

# Home Based Supplementary Powders and Their Health Benefits

Project Report

Submitted to the Chandigarh University in partial fulfillment of the requirements for the degree of

B.Sc. Nutrition and Dietetics in

Nutrition and Dietetics  
(Minor Subject: Food Technology)



By

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Any omission in this brief acknowledgement does not mean lack of gratitude.  
Thanking you



Aashina Bhatia (18B12D028) Chandigarh University, Mohali 10May, 2021

**CERTIFICATE-I**

This is to certify that the dissertation entitled, “**Home based supplementary powders and their health benefits**” submitted for the degree of B.Sc. Nutrition and Dietetics in the subject of **Nutrition and Dietetics (Food Technology)** of the Chandigarh University, Gharuan, Mohal-140413 is a bonafide project work carried out by **Ms. Aashina Bhatia (18BND1028)** under my supervision and that no part of this dissertation has been submitted for any other degree.

The assistance and help received during the course of investigation have been fully acknowledged.

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**CERTIFICATE-II**

This is to certify that the dissertation entitled, “**Home based supplementary powders and their health benefits**” submitted by **Ms. Aashina Bhatia (18BND1028)** to the Chandigarh University, Mohali, in partial fulfillment of the requirements for the degree of B.Sc., in the subject of **Nutrition and Dietetics (Food Technology)** has been approved by the Student’s Advisory Committee after an oral examination on the same.

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**ABSTRACT**

Many health supplements are available these days but not all are healthy. Many have side effects which pose adverse health effects that may last till life. With fancy packaging and fancy cost they come with no therapeutic benefit. They only build the muscles but not give them strength. There are various ingredients which we use on a daily basis unaware of the fact that they are more benefitting and healthy choice over synthetic supplements. But as a consequence of our sedentary life style, physical activity level and non- availability of fresh food products people are more prone to life style disorders such as diabetes, hypertension, gastrointestinal disorders and deficiency disorders. To eradicate these health problems, homemade supplementary powders prove to be a big relief. The enormous nutritional, nutraceutical and phytochemical components have various therapeutic effects neutralizing various disorders.

*Keywords: Supplements, Lifestyle Disorders, Deficiency Disorders.*

A handwritten signature in black ink, appearing to read 'Abhinav', with the date '12/7/2021' written below it.

**Signature of the Student**

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## CHAPTER ONE INTRODUCTION

It's a fact that no synthetic nutrient can replace a healthy balanced diet. But even after having a balanced diet, *why everyone is suffering from various lifestyle disorders? Is our diet not fulfilling our body requirement or are we not having healthy food or our body is not able to metabolize and absorb all the nutrients from our diet?* If so, then what needs to be done? *Is this not a huge problem? How to solve this problem?* Asking from a nutritionist or any health advisor, we get a solution – **"SUPPLEMENTS"**. So now another question arises. *What are these supplements? Are they really necessary to take these medicines like objects?? Do they have any side effects? Aren't they costly? Is any home-made substitute available at a cheaper rate with an amazing taste and enormous health benefits?* Let's look upon each and every question in detail.

Balanced diet is one which contains different types of foods in such quantities and proportions so that the need for calories, proteins, minerals vitamins and all essential mineral nutrient needs are adequately met and a small provision is made for extra nutrients to withstand short duration of leanness and it covers energy expenditure for tissue maintenance, growth and repair. Besides meeting nutritional requirements; a healthy balanced diet provides us with bioactive phytochemicals such as dietary fibers, antioxidants, nutraceuticals that provides us various health benefits; it improves our longevity; prolongs productive life; prevents degenerative diseases; improves immunity; increases endurance level; develop optimum cognitive ability; helps in coping up stress and many more beneficial health effects.

Yet even if you eat a healthy well balanced diet, you may still fall short of needed nutrients. That's a consequence of aging. As we get older our ability to absorb nutrients from food decreases. Also our energy and nutrient needs aren't same at any stage of the life. It varies from infancy to geriatric stage. Even no two individuals of same age have same body needs. Besides, there are numerous nutrients which we are unable to absorb from food as either they are in bound form or not in their bioactive form to be observed. Not only this, some anti-nutritional components also play a game here by hindering the absorption. To shut these anti-nutritional factors, we need to upgrade our cooking process from „what's easy to cook" to „how to cook in an appropriate manner" and what all pre and post processes are required for consuming meals.

It is also observed that many people these days have contracted lifestyle and metabolic disorders. Heavy workers have an amazing body during day time, but have severe leg cramps and nerve twitching at night whereas lazy people become so obese and overweight to be called healthy rather than fatty are not even able to move from their bed to kitchen. Light workout only makes their body pain like hell. Some have diabetes and some are cardio vascular disease patients. Someone's liver is not healthy, while another person needs a high power eye lens to see this beautiful world. From children to adults everyone has some or the other basic nutrient deficiency or metabolic lifestyle disorder.

A. *Can a Supplement Make Up the Difference? Let's See!!!*

### ➤ *Supplements-*

Under Dietary Supplement Health Education Act, dietary supplements are defined as products intended to supplement our diet that contains at least one of the following: a vitamin, a mineral, an herb, or other botanical, or an amino acid; or it can be defined as a substance used to supplement the diet by increasing total dietary intake. A dietary supplement can also be defined as a concentrate, metabolite, constituent, extract or combination of any previously described ingredients. Dietary supplements can be in the form of tablet, pills, capsule, powder, soft gels, gel caps, or liquid.

