RDI) will keep diseases under control and permit to maintain an overall good health.

Although nutraceuticals significantly promote the health and use for disease prevention, yet health care providers, nutritionists, and regulatory toxicologist should strategically work together to plan appropriate regulation to provide the health and therapeutic benefit to mankind. That is why implementation of regulatory body is important to standardize the industry is growing at a rate far exceeding expansion within the food and pharmaceutical industries [1,16]. Furthermore, herbal nutraceutical are very popular and may be a powerful instrument in maintaining health and to act against nutritionally induced acute and chronic diseases, thereby promoting optimal health, longevity, and quality of life. Moreover, limited data is available on nutraceuticals consumption, use and reason behind consumption of nutraceuticals among the growing population. In this study, female who are consuming nutraceuticals and showed willingness to continue the use of nutraceuticals during COVID pandemic is extensively explored [8, 12].

#### *Nutraceuticals and Its Health Implications-Literature Review*

The study by [19] reveals that the nutraceutical is demonstrated to have a physiological benefit and provide protection against chronic disease. Apart from disease prevention, they play a vital role in disease prevention, management and therapy. Additionally, the growing awareness among the customer regarding health care has led to an opportunity for “nutraceutical” products in the

pharmaceutical frontline as an alternative to contemporary medicine. This revolution will lead us into a replacement era of drugs and health, during which the food industry will become a search, oriented one almost like the pharmaceutical industry. Additionally, the high value of nutraceutical market potential has led government agencies to establish regulatory requirements for the design, testing and marketing of these products, though much remains unregulated [13, 5].

Mandala et al. (2010) research revealed that nutraceuticals can have an effect on cardiovascular disease in numerous ways. Firstly they tend to reduce circulating levels of LDL-cholesterol. This is achieved by modulating cholesterol production in the liver (i.e. monacolin, policosanol, red yeast, rice etc.), binding cholesterol within the intestines and/or increasing LDL-c receptor uptake in the liver binding cholesterol within the intestines and/or increasing LDL-c receptor uptake in the liver. Second way is to reduce the possibility of oxidation by neutralising radicals with antioxidants and the third way is to reduce artery plaque through fibrinolytic activity and to reduce blood pressure.

[20] mentioned that the recent pandemic situation around the globe has given a special requirement for innovating new drugs and repurposing the existing drugs against COVID-19. Various studies on molecular docking-based screening of existing antiviral, antibacterial and other FDA approved drugs and phytochemicals has already been done and further experimental analysis is still going on. Furthermore, their paper stated that the nutraceuticals made from widely-consumed plant products promote longevity, improve health-span, and protect against aging and stress. However, the individual and synergistic effects of nutraceuticals as a component of dietary composition will require further study and scientific scrutiny. Some nutraceuticals and their synthetic derivatives are being tested for their therapeutic potential. However, further extensive studies will be required in this field.

[17] observed that the nutraceutical products play pivotal role in making food regimes more sustainable in

terms of well-being and health and have the positive effect of their medicinal properties on economic sustainability in the national and global health systems. Apart from this, mostly people are not receiving sufficient nutrition through food; moreover, high levels of toxicity, pollutants and pesticides that exceed our body's ability to protect themselves from their effects; hence, the most effective strategy for boosting the immune system is use of nutri-boosting supplements. Nutraceuticals are pharmacologically active substances which are extracted from a variety of foods, animal, and plant source and administered orally at dosages. These products are growing at a high speed decisively influencing marketing and consumer choices [8].

