IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

NUTRACEUTICALS MORINGA OLEIFERA, ZINGIBER OFFICINALE AND ALOE VERA AS IMMUNO-BOOSTER

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Abstract

Nutraceuticals are dietary supplements, utilized to ameliorate health, delay senescence, prevent diseases, and support the proper functioning of the human body. The world woke up in 2020 with a new virus called coronavirus 2019 (COVID-19). The virus spread easily from Wuhan, a western province in China to the whole world and caused a pandemic situation. Our body is always exposed to mysterious invaders which can cause diseases and infections. The immune system enables us to keep these contagious microorganisms at bay and protects our body depending on the strength of the immune system. Nutrients like vitamins, minerals, fatty acids, amino acids, etc. play a significant role in the host immunity. Moringa is a miracle tree whose leaves are rich in several vital components that improve the body's immunity. Ginger is one of the most important medicinal agents in various alternative systems of medicine Scientific studies have shown that ginger is used in treating colds, headaches, nausea, stomach upset, and diarrhoea. Moreover, scientific studies have shown that ginger has anti-inflammatory, anti-oxidative, immunomodulatory, and bronchodilator. These two herbal plants can boost the immunity of healthy and sick patients, thereby giving protection against COVID-19. So, this review covers all the information about improving the immune response to COVID-19 viral infection by the use of herbal plants like Moringa oleifera and Ginger.

Keywords: Covid-19, Immunity booster, Nutraceutical, Moringa oleifera, Ginger.

1. INTRODUCTION

"Any substance may be considered as food or part of food, which in addition to its normal nutritive value provides health benefits including prevention of diseases or promotion of health" [1]. Nutrition is a basic need as various risk factors related to health result due to imbalanced nutrition. These nutritional imbalance incidences are widely prevalent in India leading to adverse conditions. A certain sector of the population consumes a diet that does not provide sufficient calories and balanced nutrition. In India, nearly 20% of the total population and 44% of young children (below 5 years of age) are exposed to undernourished conditions and are also underweight. On the other hand, there is a huge population that is nourished in calorie intake but not in terms of nutrient intake. This segment would typically include middle to upper-class population with sufficient purchasing capacity to buy nutrients but probably less aware of their nutrient requirements, again leading to imbalanced nutritional uptake [2]

Since the industrial age initiation, the lifestyle of human beings has dramatically changed. Increased workload, fast living, and various psychological pressures have forced people to various eating cultures such as instant and tasty meals but decreased the quantity and quality of nutrients. At the same time, industrialization has caused numerous air and water pollutions, and soil and food contamination because of the extensive use of various chemicals, heavy metals, electromagnetic waves, and other potentially harmful man-made items existing in industries. These problems have led to increased incidences of diabetes, obesity, various cancers and vascular diseases, physiological problems, as well as other degenerative diseases. The increased demand for health care has dramatically raised the cost of medical care. Now, more and more people realize that a healthy body is more important than money or work. Therefore, people are trying to achieve a better-quality life by eating more vegetables, fruits, plant foods, dietary supplements, or Nutraceuticals. About 2000 years ago Hippocrates correctly emphasized this concept as "Let food be your medicine and medicine be your food".

The term 'Nutraceutical' was coined in 1989 by Stephen Defelice, founder and chairman of the Foundation for Innovation in Medicine, an American organization that encourages medical health [3] According to him "Nutraceutical is any substance that is a food or a part of food and provides medical or health benefits, including the prevention and treatment of disease". Such products may range from isolated nutrients, dietary supplements, and specific diets to genetically engineered designer foods and herbal products [4]

The concept of Nutraceuticals started from a survey conducted in the U.K., Germany, and France and it is concluded that diet is rated highly by consumers than exercise or hereditary factors in achieving good health[5] In the U.S. "Nutraceutical" is commonly used, but no regulatory definition existed. Its meaning was modified by the health ministry of Canada which defines Nutraceutical as "a product isolated or purified from the food, generally sold in medicinal form not associated with food and demonstrated to have a physiological benefit. It also provides benefits against chronic disease". [5] In Britain, the Ministry of Agriculture, Fisheries and Food has developed a definition of a functional food as a food that has a component incorporated into it to give it a specific medical or physiological benefit, other than purely nutritional benefit[7].

The Coronavirus 2 of the Severe Acute Respiratory Syndrome (SARS-CoV-2) affects upper respiratory tract epithelial cells, causing mild symptoms. When the virus infects the alveoli of the lungs, it can cause severe pneumonia, which can lead to respiratory failure and acute respiratory distress syndrome (ARDS) [8]. The Moringa oleifera commonly referred to as "Moringa." When compared to fruits and vegetables that contain these nutrients, moringa leaves had a higher concentration of important minerals and vitamins. Yogurt, milk, spinach, banana, and carrot all have less protein, calcium, iron, potassium, and vitamin A than M. oleifera leaves [9,10]. Ginger (Zingiber officinale Roscoe) is a well-known and widely used spice and condiment and possesses health-promoting properties These two herbal plants can boost the immunity of healthy and sick patients, thereby giving protection against COVID-19 [11].

The reasons for the transition to nutraceuticals are as follows: [12,13,14,15,16]

1. Increasing numbers of consumers, concerned about healthcare costs.

2. Nutraceuticals are being used by those who are dissatisfied with pharmaceutical agents for enhancing health and preventing chronic disease.

3. Health care providers recognize the fact that our heavily processed food supply, coming from crops grown with chemical fertilizers, pesticides, herbicides, and often genetically modified seeds, lacks sufficient nutrients necessary for optimum Health.

4. People believe more in prevention than a cure.

5. People who suffer from chronic illnesses for which allopathic treatment has failed to provide a cure.

6. Economically challenged patients.

The US Food and Drug Administration (FDA) has not approved nutraceuticals for health benefits or disease prevention, with a few exceptions; however, nutraceutical makers have marketed them as health-promoting substances.

1.1 MERITS OF NUTRACEUTICALS

Nutraceuticals may provide several advantages, including the ones listed below [17].

a. It's possible that our diet's health value will improve.

b. May assist us in avoiding some medical issues.

c. Traditional medicine may be seen as more "natural" and less prone to have unpleasant side effects.

d. May have a psychological benefit from doing something for oneself.

e. May easily be available and economically affordable.

f. May present food for populations with special needs (e.g., nutrient-dense foods for the elderly).

g. May help us live longer.

1.2DEMERITS OF NUTRACEUTICALS

Some nutraceuticals may induce allergic reactions. Sometimes, some people may also experience sleeping problems, blood thinning, cardiac arrhythmia, and other serious conditions if they take it along with some prescribed medications.