Dietary supplements thus seem to be an obvious way to plug gaps in your diet. They can be beneficial to health but taking supplements also involves health risks. For example, taking too much of a particular nutrient without realizing it itself becomes a poison. But then there are multivitamins or multi nutrient supplements available whose evidence about benefits is still mixed. According to a study conducted at Nutrition department at Harvard School of Public Health, multivitamins were found to reduce the risk of cancer and cataracts in men to some extent, but at the same time it didn't reduce the deaths from heart diseases. Besides, supplements have major side effects and are costly too.

B. *So Now, what Should be done??*

According to doctors and some dietitians, we need to switch from synthetic supplements to our home based diet. Nutrients are more potent from the food rather than in supplementary form. Thus, there is a need to improve diet before turning to supplements. The food not only offers us nutrients but also certain non-nutrient components such as flavonoids, phytochemicals, antioxidants, anthocyanin pigments, etc. that have enormous health benefits. Also, food tastes better than supplements. All we need to do is alter our diet in such a way it fills the gap of missing nutrients.

C. *Home Based Dietary Supplements –*

The nutrients especially micronutrients available from food are in a very less quantity, which do not fulfill our bodily requirements leading to certain disorders. Now, after looking upon the scenario of supplements, what should we do? *Is there any home-made solution available to these disorders without side-effects?*

The answer to above given question is *yes*. There are some *nuts, spices, herbs, and condiments, seeds* which have certain medicinal properties along with their nutritional and non-nutritional components. These can be used in their blend and whole form to form a solution that gives both energy and nutrients and is healthy too both for children and geriatric people. Along with its cost effectiveness, these blend home-made supplements offers taste along with satiety. Plus, they are hygienic, and can be processed very easily at our homes and can be stored too.

*D. Why Nuts, Spices, Condiments, Seeds, and Herbs?*

- *Nuts*- Nuts are one seeded indehiscent fruits or seeds with a specific taste and flavor obtained from plants. They can be consumed in the form of paste, dry powders, and whole nuts and can simply be consumed by garnishing them on various cuisines. These nuts are essentially rich in fats, calories and are an excellent source of proteins too. They are a good source of energy and certain vitamins and minerals, especially, vitamin A, B, E, calcium, magnesium, iron, potassium, sodium and phosphorous. They are not a good source of carbohydrates and roughage except chestnut.
- *Herbs, Spices And Condiments*- Till now, we have been using spices and condiments in our day to day life in order make our food more palatable, tasty and acceptable. More than 70 spices and condiments are being used from traditional times. India is considered to be “home of spices”. But besides adding taste to food, there are certain spices and condiments and herbs which are rich in certain non-nutrient and nutrient components. They do not provide us energy but are rich in certain phytochemicals and nutraceuticals such as antioxidants, flavonoids, dietary fiber and many more. Because of such components, these small-small herbs and spices offers us various medicinal properties helping us fight with diabetes, gastrointestinal disorders, respiratory and various other diseases and disorders.

*E. Objectives of Making Home Based Supplementary Powders-*

- To provide health benefits using basic dietary components.
- To supplement the diet with cost effective healthy options.
- To obtain nutritional and medicinal benefits directly from food.
- To replace synthetic medicinal supplements with freshly made hygienic and healthy supplements at home.
- To eradicate certain lifestyle disorders and provide a productive and long life.

## CHAPTER TWO

### REVIEW OF LITERATURE

A. *Certain Nuts, Spices, Herbs, Condiments and Seeds are there which are Efficient to Provide us Energy, Nutritional Components and Various Health Benefits in Both Blend and whole Form. Plenty of Research Work has Already been done on The Beneficial Effects of these Food Items. the Work done Previously has been Analyzed and Reviewed Under Following Major Leads-*

- Nutritional components
- Nutraceuticals components and their benefits
- Medicinal effects
- Antioxidant properties

➤ With Respect to Almonds

Astrup, A. et al. (2009), focused upon the various health benefits provided by almonds in his research study. He explained that almonds lower blood cholesterol level; reduce the risk of heart disease, control body weight and diabetes. He explained well about the nutrient density of almonds and their beneficial effects are the reason why they should be a part of our healthy balanced diet.

Fatima, T. et al. (2018), discussed about the health benefits of almonds and its uses in various traditional Indian dishes. She mainly focused upon the mineral composition and proximate nutrient composition of four different almond species. The health benefits of almonds in controlling blood glucose levels in diabetic patients have been well enlightened via this review paper.

➤ With Respect to Fox Nuts

Mahawar, K. H. (2016) provided detailed information on production, cultivation, technologies involved, and supply chain of makhana"s or fox nuts via his research study.

Francis, A. (2018) discussed about the fox nuts and its flour processing along with its various health benefits. He used this flour for making cookies and compared it with other cuisines too. He also described the sensory properties of fox nuts, its flour and its dishes. The fox nuts and its flour not only improves the daily lifestyle of an individual but also replaces lots of additional food stuffs as it has got so many health regeneration potential. The high amount of magnesium, proteins and regeneration properties along with their anti- ageing properties and low glycemic index makes them the perfect ingredient in our daily diet.

BRI, J. et al. (2019) discussed the increasing influence of protein based diet. Their study not only showed the sensory and organoleptic analysis of different products made from fox nuts or makhana"s but also provided the detailed information on low fat content, high carbohydrate and high protein content of fox nuts.

Tehseen, S. et al. (2020) outlined the health benefits of fox nuts by describing them as health promising fruit commonly called as makhana"s. These makhana"s have high amount of carbohydrates, proteins, ash, crude fiber, minerals such as Mg and various phytochemicals. It provides many traditional medicinal effects that help us fight against many human disorders of digestive, respiratory, excretory, circulatory and reproductive systems. These are used as a natural source of antioxidants and for its anti-diabetic, anti- hyperlipidemic benefits. It has low sodium and potassium content thus helps in lowering blood pressure.