Over the decade's researcher are associating nutraceuticals and their benefits among aging consumers. Functional foods are being developed for differential market positioning. The development in nutraceuticals and functional foods is generally targeted at different demographics and market requirements [9, 10]. The aging population will significantly drive functional foodstuff development within the future. The sensory preferences (e.g., taste, texture) of these consumers are very different from those of younger consumers. It is well known that the nutritional and medicinal requirements of a person vary with age, and hence the nutraceutical and functional food industry can offer products according to age groups. For aging consumers, key products of interest are functional foods that impact vascular health (e.g., omega-3 fatty acids), immune health (e.g., probiotics), the aging process (e.g., resveratrol, antioxidants), digestive health (e.g., probiotics, fiber), eye health (e.g., lutein, zeaxanthin), and bone and skeletal health (e.g., calcium, vitamin D3). For infants and very young children, products that support brain development (e.g., omega-3 fatty acids) and immune health (e.g., probiotics, oligosaccharides) are of the most interest. Of the various functional food and beverage products, infant formula are that the world's fastest growing functional food, followed by energy drinks and pre- and probiotic yogurts [11]. Non-dairy milk alternatives such as rice, oat, hemp, and

nut milks are set to be the fastest-growing functional beverage category because of the rising prevalence of food intolerances and health concerns attributed to dairy and soy. In terms of the health positioning of functional foods and beverages, those targeted for general well-being are the top performers, followed by those for weight management, digestive health, energy boosting, and endurance. However, the fastest growing positioning category is energy-boosting foods. Addition of nutraceuticals into foods offers consumers a variety of healthier food choices that will help fulfill some of their health and wellness needs [16, 3, 4].

[14] has conducted epidemiologic studies that demonstrated the association between certain dietary patterns as well as cardiovascular health. Moreover, research found that functional foods and nutraceuticals in the dietary components have cardio-protective potential and prevent development of diseases. According, to Basu et al. (2007) the study explores on growing recognition of the potential role for nutraceuticals as well as dietary supplements that reduces the health risks and improve health quality. As nutraceutical is the hybrid product of both nutrition and pharmaceutical, it a play a significant role in transforming and sustaining normal physiological function that maintains healthy human beings. Additionally, the global market of nutraceuticals and functional foods has become a multi-billion dollar industry. Furthermore, it is expected that the demand of nutraceuticals will increase in the coming years [8].

### Aim

To assess the knowledge, attitude and practice (KAP) associated with nutraceuticals consumption among the women at Raipur, Chhattisgarh, India.

### Objective

1. To assess the socio-economic and demography factors associated with nutraceutical consumption among the women.
2. To study the depth of knowledge, attitude and practice of nutraceutical pertaining to health and wellness among

the women.

3. To study the perception regarding various nutraceutical products among the women.

### Methodology

This is an exploratory study with limited data available on consumption of nutraceuticals among the women at Raipur, Chhattisgarh. All female patient who visited Banerjee clinic from March 2021 till October 2021 as well as insisted the use of nutraceuticals where included in the study. Women came to the Banerjee clinic for various treatments asked doctor to give immunity booster, multivitamins, medicine to overcome weakness. Women also seek health care advise for good skin, hairs, and overall all wellbeing. In the current study 237 women participated who gave their consent and provided all necessary information.

The secondary data was collected from online sources like Google scholar, Pubmed, research gate, academia, BMJ, Medline and the duration of literature survey was one month. After the secondary data collection, set of close ended questionnaires were designed. Prior to study questionnaires were modified as per the local setting and pilot study was conducted.

#### *Study Duration and Area*

The duration of the study was 8 month, and all the female patients visited Banerjee's clinic located at Khamtarai region Raipur Chhattisgarh who visited regularly in the clinic were included in the study. The majority of the female patient traveled from the outskirts of Raipur district mainly from the rural sectors (Birgaon, Ravabhata, Bhanpuri, Khamtarai, Urkura, Dhaneli, Urla, Siltara). Furthermore, all those regular patients who insisted the doctor to prescribe essential nutraceuticals or explained various symptoms (like hair fall, general weakness, loss of weight, loss of strength, loss of appetite etc) and wanted to take nutraceuticals in various forms where included in the research.