1. Headache

Excess of vitamin A is associated with headaches. A single large dose can also cause nausea and headache. It can range from mild to severe in different people. Therefore, it is important to take the supplements as advised by the doctor.

2. Dizziness

Excess of vitamin A can also cause dizziness and birth problems. You should eat the right foods and take nutraceuticals in the prescribed quantity to avoid this side effect. As a patient, you should be responsible that before consuming any of the supplements, you should consult your doctor for the right dosage.

3. Elevated blood pressure

Certain minerals also tend to increase blood pressure which can be harmful for us. It can prove to be fatal for those suffering from heart disease. A large proportion of the general population takes dietary supplements. Medical practitioners should be aware of that and therefore they should take the information from the patients regarding their supplement intake.

4. Digestion problems

Excessive intake of certain supplements can cause various digestive problems like vomiting, loose motion, and constipation. Excess of vitamin C is often associated with cases of constipation[18]

1.3Classification of Nutraceuticals

➢ Inorganic mineral supplements

➢ Vitamin supplements

➢ Digestive enzymes

➢ Probiotics

➢ Prebiotics

➢ Dietary fibres

➢ Health drinks

➢ Antioxidants

➢ PUFA

➢ Herbs as functional foods

Inorganic mineral supplements:

➢ Large number of elements control a variety of physiological and biochemical functions of the human body

➢ Most of the minerals are provided through diet, Deficiency of minerals in food may lead to various diseases

E.g.: Calcium – Imp in the treatment of bone loss and prevention, sufficient intake of Ca post menopause significantly reduces the risk of bone fracture

Manganese – bone formation and cartilage

Zinc – Antioxidant

Vitamin supplement:

➢ Necessary for the maintenance of human life in small quantities

➢ Vit B complex – Specific vitamin B recommended to combat high levels of homocysteine

➢ Niacinamide deficiency – Neurological and skin problems

➢ Vitamin C – Antioxidant, Necessary for proper maintenance of bones.

Digestive enzymes:

➢ Use to help absorb and digest food material

➢ Pepsin of digestive juice – Digestive aid for proteins

➢ Amylase – Digest carbohydrates

➢ Pancrilipase – Breakdown of fat in the small intestine

➢ Papain and bromelain – In digestive disorders

Probiotics:

➢ Describing as a living organisms

➢ When ingested with or without food improves the intestinal microbial balance and consequently the health and functioning of the large intestine

➢ Approximately 95% of bacteria found in the colon of the human body, some of them are useful and some of them harmful

➢ Natural balance between these two plays an important role in the health and functioning of the large intestine.

E.g.: Bio yogurts – Lactobacillus acidophilus reduces the incidence of vaginal infections

Bifido bacteria found in yogurt prevent young children from suffering from diarrhoea **Prebiotics:**

➢ Food components that escape digestion by normal human digestive enzymes and reach the colon after passage through the stomach and small intestine

➢ selectively promote the growth of probiotics

E.g.: Fructo oligosaccharide used in food supplements encourage the growth of Bifidobacteria already present in the gut

Dietary fibres:

Necessary for our body to function properly

Water insoluble fiber:

➢ Absorbs water to a certain extent

➢ Mainly contributes to the bulking of stool

➢ Allows quick passage of wastes

E.g.: Whole grain cereals, wheat, fruits, and vegetables

Water soluble fibers.

➢ get dissolved in water and forms a gel that binds the stool

➢ Slows down the absorption of glucose and reduces cholesterol levels

E.g.: Oats, legumes, fruits, and vegetables

Health drinks:

➢ Health drinks are incorporated with antioxidants, Vit A, C, and E, and herbal extracts

E.g.: Tropicana fruit juice fortified with Calcium provides 365 mg/250 ml

Anti-oxidants:

➢ Deficiency of antioxidants leads to a variety of diseases like diabetes, cardiac diseases, arthritis, etc

True antioxidants:

➢ React with free radicals and block the chain reaction of free radicals

Antioxidant synergists:

➢ Very low antioxidant potential, but enhances the effect of true antioxidants by reacting with heavy metals which catalyze auto-oxidation.

Examples:

➢ Vitamin C - Citrus fruits

➢ Lycopene – Tomato

➢ β-carotene – Carrot, sweet potato

➢ Rutin – Buckwheat, eucalyptus

➢ Quercetin – Onion, apple, black grapes

➢ Betalaines – Beet root.

Polyunsaturated fatty acid (PUFA):

➢ Human body is capable of synthesizing most of the fatty acids except two major Poly unsaturated fatty acids omega-3-fatty acid and omega -6-fatty acid

➢ These are precursors for arachidonic acid and docosahexaenoic acid (DHA)

➢ These acids are found to regulate Blood pressure, heart rate, blood clotting etc.

➢ Essential for the development of the fetus and also during the first 6 months after birth

➢ Breast milk is a rich source of DHA

Herbs as functional foods:

Various herbs are used in the prevention of disease E.g.: Garlic, spirulina, Momordica, flax seed, tomato, turmeric, Ginkgo biloba, etc [19]

1.4 Immune system [20]

The immune system comprises of a less specific component, innate immunity, and a more specific component called adaptive immunity. Innate immunity comprises the first line of defence such as the skin barriers, biochemical responses such as complements, antimicrobial substances, and phagocytic cells such as neutrophils and macrophages. Innate immunity provides the first line of defence whenever the immune system encounters an antigen for the first time. However, when the antigen is encountered, the immune system produces a specific response that gets into the "memory" of the system and is successful in eliminating the antigen if it is encountered again. This response is mediated by adaptive immunity.

Every organism has its mechanism for identifying and handling threats to its existence. The presence of such kind of response has formed the basis of existence and evolution. The immune defence system in the human body is a complex system of various immune cells, antibodies, and physical barriers that prevent pathogens from infiltrating and further reproducing in the body. The immune system works not only toward the pathogens, but also toward any foreign body such as allergens, toxins, or environmental pollutants. Management of the threat of epidemics and pandemics is possible if the human immune system is well-studied and understood for the prevention and treatment of emerging infectious diseases. Immunity-boosting properties encompass not only immunomodulatory properties, but also antioxidant, antitumor, antiviral, antibacterial, and antifungal properties.