➤ With Respect to Muskmelon and its Seeds

Parle, M. (2011), discussed about the origin of muskmelon and its various phytochemicals and its health benefits via his research study. He phrased his paper by saying that, "Muskmelon is eat-must melon".

Purushotham, B. et al. (2020) researched on muskmelon using HPLC techniques to study the phenolic components of muskmelon. He also discussed the medicinal and anti- cancerous properties of muskmelon extracts. Besides he used HPLC technique and GC-MS for metabolite profiling of *Cucumis melo L.* seeds and whole fruit and their solvent extracts.

➤ With Respect to Fennel Seeds

Khan, M. (2014) outlined the therapeutic effects and nutraceutical components of fennel seeds along with its medicinal properties such as antioxidant, anti-inflammatory, anti- cancerous, anti-fungal, anti-bacterial, anti-viral and ant nociceptive activities. He thus referred fennel seeds as the medicinal herb.

Akbar, S. (2018) referred fennel seeds as a common spice with unique medicinal properties. He discussed the use of fennel seeds in various medicinal practices. Various pharmacological and phytochemical properties such as its nutritional composition, antioxidant, anti-inflammatory, anti-spasmodic, diuretic, anti- hypersensitive, anti- microbial, gastro protective, estrogenic, hepato-protective and anti-thrombotic activities have also been discussed well.

➤ With Respect to Black Chickpeas or Black Gram or Kale Channe

Jukanti, A. (2012) discussed about the nutritional composition of black chickpeas along with its nutraceutical components and beneficial effects on diseases like CVD, Type 2 diabetes, degenerative disorders, digestive diseases and some cancers.

Togay, Y. et al (2019) conducted an experiment to determine the quality criteria and nutrient contents of local black chickpeas genotype growth in different locations. He outlined the variation in nutritional composition of 7 different genotypes of black chickpeas found in Turkey. The nutritional composition of genotypes found in turkey could be related and compared to the genotypes found in our own country.

➤ With Respect to white Pepper *Piper Nigrum* L.

Singh, S. et al. (2013) investigated the antioxidant and antimicrobial and anti-inflammatory potentials of volatile oil and oleoresins of white pepper. Gas chromatography-Mass spectrometry was used to analyze 40 different components constituting approximately 97.7% of volatile oil. Presence of certain nutraceutical components such as limonene, sabinene, beta-caryophyllene and torreyol was observed. Piperine is the major component of white pepper.

Zeng, F. et al (2013) studied the chemical quality (total lipid, total protein, starch, Piperine, and essential oil) and flavor quality of white pepper derived from 5 new genotypes.

➤ With Respect to Carom Seeds or Ajwain

Ishtiaque, S. et al (2014-2015), outlined the antioxidant properties and phenolic contents of Ajwain, mustard, fenugreek and poppy seeds. Polyphenols are the major constituents of natural antioxidants obtained from fruits, leaves and seeds etc. This study revealed that Ajwain is a potent source of natural antioxidants and can be used to replace the synthetic antioxidants. This study also suggested that natural antioxidants can be utilized for food safety and for increasing the shelf life of the food and secures the health effects.

Shahida et al. (2019) isolated various bioactive components of carom and discussed its various uses for medicinal and health purposes. Carom is used as a natural, safe and cost effective therapy for a number of health concerns because of its detoxifying, anti-bacterial, anti-viral and calming properties. Ajwain seeds are very valuable for its oil contents. It is most commonly used as a home remedy for diarrhea, asthma, colic and dyspepsia and it also have antifungal, anti-bacterial, anti-helminthic, antioxidant properties. The active components of Ajwain essential oils are phenolic carvacrol and mainly thymol. Both of these are responsible for anti-tussive and antiseptic properties. The phenolic compound thymol is germicide, anti-fungal and antispasmodic agent. The extraction and isolation techniques used for the separation of bioactive components present in essential oils of Ajwain have also been discussed. Various biological activities of isolated components have been briefly explained.

➤ With Respect to Cumin Seeds

Riaz, A. et al. (2014) outlined the primary functions of spices to provide aroma, texture and color to food and referred spices as building blocks of flavor in food. Various functions such as preservation and nutritional and health benefits of spices has been discussed. Particularly, cumin seeds have various antioxidant properties and many nutraceutical and phytochemical components.

➤ With Respect to Rock Salt

Sarker, A. et al. (2016) discussed about the enormous health benefits of the rock salt. Rock salt is considered as a natural dietary mineral supplement that can provide us health benefits. It aids in digestion, acts as a laxative, improves appetite, removes gas and soothes heartburn. It facilitates cellular absorption of minerals and plays an important role in replenishing the body's electrolyte and maintaining the pH balance. It also stimulates blood circulation and removes toxic minerals and refined salt deposits. It stabilizes blood pressure and aids in weight loss by equalizing minerals which inhibit cravings and eliminates fat dead cells. It is used as a home remedy to cure many diseases and ailments such as rheumatic pain and herpes, inflammation and irritation from insect bites. It helps people suffering from respiratory disorders and sinus. It also heals wounds, acne or pain due to gout or arthritis. It can be used as a mouth freshener or teeth whitener and relieves sore throat. One of the amazing benefits of rock salt is that it overcomes muscle cramps. Rock salt also regulates sleep, detoxifies your body and eases stress and body pains. It greatly improves our immune system. It also improves the respiratory, circulatory and nervous systems to a significant extent. It strengthens our bones and connective tissues. Rock salt provides various skin and hair benefits too. Besides the benefits, this paper also discusses the use and various techniques to use the rock salt to obtain its enormous benefits.

