

“To study consumer perception towards Spirulina Bar”

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INTRODUCTION

Forecasts indicate that the world population will peak at 9.2 billion by 2075, having reached 8.9 billion in 2050, raising serious concerns about the future availability of protein. There is a growing global middle class and rising living standards at the same time, which drives up demand for animal-based protein. Freshwater and land resources are under tremendous strain from the production of traditional protein, especially when plant protein is converted to animal protein. Thus, fresh strategies for addressing the protein supply in the future must be put into practice.

The FDA has classified spirulina, a microalgae belonging to the Cyanobacteria group, as a material that is widely recognized as safe since 1981. Spirulina was first used as food by the Aztecs and other African nations thousands of years ago. Like many other plant-based super foods, spirulina is completely safe for consumption by both adults and children. Spirulina is a full vegetarian protein source when eaten as food. It can be an amazing supplement for both adults and kids if it is taken responsibly and sourced.

Scientific Classification :

Phylum: Cynobacteria

Class: Cyanophyceae

Order: Oscillatoriales

Family: Microcoleaceae

Genus: Arthrospira

Species: A. platensis

Botanical Name: Arthrospira Platensis

The overwhelming majority of Spirulina that is sold as nutritional supplements comes in the form of tablets, capsules, and dry powder. The current food aid programs offered by a number of organizations, including Phycon, Agama, and a few others, concentrate on treating malnutrition and preventing hunger, particularly with regard to the requirements of small children who are most vulnerable. Demand for sophisticated microalgae products is rising as more people want to improve their health and stave off illness by incorporating these microalgae into their regular diets in the form of foods and/or ingredients rather than as pills or capsules. In the food sector, appealing, cutting-edge goods made from microalgae and/or their derivatives are making a strong impression.

Microalgae of the species *Spirulina platensis* are extensively distributed and can be found in freshwater, brackish water, or marine habitats. This autotrophic, unbranched, blue-green microalga is distinguished by filaments made of multicellular trichomes shaped like spirals and columned cells that combine to form twisted filaments with spiral shapes. Protein values in *Spirulina platensis* range from 60% to 69%, lipid levels from 5% to 7%, carbohydrate levels from 16% to 20%, and carotenoid levels from 650 mg/100 grams. The microalga *Spirulina platensis* is abundant in provitamin A carotenoids, including β -carotene. With β -carotene levels at least 50 times greater than carrots, *Spirulina platensis* is a great material to boost β -carotene levels in a variety of food products.

Spirulina platensis has been extensively used in the healthy food industry. These microalgae are not only readily digested but also contain essential nutrients that the human body needs, including vitamins, minerals, amino acids, lipids, carbs, protein, and several beneficial colors. The dried powder of this microalga is sold as health food in some countries, including Spain, Switzerland, Australia, Japan, and America. It has also been used as a medication.

The health advantages of spirulina are associated with polyunsaturated fatty acids and plant-derived proteins; the protein source is low in calories and cholesterol. Spirulina's "healthy" qualities are completed by minerals and antioxidants. The disadvantages of *Spirulina platensis* are the fishy odour disliked by consumers and the grainy texture due to the large particles of the microalgae. These problems become obstacles in the study of the addition of dry biomass *Spirulina platensis* into chocolate bars.

Benefits of Spirulina: -

1. GLA (Gamma Linolenic Acid)

2. Vitamins

1. Vitamin E:
2. Vitamin C (Ascorbic Acid)
3. Beta Carotene (Vitamin A)

3. Minerals

4. Builds immunity

5. Supplements Protein Requirements

6. **Powerful Antioxidants and Anti-Inflammatory Properties.**
7. **Improve Muscle Strength and Endurance.**

REVIEW OF LITERATURE

• Louise Neilson et al.2022 :-

Further information about the acceptance and awareness of algae among a sample of UK consumers can be found in Consumer awareness and Acceptance of "Algae" as a Protein Alternative. Results imply that algae are still a unique source of nutrition. Even though consumers seem receptive to eating goods made from algae, more education about the health advantages of eating algae is required to allay worries about familiarity, food processing, and desired taste. For instance, conveying the advantages of integrating more wholesome and sustainable foods in a consumer's diet using marketing and advertising techniques, such as offering recipes and providing examples of how to use them. Additionally, product sampling could be incorporated into marketing techniques to lower obstacles associated with buy willingness. Additionally, despite the variation in expected price, it appears that appropriate pricing needs to be considered, in order to increase the likelihood of healthy and sustainable food consumption.