1.5 Mechanism of action of Immune system [21,22]

The adaptive immune response relies on antigen presentation. Antigen-presenting cells (APCs) such as dendritic cells present antigens via the Major Histocompatibility Complex II (MHC-II) to T-helper Cells. T helper cells differentiate into Th1 cells which promote cell-mediated immunity and Th2 cells which promote humoral immunity. Th1 cells activate the infected APCs which have the MHC-II restricted antigen. These APCs start producing Nitrogen oxide and superoxide radicals which help in the elimination of pathogens. Th1 cells, Interleukin 2 (IL2), and cytotoxic T (Tc) cells present these activated APCs to the specific T cell receptors in MHC I. These activated TC cells destroy the infected cells and remain as memory T cells which are antigen-specific and can be activated directly by the APCs if there is any event of reinvasion by the same antigen. This results in a much faster cell-mediated response due to the memory of these T cells. Th2 cells activate B cells which mature into plasma cells. B cells have antigen-binding receptors on their surface known as antibody molecules. When a B cell encounters an antigen for the first time that matches its membrane-bound antibody, it starts dividing rapidly to give rise to memory B cells and plasma cells. Memory B Cells do not secrete antibodies and have the same membrane-bound antibodies as their parent cell. Plasma cells, on the contrary, have no membrane-bound antibodies but can secrete high amounts of antibodies. Since the memory B cells cannot produce antibodies, the memory B cells proliferate into more memory B cells and plasma cells, on exposure to the antigen again in the future. These plasma cells secrete antibodies, which bind to the specific antigen, facilitating the neutralization of antigens. Antibodies or immunoglobulins have varying functions ranging from neutralization of antigens to agglutination and opsonization.

Immune-boosting Nutraceuticals While nutraceuticals have been explored for their immunomodulatory and anti-inflammatory properties, various other properties such as antibacterial, antiviral, and antifungal properties also contribute to the immunity-promoting properties of nutraceuticals. Various nutraceuticals and functional foods have immunity-boosting properties

1.7 A NATURAL IMMUNITY BOOSTER

Herbs are known for their several health benefits. They are anti-oxidants, immunomodulators, anti-microbial, anti-inflammatory, and aid in digestion. Herbal plants that boost the immune system stimulate the activity of cells responsible for fighting infections [23]. These natural immune boosters are an important tool in our current war against coronavirus infection. About Boosting immunity naturally over 80% Of the earth's population depends on plants that increase immunity and promote healing. However, one very important function of herbs is they help cleanse toxins and in turn, help boost our immunity [24]

2. AIM, OBJECTIVE, PLAN OF WORK AND NEED: -

2.1 Aim:

To study the immunobooster herbal nutraceuticals Moringa oleifera, Ginger, And Aloe Vera.

2.2 Objective:

- Increases the health value of the diet
- Provides psychological benefits
- Less likely to produce unpleasant side effects
- Nutrient-rich foods are beneficial, especially for elderly people
- Possess prolonged half-life
- Easily procurable without prescription
- Many people believe that the Nutraceutical approach is more natural than using a medical practitioner's prescribed drug

2.3 Plan Of Work:

1. Literature survey

2. Selection of herbal drugs (Nutraceuticals)

3. Collecting Information on Selected Herbal Drugs (Nutraceuticals)

4. Need of herbal Nutraceuticals.

5. Future Aspects of herbal nutraceuticals.

6. Summary

7. Conclusion

2.4 Need for Nutraceuticals [25]

• Adequate nutrition is not available in the routine food.

• Present day living environment is highly toxic due to pollution and pesticides because of these body loses its proper functioning power.

• There are side effects arising due to the administration of synthetic drugs.

• A good quality dietary supplementation absorbed and utilized by the body can truly strengthen our body and add to vitality hence we need n

3. DRUG PROFILE:

3.1 MORINGA OLEIFERA

Name: Moringa Oleifera

Synonym: Sahjan, Horseradish tree, Ben tree, or Drumstick tree.

Biological Source: It can consist of dried, long, slender, triangular seed pods of Moringa oleifera.

Family: Moringaceae

Geographical Source: It has 14 species, but the most commonly grown species is Moringa oleifera which is native to India, Africa, Arabia, Southeast Asia, South America, Pacific and Caribbean Islands.

Morphological Character:

Colour: Green

Odor: Characteristics

Shape: Long, Slender

Size: Height is 10 to 12m and diameter is 45cm.

Scientific Classification: Kingdom: Plantae

Division - Tracheophyta- Vascular plant

Class - Magnoliopsida

Order: Brassicales

Family: Moringaceae

Genus: Moringa

Species: M. oleifera[26,27]

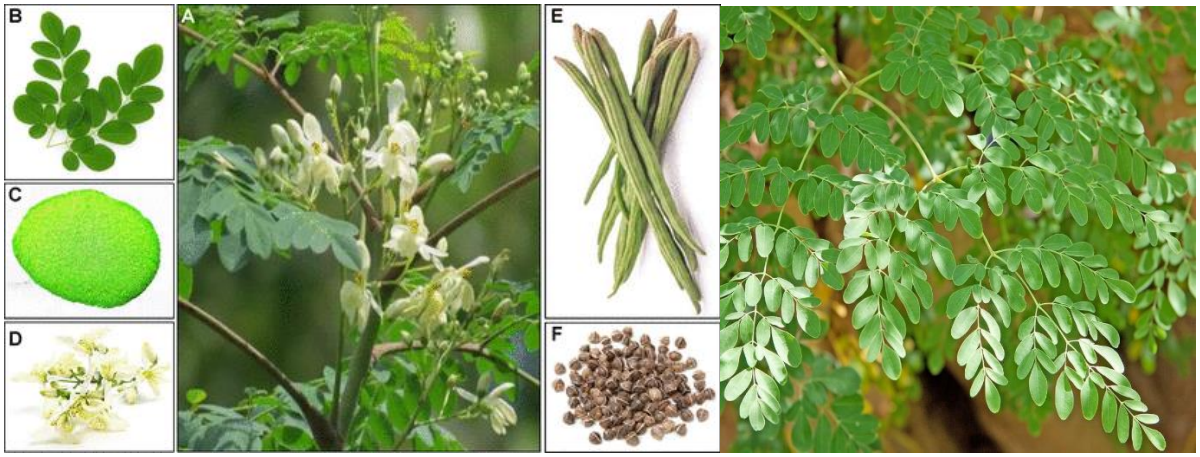

Fig.1: Moringa Oleifera

3.1.1 BIOACTIVE CONSTITUENTS OF MORINGA

Moringa oleifera contains components including vitamins, polyphenols such as (flavonoids, and phenolics acid), Alkaloids, glucosinolates and isothiocyonates, tannins, and saponins.

Moringa oleifera leaves are a good source of Flavonoids. Flavonoid ingredients of moringa include myrecytin, quercetin, and kaempferol [28].