➤ With Respect to Ginger

Bijaya, B. Bag (2018), outlined the processing procedure of ginger in India. Since a very long time ginger is known for its medicinal value as a digestive aid, spiritual beverage, aphrodisiac, antiemetic, anti-cancer, anti-platelet, anti-microbial, anti-parasitic, antioxidant, anti-inflammatory, analgesic, hepato protective and immune stimulating properties. It is used in manufacturing and baking industry and meat processing industry up to a great extent. The nutrient composition of ginger is such as- proteins (2.3%), Fat (0.9%), carbohydrates (12.3%), minerals (1.2%), fiber (2.4%) and moisture (80.9%) are the main constituents of fresh ginger. Minerals such as iron, calcium and phosphorous are also found in it. It also contains vitamins such as thiamine, riboflavin, niacin and vitamin C. Ginger is known to be a powerful digestive aid. It helps curing many digestive and

gastrointestinal tract disorders. The processing procedure of ginger is as followed-

- Cleaning,
- Sorting,
- Peeling,
- Drying,
- Grading and packaging. Ginger powder can be used as a pharmaceutical and is used for the production of herbal medicines. It is also used as a food additive. Dry ginger powder also called as saunth in Hindi when mixed with rock salt and water aids diarrhea.

*B. The Other Leads Under which this Literature can be Reviewed is-*

- Supplementary powder preparation from spices, herbs and condiments
- Physicochemical properties
- Sensory evaluation
- Microbiological analysis
- Effect of heating on different spices

PBD Suresh, et al. (2007) outlined the effect of heat processing of spices concentrations of their bioactive principles- turmeric, red pepper, and black pepper. This research study suggests that there is loss of some components on heat processing of spices separately. Curcumin loss from turmeric was 27-53% on pressure cooking for 10 minutes. In the presence of tamarind, Curcumin loss is 12-30% whereas capsaicin loses from red pepper ranged from 18-36%. Piperine loss from black pepper ranges from 16-34%.

Abraham, P. et al. (2010), discussed the procedure to prepare a home based supplementary powder using various spices such as dry ginger powder, fennel powder, cumin powder and fresh ginger extract addition on supari from aonla. All these spices are rich in nutraceuticals and are being used in Ayurveda since ancient times. It has been used to treat several disorders such as common cold, scurvy, cancer and heart diseases. Aonla shows certain antioxidant, anti-inflammatory, anti-mutagenic properties on human beings. The physicochemical parameters have been explained and total phenol content, tannin content, titrable acidity and ascorbic acid content has been evaluated in different control samples and formulations.

### CHAPTER THREE MATERIALS AND METHODOLOGY

#### A. The Methodology Adopted to Complete this Research Study is as Follows-

- To prepare various supplements at home
- Sensory evaluation of supplements

#### B. Preparation of Various Supplements at Home

##### ➤ Fox nut supplements-

- Ingredients- The ingredients required for preparing fox nuts supplements have been mentioned below in Table 1.

Table 1- Ingredients of fox nuts supplements

SNO.	INGREDIENTS	QUANTITY
1.	FOX NUTS	100gm
2.	ALMONDS	100gm
3.	MUSKMELON SEEDS	50gm

##### • Recipe-

- ✓ Dry roasts the fox nuts at approximately 175-180 degree Celsius for 8-10 minutes in an oven or otg or a frying pan (till they start turning golden brown).
- ✓ Let them cool for some time.
- ✓ Mix all the ingredients in a bowl.
- ✓ Grind them all together to form a fine powder.
- ✓ Collect it in a separate air tight container.

- Mode Of Consumption- Have one spoon of supplement (10gm) along with a glass of milk either by mixing it or consuming it raw.

- Nutritional Value- (As Per ICMR)-Table 2

Table 2- Nutritional Values of Fox Nut Supplements

SNO.	INGREDIENT	QUANTITY	ENERGY	PROTEIN	CHO	FATS
1.	ALMONDS	100gm	609.23 Kcal	20.8gm	10.5gm	58.9gm
2.	FOX NUTS	100gm	347 Kcal	9.7gm	76.9gm	0.1gm
3.	MUSKMELON SEEDS	50gm	34kcal	0.84gm	8.6gm	0.19gm

##### ➤ Gastric booster –

- Ingredients- Mentioned Below In Table 3

Table 3- Ingredients of Gastric Booster Supplement

SNO.	INGREDIENTS	QUANTITY
1.	Carom seeds(Ajwain)	10gm
2.	Cumin seeds(Jeera)	10gm
3.	Fennel seeds(Saunf)	10gm
4.	Asafetida (Hing)	2.5gm
5.	Rock salt or black salt	1.25gm
6.	Dry ginger powder(Saunth)	2.5gm
7.	Sugar or powdered Jaggery	15gm

##### • Recipe-

- ✓ Dry roast carom seeds for 1-2 min at 175 degree Celsius or till they become aromatic, do not over roast them as it will give bitter taste to the supplement.
- ✓ Dry roast fennel seeds and cumin seeds at 180 degree C for 2-3 minutes in a pan or an OTG.
- ✓ Mix all the roasted ingredients once cooled and grind them till they form fine powder.
- ✓ Mix this powder with other powdered ingredients thoroughly.
- ✓ Store the powdered supplement formed in an airtight container.