• **Potter, Stojceska, and Plunkett, 2013:-**

Data from UNICEF (2016) showed that 22.9% of children under five have stunted growth globally. Undernutrition is a contributing factor in about half of all pediatric fatalities (five years of age and younger), or three million young lives lost annually. 52 million children under five were considered wasted worldwide, of which 17 million were classified as highly wasted. This suggests a prevalence of roughly 2.5% and 7.7%, respectively. It is imperative that disorders associated to protein insufficiency be addressed among the younger demographic. The past several years have seen a rise in the demand for snack products with better nutritional qualities because of their high functionality, convenience, and appeal, particularly to kids. Bars of high-protein nutrition (HPN) with 20–50 g of protein per 100 g are one of the ways of incorporating a substantial amount of protein into the diet of children.

• **(Batista et al., 2017; Morais et al., 2006) (Lucas et al., 2017):-**

Spirulina has received FDA approval as a safe food that has no adverse effects on human health and has been certified as GRAS (Generally Recognized as Safe). The substances found in spirulina biomass have the potential to treat diseases by acting as antioxidants, antivirals, antibacterials, anticancer agents, and anti-inflammatory agents. Spirulina is already added to foods like pasta cookies and ready-to-eat (RTE) extruded snacks. In 2017 Pinto et al.- Energy bars are becoming more common in children's diets and are thus regarded as ready-to-eat food. In addition to their great sensory quality, these foods' adaptability has drawn customers. Studies have been conducted to see if bioactive components may be added to snack bar formulations to provide healthier options.

• **Müller & Krawinkel, 2005:-**

United Nations Children's Fund, 2018; World Health Organization, 2014; 2015: Low-nutrient diets—such as those deficient in protein or minerals—affect children's growth and development as well as the prevalence of disorders. More than 170 nations passed a political declaration in 2014 at the Second International Conference on Nutrition, pledging to guarantee that everyone has access to more sustainable and healthful diets. By 2025, these nations ought to have achieved tangible outcomes by means of resolute policies and measures.

• **Batista et al., 2017; Rodríguez De Marco et al., 2014:-**

In this case, the population's nutritional health has been enhanced by the usage of the microalga spirulina, which has a high concentration of nutrients and biochemicals. Protein, beta carotene, GLA, B vitamins, minerals, chlorophyll, sulfo-lipids, glycolipids, superoxide dismutase, phycocyanin, enzymes, RNA, and DNA are all found in abundance in spirulina, which is the most comprehensive food supply of these nutrients.

• **Stephanie Grahl, et. Al., 2018:-**

The conceptualization of novel food products based on spirulina (*Arthrospira platensis*) and the resulting consumer expectations is known as consumer-oriented product development.

• **Veronika Somoza on 18 May 2020**

Larger trials are needed, although the evidence supporting the beneficial effects of Spirulina in allergic rhinitis is sufficient. Spirulina is thought to have anticancer properties due to β -carotene, a well-known antioxidant; nevertheless, there is no concrete evidence linking β -carotene levels to

carcinogenesis because the etiology of carcinoma is often complex. Larger trials are necessary before any firm findings can be drawn, despite some encouraging research on spirulina's ability to decrease cholesterol. Finally, there aren't any high-quality research studies examining the function of spirulina in antiviral and chronic fatigue treatments. Spirulina is currently thought to be a safe food supplement with little adverse effects, according to the research, but its potential as a medication is still unknown.

MARKET ANALYSIS

As consumers are focusing more towards healthy lifestyle, the market potential for nutrition products is gaining traction. In the recent past the market for nutrition products has increased in many folds. Protein bars are considered as major innovation in the nutrition industry. Protein bars are considered as good source of protein by many dieticians.

There are various companies into manufacturing of protein bars such as Muscleblaze, RiteBite, Yogabar, Asitis Nutrition, Etc. These bars provide 20-25 gm of protein from 65-80 gm bar varying brand to brand. These bars are majorly synthetic protein based and contains many synthetic chemicals. With increasing awareness towards harmful impact of synthetic contents in protein bars there is been increase in production of plant based protein bar which have no synthetic chemicals present.

Spirulina is been used prominently in plant based protein bars as it is good source of plant protein and rich in various antioxidants, vitamins and minerals. As spirulina is gaining more awareness among the consumers many new companies are in to manufacturing of Spirulina based protein bars. Many companies such as Mettle, Bitobite, Anaganaga, etc are producing protein rich spirulina bars.