Phenolic acid is a sub-group of phenolic compounds derived from hydroxybenzoic acid & and hydroxycinnamic acid naturally present in plants.

Chlorogenic acid (CGA) is an ester of dihydro cinnamic acid and a major phenolic acid in moringa oleifera.

Alkaloids are a group of chemical compounds, which contain mostly basic nitrogen atoms. Several of these compounds, including N,α-L-rhamnopyranosyl lincosamide, phenyl acetonitrile pyrrolemarumine, 4′-hydroxyphenylethanamide-α-L-rhamnopyranoside, and its glucopyranosyl derivative, have been isolated from Moringa Oleifera leaves [29].

Moringa oleifera has pharmacologic properties such as Hypolipidemic, Antioxidant, Anti-inflammatory, immunomodulatory, Hepatoprotective, Antihyperglycemic, and anticancer effects [30].

Table 1.1: Phytochemical constituents isolated from Moringa oleifera[31]

Sr. No	Parts	Phytochemical constituents
1	Root	4-(rhanopyranosyloxy)-benzyl glucosinolate and benzyl glucosinolate
2	Stem	4- hydroxymellein, vanillin,- testosterone, octacosanol acid, and sitosterol

3	Whole gum extrudates	L-arabinose, D-galactose, D-glucuronic acid, L-rhamnose, Dmannose, D-Xylose and leucoanthocyanin
4	Bark	4-(L-rhamnopyranosyloxy)-benzyl glucosinolate
5	Leaves	Glycoside niazirinin and three mustard oil glycosides, 4-[4'-o – acetyl – L-rhamnosyloxy)benzyl] isothiocyanate,niaziminin A and B
6	Mature Flower	D- mannose, D- glucose, protein, ascorbic acid, polysaccharide
7	Whole pods	Nitriles, isothiocyanate, dithiocarbamates,0-[2'- hydroxy-3'-(2"-heptenyloxy)]-prppylundecanoate, 0-ethyl-4-[(-1-rhamnosyloxy)-benzyl] carbamate, sitosterol
8	Mature Seeds	Crude protein, Crude fat, carbohydrate, methionine, cysteine,4-(- L-rhamnopyranosyloxy)-benzyl glucosinolate,moringyne, mono palmitic and di-oleic triglyceride
9	Seed oil	Vitamin A, beta carotene, the precursor of vitamin A

Table 1.2: Traditional uses of moringa oleifera[32]

Sr. No	Parts and their form	Pharmacological activities
1	Crude ethanolic extracts of dried seed, hot water infusion of flowers, leaves, r o o t s seeds, and bark, crude methanolic extracts of roots	Anti-inflammatory
2	Oil from dried seeds, methanolic and ethanolic extracts of free dried leaves	Anti-oxidant
3	Deflated and shell-free seeds, fresh leaves root, And bark.	Anti-microbial
4	Aqueous extracts of stem bark, ethanolic extracts of leaves, ethanolic and aqueous extracts of whole pods and their parts, coats, pulp, seed	cardiovascular
5	Leaves and fruits	Antihyperlipidemic
6	Methanolic extracts of roots	CNS depressant
7	Aqueous and ethanolic extracts of leaves and flower buds	Anti-fertility
8	Paste of leaves and ethanolic extracts of leaves and flower buds	Anti-cancer
9	Aqueous and ethanolic extracts of seed	Anti-hepatotoxic
10	Methanolic extracts of leaves and flower bud	Anti-ulcer

11	Hot water infusion of flower, leaves, roots seed, and stalk of bark	Anti-spasmodic
12	Seed infusion	Diuretics
13	Carotene of moringa oleifera	Produce vitamin A raises blood hemoglobin level

3.1.2 Pharmacological Activity

• **Antimicrobial activity:** Antimicrobial activities of moringa oleifera leaves, roots, barks, and seed reported against bacteria yeast dermatophyte and helminths by disk-diffusion methods. Fresh leaf juice and aqueous extracts from the seed inhibit the growth of Pseudomonas aeruginosa and Staphylococcus aureus. No activity was demonstrated against other pathogenic Gram-positive and Gram-negative bacteria and candida albicans. [33]

• **Anti-inflammatory activity:** Anti-inflammatory activity from the n-butanol extract of the seed of moringa oleifera was reported against ovalbumin-induced airway inflammation in Guinea pigs. The crude methanol extracts of the root by oral administration inhibit carrageenan-induced raw paw edema in a dose-dependent manner.[34]

• **Antioxidant activity:** Antioxidant effects of moringa oleifera leaf extracts reported in this, Tested in two stages of maturity using standard in vitro models. The successive aqueous extracts of moringa oleifera exhibited a strong scavenging effect on 2,2 -diphenyl -2 -picryl hydroxyl (DPPH) free radical, superoxide, nitric oxide radical and inhibition of lipid peroxidation. The free radical scavenging effect of moringa oleifera leaf extract was comparable to that of the reference antioxidants.[35]

• **Cytotoxic effect:** Cytotoxic effect of various extracts of leaves of moringa oleifera investigated. The cytotoxic efficiency was evaluated on human multiple myeloma cell lines of the organic extracts, methanolic extracts of moringa leaves showed the least viability at the highest dose.[36]

• **Anti-atherosclerotic and hypolipidaemic:** Anti-atherosclerotic and hypolipidaemic activity of moringa oleifera leaves reported using simvastatin as a standard drug. The extracts significantly prolonged the lagtime of conjugated diene(CD) formation and inhibited thiobarbituric acid reactive substance formation in both in vitro and ex vivo experiments in a dose-dependent manner in hypercholesterol-fed rabbit, it significantly lowered the cholesterol levels and reduced the atherosclerotic plaque formation to about 50 and 86%, respectively. [37]

• **Anti-ulcer:** Anti-ulcer effect of aqueous extract of moringa oleifera leaves reported on adult Holtzman rats of either sex using ondansetron as standard drug. [38]

• **Antipyretic and wound healing:** Antipyretic and wound healing activity from the ethanolic and ethyl acetate extracts of Moringa oleifera leaves were reported. The ethanolic and ethyl acetate extracts of seeds showed significant antipyretic activity in rats, whereas ethyl acetate extracts of dried leaves showed significant wound healing activity (10% extracts in the form of ointment) on excision, incision, and dead space wound models. [39]

• **Anti-diabetic:** Anti-diabetic activity of aqueous extract of moringa oleifera leaves reported on glycemic control, hemoglobin, total protein, urine sugar, urine protein, and body weight. [40]

• **Anticancer:** A paste drumstick leaf has been screened for its influence on the carcinogen detoxifying glutathione-s-transferase (GST) in Swiss mice. it increases GST activity by more than 78% in the stomach, liver, and esophagus and shows protective activity against carcinogenesis. The crude ethanolic extract of the seed exhibited anti-tumor activity against Epstein-Barr virus -early antigens. [41]

• **Anti-fertility:** The bark of the drumstick tree was screened for its anti-fertility effect on Early pregnancy in albino rats. the aqueous extract of root and bark at a dose of 200mg /mg and 400 mg/mg respectively showed a post-coital antifertility effect in rats and also induced fetal resorption at late pregnancy. [42]

3.1.3 Therapeutic Uses[43]

❖ Moringa For Blood Pressure:

✓ A diet high in magnesium benefits those with hypertension, most likely by contributing to the relaxation of the smooth muscles of the blood vessels.
✓ Moringa also contains magnesium along with zinc and vitamin E which take part in decreasing blood pressure along with other nutrients.