- Mode Of Consumption- Have ½ to 1 tsp. of supplement (5gm) after 10min of having meal as mukhwas and drink a glass full of lukewarm water with it. Supplement for eyes-
- Ingredients- Mentioned below in table 4

Table 4- Ingredients for Preparing Eyesight Supplement

SNO.	INGREDIENTS	QUANTITY
1.	Almonds	100gm
2.	Fennel seeds	100gm
3.	Rock sugar/ kuja mishri	100gm
4.	Roasted kale channe	100gm
5.	Muskmelon seeds	50gm
6.	White pepper	50gm

- Recipe-
  - ✓ Mix all the ingredients together and grind them finely.
  - ✓ Store the powder formed in an airtight container.
- Modes Of Consumption- Consume 15gm. of this supplementary powder formed at night with a glass of warm milk after having meal.
- Precautions-
  - ✓ Consume only prescribed amount of supplement.
  - ✓ Overconsumption may lead to digestive problems such as constipation or diarrhea.
  - ✓ Continue taking the supplement for regular time period without any break or else it will be of no or reduced effects.

C. Sensory Evaluation of Supplements-

The sensory scores and overall acceptability of all the supplements were recorded on a 5 point hedonic scale and radar graph. The sensory panel involved the panelists of all the age groups. The samples were then rated on the basis of criterion: being highly acceptable and being completely unacceptable with respect to different characteristics. Two major types of methods adopted for sensory evaluation are-

- Radar Graph
  - Hedonic Testing
- For this purpose specific code has been assigned to the supplements such as-
- FNS- Fox nuts supplement
  - GBS- Gastric booster supplement
  - ES- Eyesight supplement
  - Radar Graph - A radar graph is made on the basis of panelist responses after recording them on an excel sheet. The judging criterion for supplements included following factors physical appearance, mouth feel, overall taste, odor, and stickiness. All these factors were graded on a scale of 1-5 which were then plotted on a graph. A sample graph has been shown via fig 1.

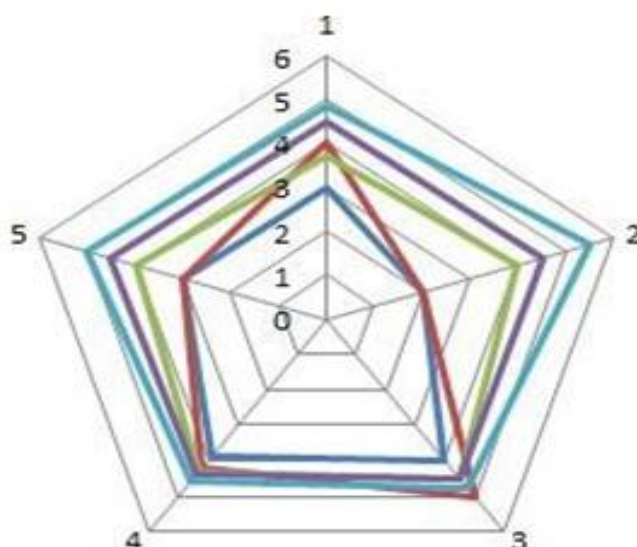


Fig 1-Sample Radar Graph

- Hedonic Test - hedonic test is performed in which panel members have to judge the organoleptic and other properties of the supplements on the scale of 1-5. A sample hedonic test form is mentioned below in fig 2-

<b>Scale</b>	<b>Range</b>	<b>Description</b>
5	4.5-5.0	Liked Very Much
4	3.5-4.49	Liked Moderately
3	2.5-3.49	Neither Liked nor Disliked
2	1.5-2.49	Disliked Moderately
1	1.0-1.49	Disliked Very Much

Fig 2- Sample Hedonic Graph



### CHAPTER FOUR RESULT AND DISCUSSION

Results recorded after the consumption of these home-made supplements were very surprising. It showed its health benefits in all age group people. The nutritional content of various herbs, nuts and seeds individually proved to be beneficial as a whole in the form of supplement too.

The sensory scores and overall acceptability of all the supplements were recorded on a 5 point hedonic scale and radar graph. The sensory panel involved the panelists of all the age groups. The samples were then rated on the basis of criterion: 5 being highly acceptable and 0 being completely unacceptable with respect to different characteristics. For this purpose, specific supplement were given specific code such as- Fox Nuts Supplement- FNS Gastric Booster- GB Eyesight Supplement-ES

The first supplement that was Fox nut supplement named after its major ingredient that is fox nuts and other ingredients such as almonds and muskmelon seeds provided various health benefits. Various important minerals and amino acids found in fox nuts and nutritionally rich almonds when converted to supplement provided strength to the muscles, bones and nerves. It not only cured muscle cramps and nerve twitching but also boosts memory and cured insomnia and helped people in having sound sleep. It also lowered blood pressure levels and helped controlling body weight. The sensory scores for fox nuts supplements are mentioned below in table 5.

Table 5- Sensory Scores of Fox Nut Supplement

SAMPLE	PHYSICAL APPEARANCE	MOUTH FEEL	OVERALL TASTE	ODOR	STICKINESS
<b>FNS</b>	4.04	3.46	4.56	4.26	3.9

SAMPLE	PANELIS T	AGE	PHYSICAL APPEARANCE	MOUTH FEEL	OVERALL TASTE	ODOR	STICKINESS
FNS	FNS 1	18	3	2	4	3.9	3
	FNS2	15	4	2	5	4.2	3
	FNS3	45	3.7	4	4.5	4.3	4
	FNS 4	23	4.5	4.5	4.5	4.4	4.5
	FNS 5	47	4.85	5.5	4.75	4.6	5
	<b>AVERAGE</b>		<b>4.04</b>	<b>3.46</b>	<b>4.56</b>	<b>4.26</b>	<b>3.9</b>