#### *Study Criteria*

Women age 18 years and above who gave consent to participate in the study and regularly visited the

Banerjee's clinic every month on for their nutraceuticals where included in the study. Thus sampling technique in this current research was purposive sampling. Both verbal as well as written consent was obtained from all the female patients who participated in the questionnaire survey.

### Study Design

Very limited data is available on nutraceutical demands and use of various nutraceuticals among the female during COVID-19 pandemic, hence an intensive exploratory study was conducted at Raipur, Chhattisgarh, India.

### Data Collection Tool and Analysis

The questionnaire was used for data collection and 237 female participated in the study. The variables are socio-economic and demographic factors, use of nutraceutical products and preferences regarding various nutraceuticals were noted. The data analysis was done in SPSS version 16.0 for statistical reporting. The graph as well as tables is reported percentage and frequencies. Chi-square test for testing the hypothesis and measuring the strength between the two variables is use and test result is reported. Furthermore, advance statistical test were conducted to measure the significance of more than two independent variables in the study.

### Result

The socio-economic profile of the female patients was distribution as per the age, education, occupation and income. In the questionnaire survey 237 women participated in the survey conducted in Banerjee's clinic Raipur, Chhattisgarh. The majority of the participants were young age 26-33 years (41%) and 34-42 years (52%), furthermore, 5% of them belong to age category 18-25 years and only 2% age between 42-49 years. In this current survey majority of them were with graduation and post-graduation degree (88%), moreover, about 12% of the respondent had Ph.D. The education play very significant role in creating awareness and also knowledge is significant factor to assess consumer's perception on different aspects. A significant proportion respondent were professional (42%), similarly, equal proportion of respondent were student and homemaker

(17% respectively), whereas 22% of respondent are working at private or government centers and 2% were self-employed. Additionally, about 51% respondent had per month income less than 25000 rupees. Furthermore, only 28 % earn above 35000 rupees per months. Table 1 below illustrated socio-economic profile of the female respondents.

Figure 1 illustrates respondent preferences on nutraceutical product consumption form on daily basis it was found that significant proportion of participants 34.6 % consume nutraceuticals in form of tablet and powder whereas, 23.1% consume nutraceuticals as liquid form and 19.2% and 11.5% consume nutraceuticals as beverages and capsule form, thus from data it's clear that people like to tablets, powder and liquid form to products for consumption on daily basis. Moreover, health drinks, energy drinks, protein powders, other health powders that can be consumed with milk are very popular among the consumers. Figure bellows show the percentage of respondent consuming various form of nutraceuticals or functional food.

In the current research study the responded nutraceutical product various types was also assessed. The figure 2, shows that a considerable proportion of respondent (32.4%) prefer nutraceutical pre and probiotics (milk or yoghurt) on regular basis. Furthermore, the equal proportion of respondent (20.6%) of participant's consumer nutraceutical or functional food as herbal base, vitamins as well as cereals and grain. The most popular nutritional and healthy breakfast is cornflakes with added minerals, Iron and Vitamins. Furthermore, yoghurts is the most popular among prebiotics and also available in different flavors are the most readily available product in supermarkets. Additionally, some of respondent also (5.8%) use prebiotics nutraceuticals. Figure 2 below shows the proportion of various kinds of nutraceutical/functional food supplements purchase by the consumers.

Nutraceuticals are widely consumed for various purpose for maintaining health and wellbeing. Figure 3 showed that the majority of the respondent (35%) uses

nutraceuticals for general wellness, whereas 17% consume nutraceuticals for vitamin supplements. Significant proportion of respondent uses nutraceuticals and functional foods for weight management and strengthens the immune system (13% each). Furthermore, 10% use nutraceuticals for promoting digestive system and gut health especially probiotics foods such as yoghurt or butter milk are very good for intestinal flora. Similarly, 8% use nutraceuticals as energy booster for instance, energy drinks after exercise and gym with low calories. In addition equal proportion of respondent (2%) use nutraceuticals as skin care (bathing milk cream and Vitamin E rich cream) and healthy snacking likes Nutri Bar with peanuts, and other dry fruits.