❖ Moringa For Diabetes

✓ Moringa as a rich source of ascorbic acid helps in insulin secretion.

✓ It is interesting to note that certain nutrients like vitamins B1, B2, B12, pantothenic acid, vitamin C, protein, and potassium- along with small frequent meals containing some carbohydrates - can stimulate the production of insulin within the body

❖ Natural healer

✓ Neutralizes toxins

✓ Flushes toxins from the body

✓ Purifies the liver

✓ Removes heavy metals pollutants

✓ Helps strengthen the immune system

✓ Assists in building red blood cells

✓ Rejuvenates at the cellular level

✓ Reduces the pH level in the body

3.1.4 USE IN COVID-19 INFECTION

Moringa oleifera is a plant that is high in vitamin C, potassium, calcium, protein, iron, and amino acids and is frequently used as a nutritional supplement [44,45]. These nutrients are responsible for muscle growth after M. oleifera ingestion. M. oleifera has been shown in studies to serve as an antioxidant, and immune system booster, lower blood pressure, and reduce fat in the blood and body [46]. Molecular peptide docking proved the effect of M. oleifera on COVID-19. They found the presence of flavonoid which may interact with 15 peptides of SARS Cov-2 and reduce the activity of the virus. Their findings revealed that the antiviral activity of M. oleifera is due to the presence of those flavonoids [47]. Moringa oleifera is used natural drug that has shown promising efficacy against covid 19 to boost the immunity of healthy people & and re-boost the immunity of sick people during this COVID-19 pandemic [48].

3.2 GINGER

Name: Zingiber officinale

Synonyms: Gingerin, Rhizoma zingibers, Zingibere, Ginger Officinale

Biological Source: Ginger consists of the dried rhizomes of the Zingiber officinale

Family: Zingiberaceae

Geographical Source: Ginger is cultivated in areas characterized by abundant rainfall. Even though it is native to southern Asia, ginger is also cultivated in tropical areas such as Jamaica, China, Nigeria, and Haiti and it is an important spice crop in India.

Scientific Classification: Kingdom: Plantae

Division - Tracheophyta- Vascular plant

Class - Magnoliopsida

Order: Zingiberales

Family: Zingiberaceae

Genus: Zingiber

Species: Zingiber officinale [49]

Fig.2. The Picture of Zingiber Officinale

3.2.1 Bioactive Constituents Of Ginger

Ginger contains various components, including about 3.0%e 6.0% fatty oil, 9.0% protein, 60.0%e70.0% carbohydrates, 3.0%e8.0% crude fiber, about 8.0% ash, 9.0%e12.0% water and approximately 2.0%e3.0% volatile oil [50]. Ginger has about 400 different chemical components, although its pharmacological effects are primarily due to its terpene and phenolic chemicals [51] Terpene ingredients of ginger include zingiberene, bisabolene, farnesene, sesquiphellandrene, limonene, cineole, linalool, borneol, geranial and curcumene. Ginger-derived terpenes have various pharmacologic properties such as anticancer, antioxidant, anti-inflammatory, antiviral, antibacterial, antidiabetic, antihyperalgesic, gastroprotective, and neuroprotective effects [50]. The ginger-derived phenolic compounds include gingerols, paradols, shogaols, and zingerone. Ginger also contains other gingerol- or shogaol-related compounds such as 1-dehydrogingerdione, 6-gingerdione, and 10-gingerdione as well as gingerdiols and diarylheptanoids [51]. Gingerols are the main pungent components of fresh ginger. Although 6-gingerol is the most abundant gingerol, additional gingerols such as 8-,10-, and 12-gingerols, as well as 6-ginger-dione, are also found in ginger [50]. Anticancer, anti-inflammatory, antioxidant, anti-angiogenesis, anti-metastasis, antibacterial, antifungal, neuroprotective, antiemetic, and antihyperlipidemic properties are all found in gingerols [51].

3.2.2 USES

Antibacterial, anti-inflammatory, Anti-oxidant, Antimicrobial, cardiovascular protective, Antinausea, Antiemetic, Respiratory Protective, Anti-obesity, anti-diabetic.

3.2.3 PHARMACEUTICAL USES

The Ginger is used for the treatment of some types of "stomach problems," including motion sickness, morning sickness, colic, upset stomach, gas, diarrhea, irritable bowel syndrome (IBS), nausea, nausea caused by cancer treatment, nausea caused by HIV/AIDS treatment, nausea and vomiting after surgery, as well as loss of appetites.

Other uses of ginger-

• Pain relief from rheumatoid arthritis (RA) and Osteoarthritis

• Menstrual pain

• Upper respiratory tract infection

• Cough

• Respiratory problems

• Migraine headache

• Diabetes

• Chest pain and Low back pain

• Stomach pain

• Diuretic

• Increase sweating [52,53,54]