Fig 3- Data recorded for sensory evaluation of fox nuts supplement

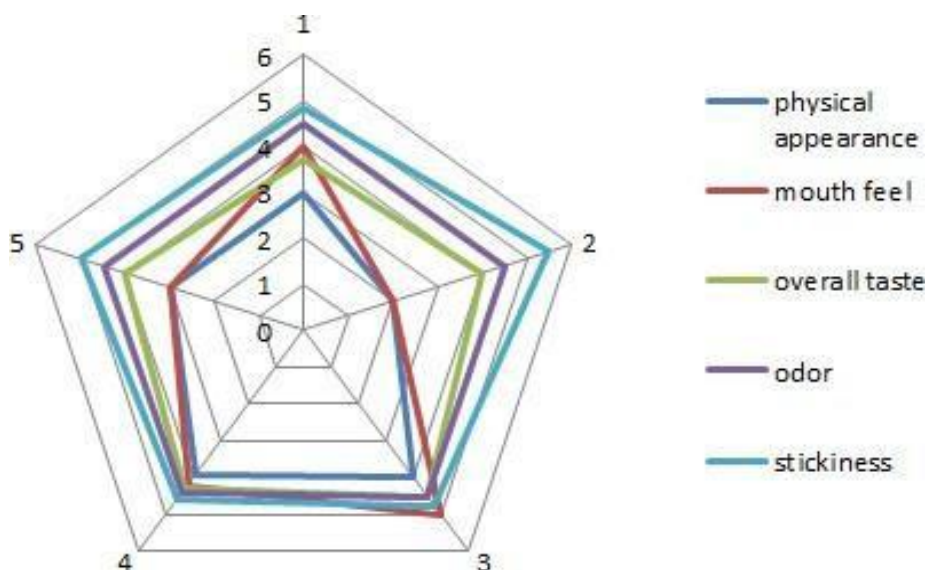


Fig 4- Radar Graph Obtained From Evaluation of Sensory Data for Fox Nut Supplement

The another supplement named Gastric booster after its health effects actually proved to be useful and acted like a quick home-made remedy to relieve all those who have indigestion or flatulence or gastric issues after having meal. More than a supplement it acted like a medicinal remedy or Ayurvedic herbal churna. It acted like a laxative and also improved appetite, soothing heartburn. It increased bowel movement and prevented bloating. The sensory scores and data recorded have been shown in table 6 and figure 5 and 6.

Table 6- Sensory Scores of Gastric Booster Supplement

SAMPLE	PHYSICAL APPEARANCE	MOUTH FEEL	OVERALL TASTE	ODOR	STICKINESS
GB	4.31	4.56	4.26	3.9	3.52

SAMP LE	PANE LIST	AGE	PHYSI CAL APPE ARAN CE	MOU TH FEEL	OVER ALL TAST E	ODO R	STIC KINE SS
GB	GB1	18	4	4	3.9	3	3
	GB2	15	3.5	5	4.2	3	3
	GB3	45	4.7	4.5	4.3	4	4
	GB4	23	4.5	4.5	4.4	4.5	3.5
	GB5	47	4.85	4.75	4.6	5	4.1
	<b>AVERAGE</b>		<b>4.31</b>	<b>4.56</b>	<b>4.26</b>	<b>3.9</b>	<b>3.52</b>

Fig 5- Data Recorded for Sensory Evaluation of Gastric Booster Supplement

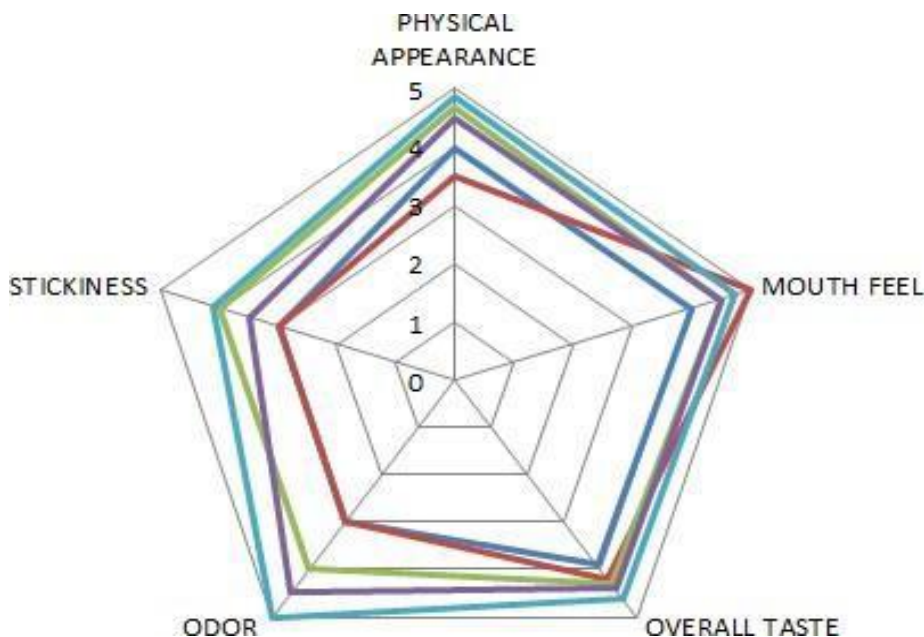


Fig6- Radar Graph Obtained for GB Supplement

The third supplement that is Eyesight supplement when consumed on a regular basis for minimum 40 days proved to be a major relief to all those who had poor eyesight and used spectacles on a daily basis. It improved eyesight by tightening iris muscles. Even it removed specs of some subjects permanently. When consumed with the very beginning of eyesight issues, it might help a lot and may free one from the boring specs burden. Besides the eyesight benefits, this supplement boosted memory, gave strength to bones and muscles, lowered blood glucose and blood cholesterol levels and relieved hypertensive patients. Following table 7 shows the sensory scores of eyesight supplement.