METHODOLOGY

An internet tool called "Google forms" was employed to conduct the poll. A few personal questions were asked, including name, age, and mailing address. An explanation of the benefits of spirulina in diet was made reference to. A series of health-related questions were then asked, and appropriate answers were given. Social media sites like WhatsApp and Instagram were used to distribute the poll link, encouraging participation from users of all ages and locations.

Description:-

Spirulina is an algae rich in a range of vitamins and minerals essential for maintaining a healthy immune system, like vitamins E, C, and B6. Research finds that spirulina also boosts the production of white blood cells and antibodies that fight viruses and bacteria in your body. Spirulina is considered as super food and also it is the vegan protein source. Exercise-induced oxidative damage is a major contributor to muscle fatigue. Certain plant foods have antioxidant properties that can help athletes and physically active individuals minimize this damage. Spirulina appears beneficial, as some studies pointed to improved muscle strength and endurance. In two studies, spirulina enhanced endurance, significantly increasing the time it took for people to become fatigued.

Questions:-

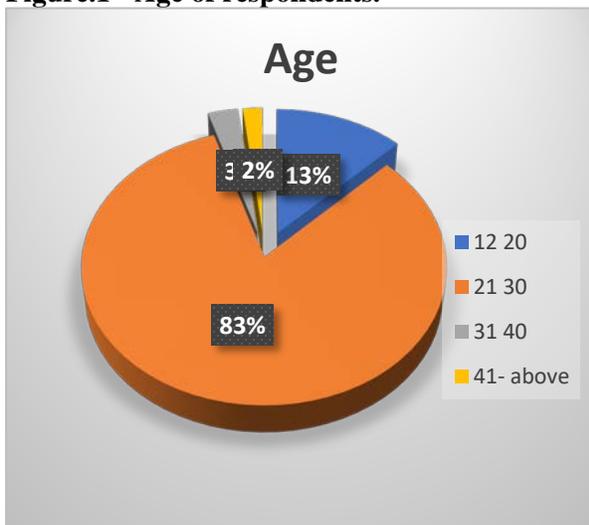
1. Do you consider health as a priority ?
2. Do you consider protein rich product ?
3. Are you aware about chemicals in regular protein bar ?
4. Would you consider plant based protein bar over other protein bars?

5. Are you aware about Spirulina and its Benefits?
6. Do you think Spirulina Chocolate bar can be a good substitute for all protein bars available in market?
7. Do you consider accepting Spirulina bar on following parameters?
 - i. Nutrition
 - ii. Taste
 - iii. Odor
 - iv. Appearance
 - v. Price
8. How likely would you accept Spirulina bar with different flavors?
9. Is it a good step to change consumption habit of protein of current and future generations?

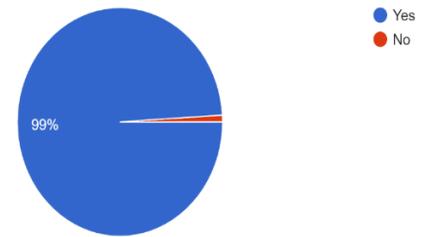
RESULT

About 104 people responded to the poll conducted online using the Google Platform. The responses that were received are shown graphically below. The age range of all responders was between 12 and >41.

Figure.1- Age of respondents.

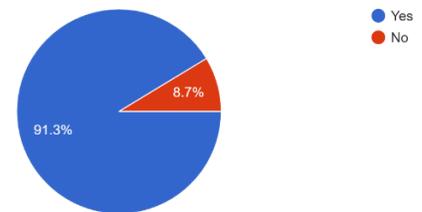


Do you consider health as a priority?
 104 responses



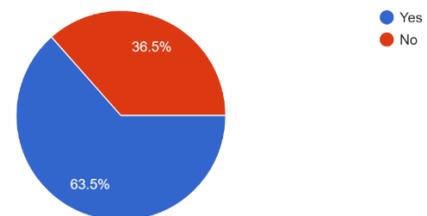
Here, 103 respondents(99%) responded health as a priority over 1 respondent not considering health as a priority.

Do you consider protein rich product in diet?
 104 responses



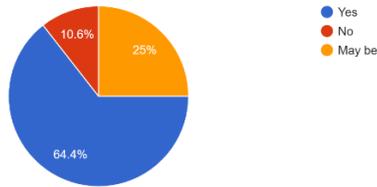
Answering the above question, 95 respondents(91.3%) considered Protein rich product in diet over 9 respondents(8.7%).