3.2.4 USE IN COVID-19 INFECTION

Fresh ginger has antiviral properties against the human respiratory syncytial virus (HRSV) and rhinovirus, indicating that it can be used to treat respiratory viral infections. In contrast to dried ginger, the aqueous extract of fresh ginger inhibits the attachment and penetration of HRSV to the human larynx epidermoid carcinoma cells and human lung carcinoma cell lines, when given 1e2 h before virus inoculation [55]. Fresh ginger has been shown to inhibit viral attachment and penetration into host cells by interacting with G and F proteins [56]. Interferon (IFN)-a and IFN-b release from infected epithelial cells is also stimulated by fresh ginger. As a result, fresh ginger can stop viruses from replicating in the lower respiratory tract [55]. PLpro, a SARS-CoV-2-related papain-like protease, cleaves polyprotein a/b (PP a/b) at many locations to produce numerous proteins required for viral survival and replication [57] SARSCoV-2-related PLpro also interferes with type I IFN anti-virus response. As a result, antiSARS-CoV-2 medications should target PLpro to effectively limit virus reproduction and survival [58]. According to molecular docking methods, 8-gingerol, 10-gingerol, 6-gingerol, and another family of ginger compounds effectively inhibit PL pro [59]. According to molecular docking analyses, 6-gingerol has a strong affinity for a variety of virus proteins (main protease, SARS-CoV3C related molecule, and cathepsin K), all of which are required for SARS-CoV-2 replication [60] 6-gingerol interacts to SARS-S CoV-2's protein as well as numerous RNA binding proteins [61]. Docking analyses also revealed that gingerol, geraniol, shogaol, zingiberene, zingiberene, and zingerone interact with key residues in the catalytic domain of the MPro. Meanwhile, geraniol, shogaol, zingiberene, zingiberene, and zingerone can interfere with S protein-ACE2 binding [62]. Docking studies show that 6-gingerol, 8-gingerol, 10-gingerol, 10-shogaol, 8- 8-paradol,

and 10-paradol interact with the RBD of the virus S protein as well as human ACE2, indicating that they can prevent SARS-CoV-2 from spreading [63]. According to the findings of a computational investigation, a ginger-derived terpene called sesquiphellandrene binds to the S protein and thereby disrupts the S protein-ACE2 interaction [64]. The neutrophils from COVID-19 display an activation status. Inflammation and hemorrhagic lesions in COVID-19 patients' lungs can be exacerbated by neutrophil activation and degranulation Lymphopenia and a higher neutrophil-lymphocyte ratio also happen in patients with severe COVID-19 [65] Patients with COVID-19 exhibited high circulating levels of calprotectin (a neutrophil activation marker) and its quantities were higher in patients who had progressed to the severe form of the disease [66].

3.2.5 Pharmacological activity

• **Anti-oxidant Activity:** Overall, in vitro and in vivo studies have demonstrated that ginger and its bioactive compounds, such as 6-shogaol, 6-gingerol, and oleoresin, possess strong antioxidant activity. Moreover, the activation of the Nrf2 signaling pathway is crucial to the underlying mechanisms of action. It should also be pointed out that the overproduction of ROS in the human body is considered to be a cause of many diseases. Theoretically, antioxidants should be effective. Several studies have found that ginger also has high antioxidant activity [67,68,69]

• **Anti-inflammatory Activity:** Ginger and its active constituents possess anti-inflammatory activity, which could protect against inflammation-related diseases such as colitis. In general, ginger and its active compounds are effective in alleviating inflammation, especially in inflammatory bowel diseases. The anti-inflammatory mechanisms of ginger are probably associated with the inhibition of Akt and NF-κB activation, an enhancement in anti-inflammatory cytokines, and a decline in proinflammatory cytokines. Notably, the application of ginger nanoparticles has the potential to improve the prevention of and therapy for inflammatory bowel disease [70,71]

• **Antimicrobial Activity:** In recent years, ginger has been reported to show antibacterial, antifungal, and antiviral activities. Biofilm formation is an important part of infection and antimicrobial resistance. One result found that ginger inhibited the growth of a multidrug-resistant strain of Pseudomonas aeruginosa by affecting membrane integrity and inhibiting biofilm formation. Moreover, a crude extract and methanolic fraction of ginger inhibited biofilm formation, glucan synthesis, and the adherence of Streptococcus mutans by downregulating virulence genes [72,73,74,75]

• **Anti-cancer Activity:** Recently, ginger has been widely investigated for its anticancer properties against different cancer types, such as breast, cervical, colorectal, and prostate cancer. The potential mechanisms of action involve the inhibition of proliferation and the induction of apoptosis in cancer. Several investigations have demonstrated that ginger and its bioactive compounds can interfere with the carcinogenic processes of colorectal cancer. It was observed in an in vitro study that a fraction rich in the polyphenols of dried ginger powder suppressed the proliferation of colorectal cancer cells and gastric adenocarcinoma cells [76,77,78,79,80,81]

• **Neuroprotection:** Many investigations have revealed that ginger positively affects memory function and exhibits anti-neuroinflammatory activity, which might contribute to the management and prevention of neurodegenerative diseases [82,83]

• **Cardiovascular Protection:** Dyslipidemia and hypertension are known to be risk factors for cardiovascular diseases, including stroke and coronary heart disease. A series of studies have shown that ginger can decrease the levels of blood lipids and blood pressure, contributing to protection from cardiovascular diseases. Ginger extract reduces the body weight, and high-fat diet and enhances the level of serum high-density lipoprotein-cholesterol (HDL-C), a protective factor against coronary heart disease. Besides, ginger extract increased the levels of apolipoprotein A-1 and lecithin-cholesterol acyltransferase mRNA in the liver, which was related to high-density lipoprotein (HDL) formation [84,85,86,87,88]

• **Anti-obesity Activity:** Obesity is a risk factor for many chronic diseases, such as diabetes, hypertension, and cardiovascular diseases. Several studies have reported that ginger is effective in the management and prevention of obesity. Ginger and its bioactive constituents, including ginger enone A, 6-shogaol, and 6-gingerol, have shown anti-obesity activity, with the mechanisms mainly related to the inhibition of adipogenesis and the enhancement of fatty acid catabolism [89,90,91]

• **Anti-diabetic Activity:** An in vitro experiment resulted in both 6-shogaol and 6-gingerol preventing the progression of diabetic complications, and they inhibited the production of AGEs by trapping methylglyoxal (MGO), the precursor of AGEs. Additionally, 6-gingerol reduced the levels of plasma glucose and insulin. 6-paradol and 6-shogaol promoted glucose utilization by increasing AMPK phosphorylation [92,93,94]

• **Antinausea and Antiemetic Activities:** In a clinical trial, inhaling ginger essence could attenuate nausea intensity and decrease emesis episodes two and six hours after nephrectomy in patients. Moreover, nausea and emesis are common side effects of chemotherapy. An in vitro experiment revealed that 6-shogaol, 6-gingerol, and zingerone inhibited emetic signal transmission in vagal afferent neurons by suppressing the 5-HT receptor, and 6-school had the strongest inhibitory efficacy [95,96,97]

• **Protective Effects Against Respiratory Disorders:** Ginger and its bioactive compounds have exhibited bronchodilating activity and anti-hyperactivity in several studies. Ginger induced significant and rapid relaxation in the isolated human airway smooth muscle. In results from guinea pig and human tracheas models, 6-gingerol, 8-gingerol, and 6-school could lead to the rapid relaxation of precontracted airway smooth muscle. In addition, ginger ameliorated allergic asthma by reducing allergic airway inflammation. Moreover, the water-extracted polysaccharides of ginger could decrease times of coughing [98,99,100,101]

3.3 ALOE VERA

Name: Aloe barbadensis Miller

Synonyms: Gingerin, Rhizoma zingibers, Zingibere, Ginger Officinale

Biological Source: Ginger consists of the dried rhizomes of the Zingiber officinale

Family: Liliaceae

Geographical Source: Aloe species are mostly inhabitants of arid climates, and are widely distributed in Africa, India, and other arid areas. The largest number of Aloe species is approximately 140, and most are found in South Africa. However, they could also be grown in subtropical summer rainfall and winter rainfall regions.