Table 7-Sensory Scores of Eyesight Supplement

SAMPLE	PHYSICAL APPEARANCE	MOUTH FEEL	OVERALL TASTE	ODOR	STICKINESS
ES	4.61	4.56	4.31	4	4

SAMPLE	PANELIST	AGE	PHYSICAL APPEARANCE	MOUTH FEEL	OVERALL TASTE	ODOR	STICKINESS
ES	ES1	18	4.2	4	4	3	3
	ES2	15	5	5	3.5	3.5	3.5
	ES3	45	4.6	4.5	4.7	4	4
	ES4	23	4.5	4.5	4.5	4.5	4.5
	ES5	47	4.75	4.75	4.85	5	5
	<b>AVERAGE</b>		<b>4.61</b>	<b>4.56</b>	<b>4.31</b>	<b>4</b>	<b>4</b>

Fig 7- Data Obtained From Sensory Evaluation of Eyesight Supplement

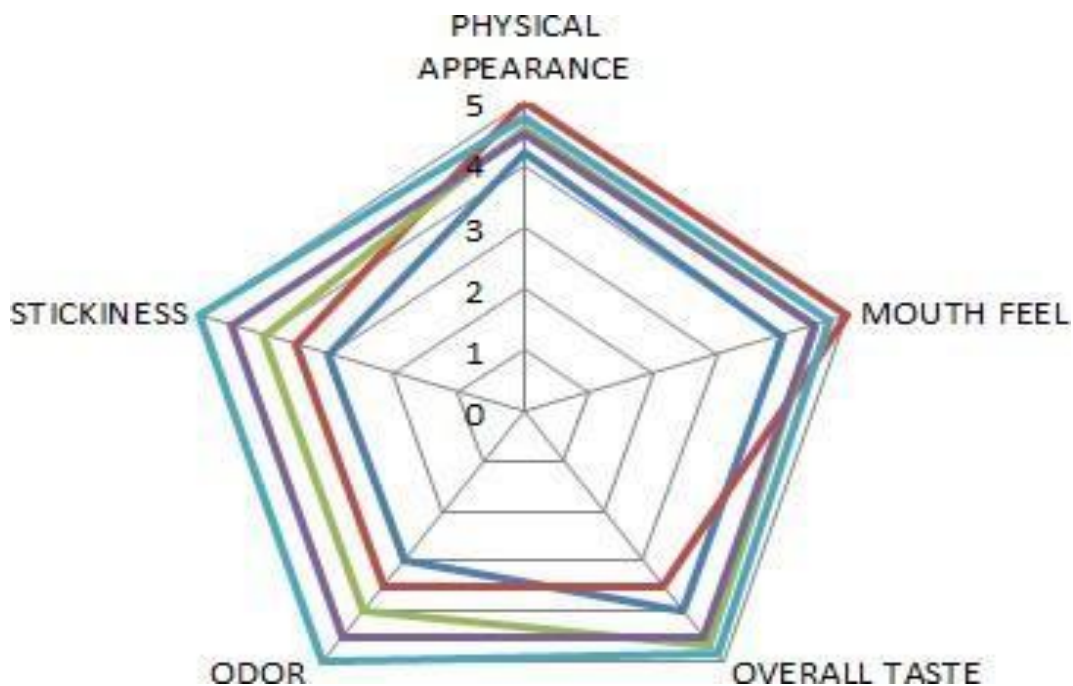


Fig 8- Radar Graph for Eyesight Supplement

A. After Giving and Consuming the Eyesight Supplement for Different Durations Following Results and Improvements were Observed-

Table 8- Results of Eyesight Supplement

Subject	Age	Condition	Eyesight power before consuming supplement		Duration of consumption of supplement *(10gm- 15gm per day with a glass of milk)	Eyesight power after consuming supplement		Difference in lens power	
			R	L		R	L	R	L
ES 1	15 years	Myopia	-1.5	-1.75	45 days	-0.5	-0.75	1	1
ES 2	10 years	Myopia	-2.5	-2.5	40 days	-1.75	-1.75	0.75	0.75
ES 3	12 years	Myopia	-1.25	-1.50	2 months	-0.27	-0.75	0.98	0.75
ES 4	7 Years	Myopia	-1.0	-0.75	40 days	-0.5	-0.25	0.5	0.5
ES 5	18 Years	Myopia	-3	-3	30 days	-2.75	-2.75	0.25	0.25

## CHAPTER FIVE DISCUSSIONS

Fox nuts also known as makhana or p7hoolmakhana or gorgon nut or lotus seed or *Euryale ferox* are the edible seeds of lotus flower that grows in water and are commonly found in India, Korea, China, Japan and Russia. These nuts are highly nutritious, gluten free and are considered superior to dry fruits such as almonds, cashew nuts, walnuts and coconut in terms of sugar, protein, ascorbic acid, and phenol content. These are low in saturated fats, sodium and cholesterol and are high in magnesium, potassium and phosphorous. It contains easily digestible proteins, carbohydrates, moisture, fat, total minerals, phosphorous and iron. These chemical components are very useful for human body and they also provide rich source of nutrition. Because of its high fiber content, it prevents constipation and improves appetite. These fox nuts contains antioxidants, and are anti-inflammatory. They prevent and cure many degenerative diseases like diabetes mellitus, heart problems which are generally caused because of free radicals and the powerful antioxidants present in them act as these free radical scavengers. It also improves reproductive system. The high magnesium and amino acid content of fox nuts helps as anti-ageing and strengthens our bones, muscles and nerves. These nuts are low in sodium and potassium thus regulates blood pressure and proves to be beneficial for hypertensive patients.