Table 2 shows association between age and nutraceuticals /functional food products use. Majority of the respondent belongs to age group 26 to 33 years (41%) and 34 -41 years (52%). Out of 41% between ages 26-33 years 29% use nutraceutical products. Similarly of 52 % age 34-41 years 45% uses nutraceuticals or functional food products. However, small proportion of the participants 18-25 years (5%) wherein, 3% use nutraceuticals. Moreover, 2% were between age 42-49 years and all of them prefer using nutraceuticals. Statistical test like chi square test ( $\chi^2$  test) and Pearson's correlation test is conducted to check the relevance of the data and to find out the strength of association and correlation between the different set of variables. Statistical test is significant if the p value is less than 0.05 at 95 % confidence interval with 5% allowable marginal error. In this  $\chi^2$  test and Pearson's correlation test (p-value = 0.00, r=0.001) CI=95%, 5% error. Hence there is strong association between age and nutraceutical products use.

Table 3 shows association between occupations and nutraceuticals/functional food products use. Majority of the respondents are professional (42%) of which 33% of the professional use nutraceutical or functional foods. Similarly 22% of respondents were in private or government employment of which 19% use nutraceuticals. Likewise, 17 % were home maker wherein majority (12%) of them uses nutraceuticals and among students out of 17% a significant

Table 1. Socio-Economic Profile of Respondent (N=237 Total number of respondent)

Socio-economic Profile	Sub Categories	N (%)
Age (in Years)	18-25	12(5)
	26-33	97(41)
	34-41	123(52)
	42-49	5(2)
	Above 49	-
Education	No Formal Education	-
	High School	-
	Undergraduate	-
	Diploma	-
	Graduate/Post Graduation	209(88)
	PhD	28(12)
Occupation	Home Maker	41(17)
	Student	41(17)
	Professional	100(42)
	Employed (Private)/(Government)	50(22)
	Self Employed	5(2)
	Retired	-
Income (Rupees/Month)	Below 15000	45(19)
	16000-25000	76(32)
	26000-35000	45(19)
	36000-45000	26(11)
	46000 and above	45(19)

Table 2. Association between age and nutraceuticals/functional food products use (N=237)

Age (in Years)	Yes	No	Total
18-25	3%	2%	5%
26-33	29%	12%	41%
34-41	45%	7%	52%
42-49	2%	-	2%
Total (%)	79%	21%	100%

Statistically significant  $\chi^2$  test and Pearson's correlation test (p-value = 0.00, r=0.001)  
CI=95%, 5% error

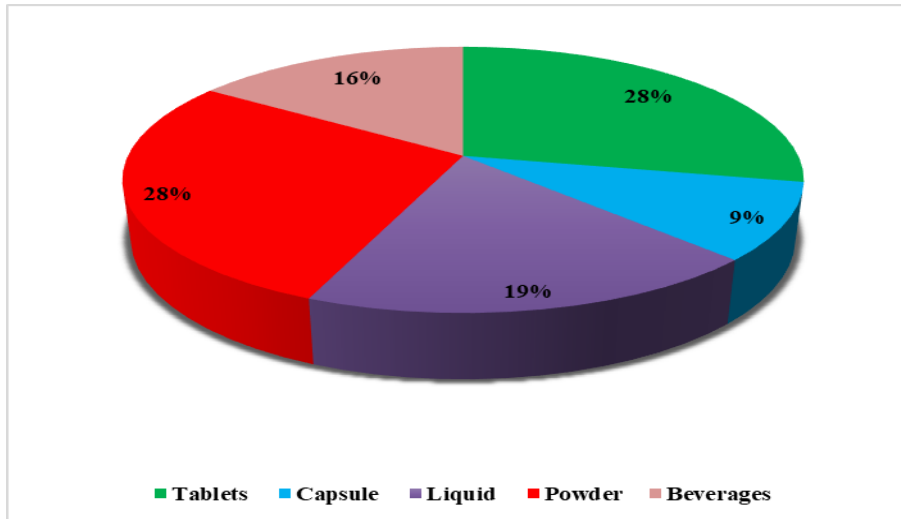


Figure 1. Nutraceuticals /Functional Foods Form consume on daily basis (n-237)