Scientific Classification: Kingdom: Plantae

Division – Magnoliophyta

Class - Liliopsida

Order: Asparagales

Family: Asphodelaceae

Genus: Aloe

Species: Aloe barbadensis Miller[102,103]

Fig.3. The Picture Of Aloe Vera

3.3.1 BIOACTIVE CONSTITUENTS OF ALOE VERA

Aloe vera contains various components, including Anthraquinone, carbohydrates, Enzymes, inorganic compounds, organic compounds and lipids non-essential and essential amino acids, proteins saccharides, vitamins, and sterols [104]. There Is a great variation of therapeutically eloquent substances produced by aloe vera which have eminent significance in many areas of many medicine. An entirety of 75 compounds are present in the leaf of aloe, and each one has a variety of remedial properties. these include lignin(capacity to penetrate the human skin), saponins(antiseptic property as well as a foaming agent), anthraquinones(aloin, iso barbaloin, anthracene, emodin, ester of cinnamic acid, chrysophanic acid, barbaloin, ethanol, aloetic acid, aloe-emodin, and ethereal oil), minerals(calcium, manganese, sodium, copper, magnesium potassium, zinc chromium, and iron), vitamins (Vit A, C, E, B12 and choline), amino acids (20 of 22 required amino acids and seven of eight essential ones), enzymes peroxidase, aliases, catalase, lipase, cellulase, carboxypeptidase, amylase and alkaline phosphate) and sugars (monosaccharides and polysaccharides)[105,106]

3.3.2 USES

Aloe vera is used based on scientific evidence antifungal, antidiabetic, anti-inflammatory, analgesic, anticancer, antimicrobial, antioxidant, antiproliferative, Gastric mucosal protection, hepatoprotective, hypolipidaemic, immunomodulatory, antimutagenic, radioprotective and wound healing [102,103].

3.3.3 Pharmacological Activities

• **Immune System Restoration:** Aloe vera has been reported to protect the skin against damage caused by radiation. It is hypothesized that the administration of Aloe vera gel results in the generation of an antioxidant protein metallothionein, which acts as a scavenger for hydroxy radicals, hence protecting the skin from oxidative damage. It also releases immunosuppressive Interleukin IL-10, thereby preventing
UV-induced suppression of delayed-type hypersensitivity [107]

• **Anti-inflammatory action and immunity activity:** Because of salicylic acid, which is both analgetic and anti-inflammatory, the production of prostaglandins from arachidonic acid is inhibited. So Aloe has been used to help with arthritis and joint-related problems. Immunity activity is enhanced by Aloe polysaccharides. [108]

• **Effects on skin exposure to UV and X-radiation:** Aloe vera supports the healing of first to second-degree burns although the exact role is not well known. It is suggested that lectin may be responsible for the therapeutic effect. [109]

• **Healing wounds:** Due to polysaccharides and the growth hormone gibberellins, increased collagen and elastin formation may reduce wrinkling. The high healing capacity of Aloe vera is to find out several mucopolysaccharides

(MPS) present between 10,000-20,000 MPS per liter. Moreover, Aloe vera effects are in the treatment of scar tissue and the prevention of scar formation following injury to the skin, probably attributed to the activity of the amino acids necessary to new cell formation and due to the ability of its enzymes to promote regeneration of the deepest layers of the skin. [110]

- **Antidiabetic activities:** Some inorganic elements (vanadium, manganese, copper) 38 and especially the polysaccharides present in Aloe vera may have a significant role in antidiabetic activities. This plant has been linked with reduced blood glucose levels in diabetics and with lower blood lipid levels or cholesterol 31- 39 (approximately 30% lower) 40 in hyperlipidaemic patients. [111]

- **Antioxidant activities:** Antioxidant activities have been studied. Aloe vera activity was similar to that of α-tocopherol. Also, it has been noticed that the growth stage of the plant is important for such activities. [112]

4. VITAMINS AND MICRONUTRIENTS AND THEIR ROLE IN IMMUNITY BOOSTER

4.1 VITAMIN A

i) It is known as an anti-inflammatory vitamin because it strengthens the immune system and regulates cellular and humoral immunological processes [113]

(ii) Necessary to generate antibodies against antigens and for normal functioning of macrophages and neutrophils [114].

(iv) The components of innate immunity, as well as their inflammatory responses, were impaired by vitamin A deficiency (VAD) [115].

4.2 VITAMIN B

(i) Vitamin B1 (Thiamin) influences anti-inflammatory properties and its deficiency causes T cell infiltration [116].

4.3 VITAMIN C

(i) Vitamin C has been linked to the immune system's strengthening and enhancement [117].

(ii) Vitamin C is an antibacterial agent that is found in the human immune system [118].

(iii) Vitamin C elicited antiviral immune responses in vivo, particularly against the influenza virus.

(iv) Supplementing with vitamin C can help asthmatic patients cope with the symptoms of respiratory infections. (v) Vitamin C has antibacterial effects, and a deficit causes a decrease in microbial infection resistance [119].

4.4 CALCIUM

(i) An increase in [Ca2+] is linked to the activation of immune system cells.

(ii) Calcium (Ca2+) is a multifunctional Cation capable of acting as a second messenger in various immune cell groups including T and B lymphocytes, macrophages, mast cells, etc [120]

4.5 ZINC

(i) Zinc is required for immune cell development and differentiation as well as appropriate function [121].

(ii) Zinc promotes CD8+T cell proliferation by modulating cytokine release

(iii) Zinc deficiency impaired neutrophil phagocytic activity, chemotactic responses of both macrophages and monocytes and immune cell ability to destroy infections.

(iv) Zinc supplementation in the diet has been demonstrated to lessen the severity of acute lower respiratory tract infections [122].

4.6 IRON SALTS

(i) Iron salts are thought to play a role in immunity.