Most of the important amino acids found in fox nuts are leucine, isoleucine, cysteine, methionine, glutamine and arginine. The amino acids arginine and methionine are the precursors or creatine which is essential for beautiful skin, nails and hairs. Taurine synthesized from cysteine reduces diabetic effects in cell. Arginine which produces nitric oxide within the cell increases elasticity of arteries and veins thereby increases blood flow. Other amino acids like isoleucine and proline helps in growth and development. Even the almonds and muskmelon seeds have various health effects that make this supplement powder more useful. They have anti-cancerous, anti-diabetic and blood sugar and cholesterol lowering effects and it also helps in controlling body weight. This supplement is a good source of energy, proteins, carbohydrates, vitamins and minerals. Thus, it can be used to manage PEM – protein energy malnutrition.

Fennel (*Foeniculum vulgare*) is a native herb of Mediterranean region, which is widely cultivated for its aromatic foliage, stock and seeds (Dimopoulos et al., 2013; Hand, 2011; Tutin, 1968). Fennel seeds are traditionally used for flavoring meat, snails, vegetables, and legume and fish dishes. Fennel contains a phenyl propene derivative known as anethole showing antimicrobial, insecticidal, estrogenic, and galactogogue activity and shows potent anticancerous activities. The important antioxidants of fennel belong to phenolic acids (caffeoylquinic acid derivatives) and hydroxycinnamic acid derivatives, flavonols and flavones and their glycosides, coumarines. Due to the presence of these components, fennels shown good antioxidant or free radical scavenging activities and inhibits peroxidation.

The ajwain is highly valued as a gastrointestinal medicine and as an antiseptic. The seeds exhibit various properties such as anti-flatulence, asthma, polyuria, indigestion, common cold, toothache, bronchitis, cardialgia, anti-arthritis, anti-rheumatic, migraine, anti-spasmodic. The ajwain seeds exhibit a wide spectrum of anti-bacterial, anti-fungal, fungi toxic, anti-filarial, insecticidal, anti-microbial, anti-spoilage, anti-oxidant, nematocidal and other medicinal properties. It is also used as a hepatoprotective and analgesic.

Rock salt is considered as a natural dietary mineral supplement that can provide us health benefits. It aids in digestion, acts as a laxative, improves appetite, removes gas and soothes heartburn. It facilitates cellular absorption of minerals and plays an important role in replenishing the body's electrolyte and maintaining the pH balance. It also stimulates blood circulation and removes toxic minerals and refined salt deposits. It stabilizes blood pressure and aids in weight loss by equalizing minerals which inhibit cravings and eliminates fat dead cells. It is used as a home remedy to cure many diseases and ailments such as rheumatic pain and herpes, inflammation and irritation from insect bites. It helps people suffering from respiratory disorders and sinus. It also heals wounds, acne or pain due to gout or arthritis. It can be used as a mouth freshener or teeth whitener and relieves sore throat. One of the amazing benefits of rock salt is that it overcomes muscle cramps. Rock salt also regulates sleep, detoxifies your body and eases stress and body pains. It greatly improves our immune system. It also improves the respiratory, circulatory and nervous systems to a significant extent. It strengthens our bones and connective tissues. Rock salt provides various skin and hair benefits too.

Ginger is known for its medicinal value as a digestive aid, spiritual beverage, aphrodisiac, antiemetic, anti-cancer, anti-platelet, anti-microbial, anti-parasitic, antioxidant, anti-inflammatory, analgesic, hepato protective and immune stimulating properties. It is used in manufacturing and baking industry and meat processing industry up to a great extent. The nutrient composition of ginger is such as- proteins (2.3%), Fat (0.9%), carbohydrates (12.3%), minerals (1.2%), fiber (2.4%) and moisture (80.9%) are the main constituents of fresh ginger. Minerals such as iron, calcium and phosphorous are present in it. It also contains vitamins such as thiamine, riboflavin, niacin and vitamin C. Ginger is known to be a powerful digestive aid. It helps curing many digestive and gastrointestinal tract disorders. The processing procedure of ginger is as followed- 1. Cleaning, 2. Sorting, 3. Peeling, 4. Drying, 5. Grading and packaging. Ginger powder can be used as a pharmaceutical and is used for the production of herbal medicines. It is also used as a food additive. Dry ginger powder also called as saunth in Hindi when mixed with rock salt and water aids diarrhea.

## CHAPTER SIX

### SUMMARY/ CONCLUSION

Home-made supplements prepared using nuts, herbs and seeds turned out to be not only cost effective but also showed multiple health benefits without any side effects. All the ingredients used in the supplementary powders had various therapeutic characteristics, nutritional as well as nutraceutical components that added health value to the supplementary powders. These supplementary powders cured various gastrointestinal disorders, respiratory disorders, improved eye sight and gave strength to our bones, muscles and nerves. Many lifestyle disorders were also cured using these powders. Consuming it on a regular basis gave relief to hypertensive, diabetic, arthritic and rheumatic patients by improving blood flow in their vessels. The special amino acid content of fox nuts and other ingredients acted like a vaso- dilator thus relieving muscle and nerve twitching. The wide variety of vitamins obtained from these supplements was of great help in removing deficiencies and deficiency related disorders. The high amount of macro-nutrients and micro-nutrient content of these supplements may also help in eradicating the protein energy malnutrition. It proved to be beneficial irrespective of person's age, gender, economic status, physical activity level and other demographic and anthropometric factors.

**Delimitations-** Due to Covid conditions and lockdown in various parts of the country, blood tests and eye sight tests could not be carried out.

**Suggestions-** Blood tests and eye sight tests can be carried out in future once the country recovers from the current situation to know effectiveness of the supplements.

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