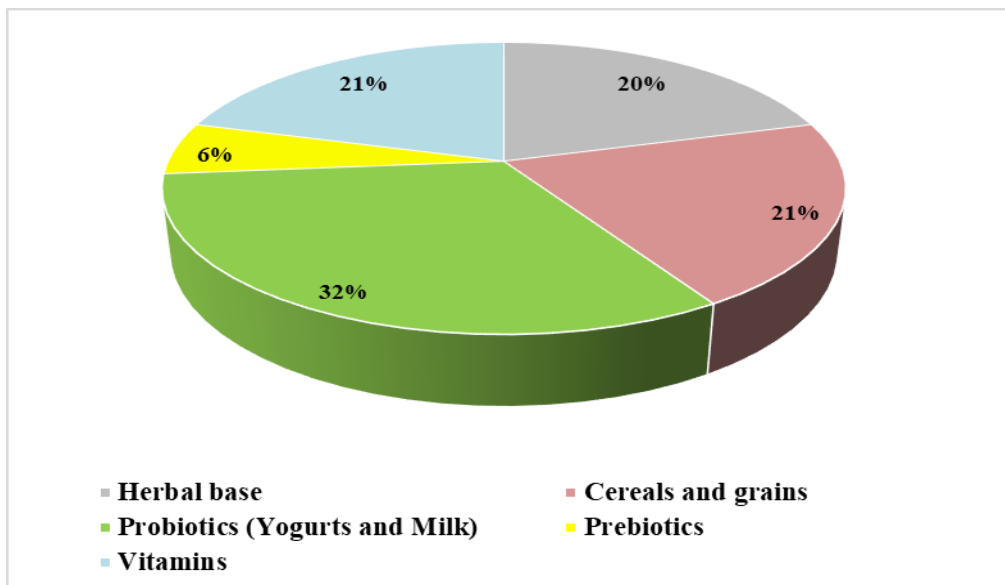


Figure 2. Various types of Nutraceutical/Functional food supplements preferred by the customers (N=237)

Table 3. Association between occupations and nutraceuticals/functional food products use(N=237)

Occupation	Yes N (%)	No N (%)	Total N (%)
Home maker	12 %	5%	17%
Student	14%	3%	17%
Professional	33%	9%	42%
Employed (Private)/(Government)	19%	4%	22%
Self-Employed	2%	-	74%
<b>Total (%)</b>	<b>79%</b>	<b>21%</b>	<b>100%</b>

Statistically significant  $\chi^2$  test and Pearson's correlation test (p-value = 0.002, r=0.000) CI=95% & 5% error