Are you aware about chemicals in regular protein bars?
 104 responses



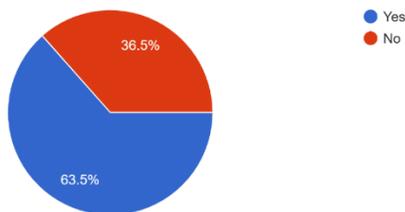
Answering the above question, 66 respondents (63.5%) are somewhat aware about chemical contents present in regular protein bars over 38 respondents (36.5%) who are unaware about the same.

Would you consider plant based protein bar over chemical based protein bar ?
104 responses



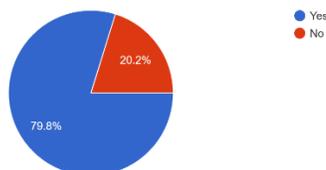
Answering the above question, 64 respondents(64.4%) shown willingness to consider plant based protein bar over other protein bars, whereas 11 respondents(10.6%) where unwilling and 26 respondents (25%) said maybe.

Are you aware about Spirulina and its benefits?
104 responses



Answering the above question, 66 respondents (63.5%) were aware about Spirulina and its Health benefits while 38 respondents were unaware about the same.

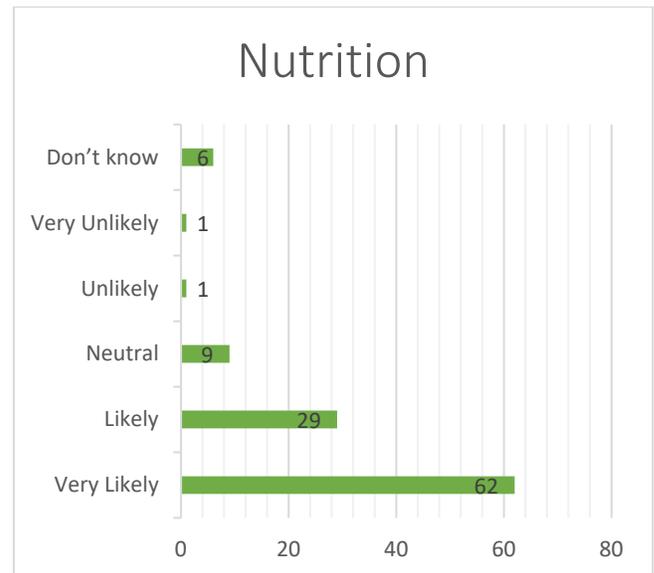
Do you think that spirulina bar can be a good substitute for all protein bars available in marke
104 responses



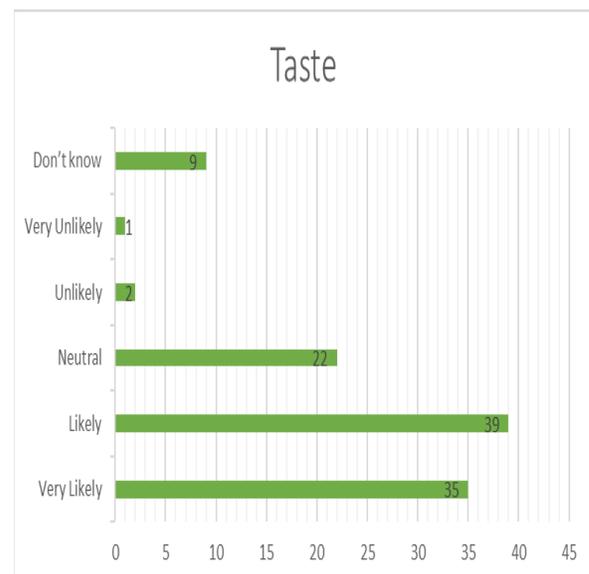
Answering the above the question, 83 respondents (79.8%) think spirulina bar can

be a good substitute for all protein bars over 21 respondents(20.2%).

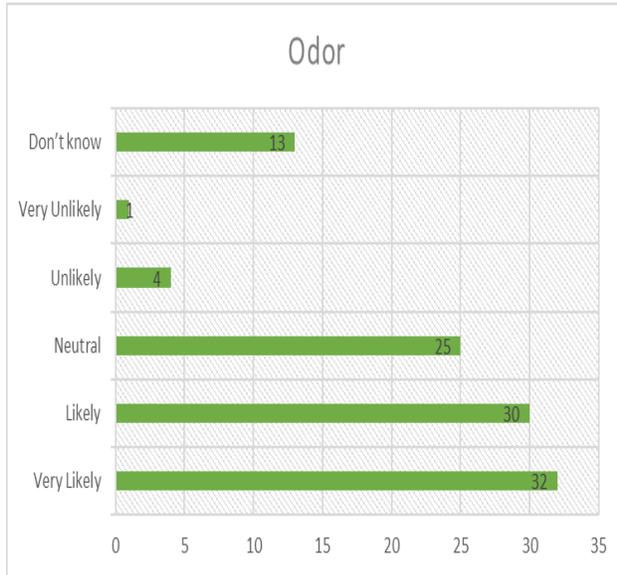
- Do you consider accepting Spirulina bar on following parameters?