(ii) Iron deficiency is linked to a decrease in cell-mediated and innate immunity, making elderly people more susceptible to infections

4.7 COPPER

(i) Copper is a powerful virucidal agent.

(ii) Copper deficiency impacts immune function and is known to reduce the killing ability of natural killer cells (NK cells) [123].

4.8 MAGNESIUM

(i) There is a strong relationship between Mg and the immune system [124]

(ii) Magnesium insufficiency is linked to immune system dysfunction, both humoral and cell-mediated [125].

5. Need for herbal Nutraceuticals [126,127]

There has been an increased global interest and acceptance of traditional medicinal products. Efforts to monitor and regulate traditional herbal medicines are underway. Ayurveda - the traditional Indian system of medicine remains the most ancient yet living tradition. In India, about 70 percent of the rural population depends on the traditional systems of medicine and Nutraceuticals for their primary healthcare needs, Research should focus on the development of safe, pure, and potent Nutraceutical products Usage of proper and authentic raw materials is encouraged.

To develop scientific methods for ensuring and checking the quality, consistency, and dosage of ingredients. [128] Increased cost and serious side effects of existing synthetic Nutraceuticals and increased number of incidences with chronic diseases lead the society to search for alternative source to meet their Nutraceutical requirements which is safe and can promote human health without any side effects. This prompted us to focus our search on the development of safe and efficacious herbal Nutraceuticals from the common plant sources available in the Southern peninsula.

6. POTENTIAL NUTRACEUTICALS FOR COVID

"Immune boosting" is a hot issue in the wake of the coronavirus pandemic, alongside a slew of speculative cures, treatments, and prevention methods [129]. This belief is so widespread among laypeople that "improving the body's immune system" is the most common rationale for taking nutritional supplements. Vitamins, minerals, antioxidants, probiotics, and "functional foods," as well as other complementary and alternative medicine (CAM) techniques, are all part of the "immune boosters" market [130,131]. A balanced diet consists of a range of foods in suitable proportions of protein, carbs, fats, minerals, and vitamins, among other things. It contains all of the nutrients necessary for a healthy body and a robust immune system. The majority of poor people in India eat a restricted diet every day, which can lead to dietary deficiencies. Furthermore, due to changing lifestyles, the middle and upper classes today consume more junk and processed food. The Western diet is low in nutrients and high in calories, refined sugars, salt, carbs, and saturated fats, which can contribute to increased inflammation and weakened immunity, increasing the risk of viral infections like SARS-CoV-2. SARS-CoV-2 has disrupted global health and economic well-being since the beginning of 2020. The regional office of the World Health Organization (WHO) in China was first alerted to the virus infection in Wuhan on December 31, 2019, and termed the infection as an epidemic on March 11, 2020. Since then, laboratories across the globe have been collaborating to develop vaccines and therapeutic agents for this novel coronavirus [132].

7. Result & Discussion

Whenever any functional food such as a grape-based beverage working toward immunomodulation is discussed, it is not only resveratrol but a group of other polyphenols and flavonoids working toward the same. It would be too simplistic to undermine the contribution of the other compounds and attribute the overall effect to a single compound with the same efficiency. Therefore, there is a need to understand the mechanism of immunomodulation by each phytochemical and the synergistic contribution of all others. While the work toward the selection of the most adequate phytoconstituent is gaining momentum, the mode of delivery and bioavailability can come out as a limiting factor. Approaches to modulate the release of the active compounds and the stability of the nutraceuticals in the gut in the gut need to be examined and worked upon. Although a lot of work has been done in the study of mechanisms of immunomodulation by nutraceuticals, most of them are conceptual and very difficult to implement due to the lack of clinical trials. Clinical trials will help us to work on two aspects. One would be scrutinizing the promising nutraceuticals and estimating their safety and relevance to human health. Second, it would also help us to standardize dose levels to correlate them with the relevant functional foods. As we move on through the various stages of formulation, production, and administration of nutraceuticals, a lack of strong regulatory controls may result in poor quality either due to raw materials or processing steps. Nutrigenomics can be used to map different nutritional requirements for different genetic makeups, making it a very interesting tool for the development of functional foods and nutraceuticals for the population who are at a high risk of obesity, heart disease, and certain types of cancers.

8. SUMMARY

Nutraceuticals are in great demand in the developing world for primary health care not only because they are inexpensive, but also for better cultural acceptability, better compatibility with the human body, and minimal side effects. This is primarily due to the general faith that Nutraceuticals are relatively safe because they are natural. Nutraceutical potentials possess the presence of rich phytoconstituents and natural anti-oxidants. A greater part of their anti-oxidant action is due to the presence of bioactive compounds such as steroids, glycosides, carbohydrates, alkaloids, flavonoids, tannins, proteins as well natural products that can reduce or minimize the toxic side effects. A Nutraceutical is any substance considered as a food, or its part which, in addition to its normal nutritional value provides health benefits including the prevention of disease or promotion of health. Although a large number of synthetic drugs are being added to the world of present pharmacopeia, no system of medicine in the world has been able to solve all the health problems. Therefore, the search for innovative nutraceuticals from plants is genuine and urgent. In India, there is an ocean of knowledge about medicinal plants and rich medicinal flora, but still, only a few pearls have been searched as therapeutic agents. There are large numbers of original plants left which have not been investigated thoroughly from a modern scientific view or their healing or Nutraceutical values have not been known. Thus, there is an insistent need for systematic, scientific examination of these plants. More research needs to be carried out to investigate the unknown and unexplored potentials of the plants.

9. Conclusion

In this context, the present studies have been planned to undertake pharmaceutical studies on some plants (Moringa oleifera, Zingiber officinale & Aloe Vera). The pharmaceutical studies help to understand the use of the above plant parts. This has been planned to gather information on herbal plants, which, may effectively act as immunobooster. *M. oleifera* can reduce the risk of cancer and modulate blood glucose, although the underlying mechanisms remain to be further explored. Therefore, *M. oleifera* provides the potential for the prevention or treatment of a series of chronic diseases. In Ayurveda, so many therapeutic preparations are based on A. vera. The plant is used widely in the traditional herbal medicine of many countries. The plant is a good choice for cosmetic and pharmaceutical industries as they are using it for the preparation of pain soothing, moisturizing, face shining creams, makeup products, tissues, moisturizers, soaps, sunscreens, incense, shaving cream, or shampoos. Ginger biomolecules have proven to show interesting medicinal properties, such as anti-inflammatory, anti-cancerous, anti-oxidative, and anti-microbial activities as well as reducing oxidative parameters.

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