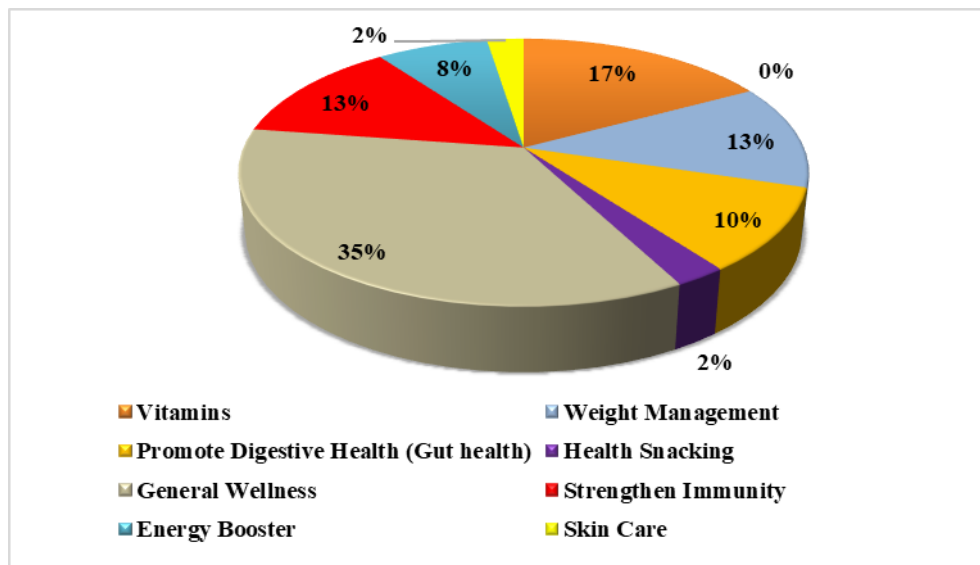


Figure 3. Consumer preferences on Nutraceutical/Functional Food Products (N=237)

proportion (14%) uses nutraceuticals. Furthermore, in the study only 2% were self-employed and all of them use nutraceuticals. Statistical test like chi square test ( $\chi^2$  test) and Pearson's correlation test is conducted to check the relevance of the data and to find out the strength of association and correlation between the different set of variables. Statistical test is significant if the p value is less than 0.05 at 95 % confidence interval with 5% allowable marginal error. In this  $\chi^2$  test and Pearson's correlation test (p-value = 0.002, r=0.000) CI=95% & 5% error. Hence there is strong association between occupation of the participants and nutraceutical products use.

### Conclusion

People across the globe has become more aware and health conscious and looking for other natural, reliable, affordable and available options. The nutraceuticals or functional foods are expected to have huge business in coming years. The current study focus to assess the consumer behaviour on nutraceutical/functional food use, health benefits, immunity against diseases especially related to immunity against corona. Further study also assessed the female consumer's behaviour and preferences related to nutraceutical or functional foods. In the present study, the majority of the participants (70%) are aware of the various nutraceutical products that are available in the markets.

Furthermore, respondent use nutraceutical products on daily basis as they are beneficial for general health, wellness and also enhance the immunity. Beside this due to Corona pandemic people are more cautious about their health. The larger majority of respondent (67%) responded that nutraceuticals boost immunity and provide immunity against corona virus infection. Additionally, the respondent preferences on nutraceutical product consumption form on daily basis it was found that significant proportion of participants (34.6 %) consume nutraceuticals in form of tablet and powder it's clear that people like to have tablets, powder and liquid form to products for consumption on daily basis. Moreover, health drinks, energy drinks, protein powders, other health powders that can be consumed with milk are very popular among the consumers. In the study a considerable proportion of respondent (32.4%) prefers nutraceutical probiotics (milk or yoghurt) on regular basis. The most popular nutritional and healthy breakfast is cornflakes with added minerals, Iron and Vitamins. Furthermore, yoghurts are the most popular among prebiotics and also available in different flavors is the most readily available product in supermarkets. The nutraceuticals are widely consumed for various purpose for maintaining health and wellbeing. The majority of the respondent (35%) uses nutraceuticals for general wellness, whereas 17% consume nutraceuticals for vitamin supplements. In the



research project it was found that majority (38%) of the respondents use nutraceuticals by suggestions from friends and their family.

In the current research project different the socio-economic variables such as age, gender, income and occupation were cross linked with other variable like consumer preference related to use of nutraceutical or functional foods, health benefits of nutraceuticals, nutraceuticals boost immunity and help to fight corona disease. However, further the more research is required in the emerging demands of nutraceuticals among the female at all age group. Women in the ongoing pandemic are exploring better health supplements to boost immunity and preserve general wellbeing.