While considering above question with Nutrition as a parameter, 62 respondents responded very likely, 29 responded likely, 9 responded Neutral, 2 were negative and 6 were unaware.



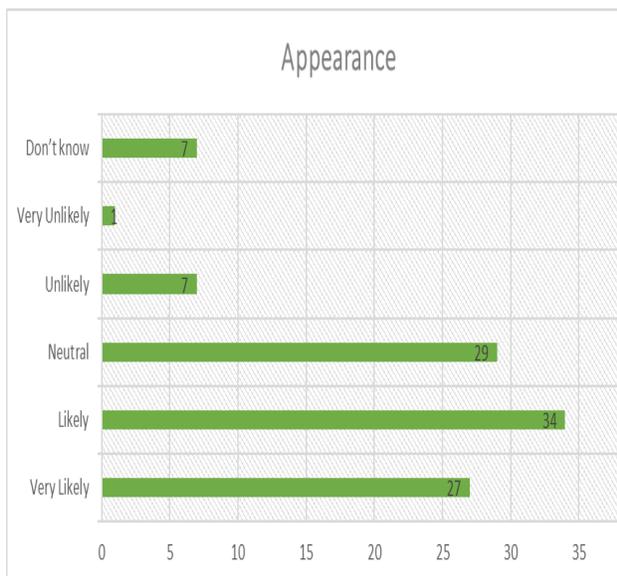
When considered Taste as a parameter, 35 respondents responded very likely, 39 responded likely, 22 responded Neutral, 3 were negative and 9 were unaware.



When considered Odor as a parameter, 27 respondents responded very likely, 34 responded likely, 29 responded Neutral, 8 were negative and 7 were unaware.

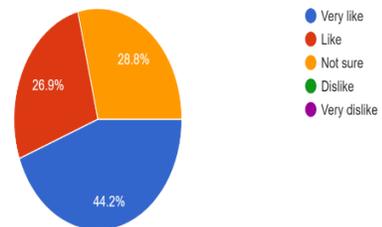


When considered Odor as a parameter, 32 respondents responded very likely, 30 responded likely, 25 responded Neutral, 5 were negative and 13 were unaware.



When considered Odor as a parameter, 32 respondents responded very likely, 22 responded likely, 36 responded Neutral, 3 were negative and 13 were unaware.

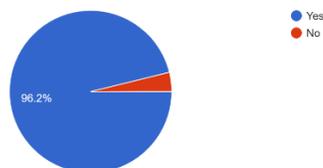
How likely would you accept spirulina bar with different flavors as a healthy substitute?
 104 responses



Answering the above question, 46 respondents(44.2%) highly agreed with having different flavors in Spirulina bar,

while 28 respondents(26.9%) shown somewhat interest and 30 were unaware.

.Is it a good step to change a consumption habit of protein of current and future generations?
104 responses



100 respondents(96.2%) considered changing consumption habit of current and future generations a good step against 4 respondents(3.8%).

CONCLUSION

The Present study attempted to focus on consumer's acceptance towards Spirulina protein Bar. The survey indicated that consumer is the ruler in the commercial market. Consumer acceptance is very much essential when considering launching and success of any particular product.

Consumers of various different age group influenced their behaviour towards Spirulina protein bar. From the survey it was reported that factors influencing consumer to accept such products, major concern for their consumption and many more things which were use for production of Spirulina protein bar. Most of the respondents belong to age group of 21-30. It was found that almost all respondents consider health as a priority. As most of the respondents are from younger age group it can be assumed that they are well educated and hence responded towards considering Protein rich products in their diet.

It was found that most of the respondents are aware about presence of chemicals in regular protein bars and they are aware about Spirulina and its benefits towards mankind.

Overall, the response for acceptance of Spirulina protein bar was good in number. Respondents by looking at the responses were willing to change protein consumption habit towards Spirulina protein bar. The survey provided positive feedback on Spirulina protein bar and paved way to its acceptance if it gets marketed.

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