### References

1. Shahidi, F. (2012). Nutraceuticals, functional foods and dietary supplements in health and disease. *Journal of food and drug analysis*, 20(1), 226-230.
2. Swaroopa, G., & Srinath, D. (2017). Nutraceuticals and their health benefits. *Int J Pure App Biosci*, 5(4), 1151-5.
3. Prabu, S. L., Suriyaprakash, T. N. K., Kumar, C. D., & Kumar, S. S. (2012). Nutraceuticals and their medicinal importance. *International Journal of Health & Allied Sciences*, 1(2), 47.
4. Kaur, S., Kumar, M., Pandit, K., Kumar, A., & Kaur, S. (2019). Potential health benefits of nutraceuticals for human health. *Evaluation of Environmental Contaminants and Natural Products: A Human Health Perspective*, 193.
5. Sauer, S., & Plauth, A. (2017). Health-beneficial nutraceuticals—myth or reality?. *Applied microbiology and biotechnology*, 101(3), 951-961.
6. Moldes, A. B., Vecino, X., & Cruz, J. M. (2017). Nutraceuticals and food additives. In *Current Developments in Biotechnology and Bioengineering* (pp. 143-164). Elsevier.
7. Torabally, N. B., & Rahmanpoor, H. A. (2019). Nutraceuticals: Nutritionally Functional Foods “an Overview. *Biomedical Journal of Scientific & Technical Research*, 15(4), 1-3.
8. Kapoor, N., Jamwal, V. L., Shukla, M. R., & Gandhi, S. G. (2020). The Rise of Nutraceuticals: Overview and Future. In *Biotechnology Business-Concept to Delivery* (pp. 67-92). Springer, Cham.
9. Anis, M., Al Taher, G., Sarhan, W., & Elsemary, M. (2017). Nutraceutical Industry. In *Nanovate* (pp. 193-215). Springer, Cham.
10. Nagar, P. (2018). Current Concepts and Prospects of Herbal Nutraceutical. *International Journal of Pharmacy & Life Sciences*, 9(2).
11. Routray, W., & Orsat, V. (2017). Plant by-products and food industry waste: A source of nutraceuticals and biopolymers. In *Food Bioconversion* (pp. 279-315). Academic Press.
12. Grand View Research (2020). Nutraceutical Market Size, Share & Trends Analysis Report by Product (Dietary Supplements, Functional Foods, Functional Beverages), By Region, And Segment Forecasts, 2020 – 2027. Retrieved from <https://www.grandviewresearch.com/industry-analysis/nutraceuticals-market>.
13. Dwyer, J. T., Coates, P. M., & Smith, M. J. (2018). Dietary supplements: regulatory challenges and research resources. *Nutrients*, 10(1), 41.
14. Malla, S., Hobbs, J. E., & Sogah, E. K. (2014). Functional foods, health benefits and health claims. *Athens Journal of Health*, 1, 37-46.
15. Chauhan, B., Kumar, G., Kalam, N., & Ansari, S. H. (2013). Current concepts and prospects of herbal nutraceutical: a review. *Journal of advanced pharmaceutical technology & research*, 4(1), 4.
16. Augustin, M. A., & Sanguansri, L. (2015). Challenges and solutions to incorporation of nutraceuticals in foods. *Annual review of food science and technology*, 6, 463-477.
17. Boccia, F., & Peluso, F. (2018). Future food and economic

sustainability: the nutraceutical technology. *Calitatea*, 19 (167), 140-145.

18. Keservani, R. K., Kesharwani, R. K., Vyas, N., Jain, S., Raghuvanshi, R., & Sharma, A. K. (2010). Nutraceutical and functional food as future food: a review. *Der Pharmacia Lettre*, 2(1), 106-116.
19. Borkar, N., Saurabh, S. S., Rathore, K. S., Pandit, A., & Khandelwal, K. R. (2015). An Insight on Nutraceuticals. *PharmaTutor*, 3(8), 13-23.
20. Kumar, V., & Jena, M. (2020). In silico virtual screening-based study of nutraceuticals predicts the therapeutic potentials of folic acid and its derivatives against COVID-19.