



Herbal Extrudates: A Compact Dietary Supplements

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ABSTRACT

Since ancient times, plants, especially herbs have been used for their medicinal properties by us humans. This practice of using plants for their medicinal property gave rise to the science of Ayurveda. These herbs not only have medicinal value but are also used as dietary supplements. Today such supplements are widely accepted and used by people all over the world. There are various types of dietary supplements available in the market today. However, this formulation is innovative and unique. It is a dietary supplement which is suitable for all ages (except infants) and especially palatable for children. It can be taken anytime and is also rich in vitamins and minerals. It is a herbal extrudate made up of different herbs. The herbs were selected on the basis of availability which includes spinach, turmeric, ginger, liquorice etc. The extrudates contain equal amounts of herbs. A moist mixture is prepared using suitable vehicle (water). The moist mixture upon passing through an extruder forms extrudates which are then dried and packed. The extrudates were studied for their physico-chemical properties. And hence, the results were interpreted accordingly which were found to be significant.

Keyword: Vitamins, liquorice, turmeric, ginger

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INTRODUCTION

Herbal is "a gathering of portrayals of plants set up together for therapeutic purposes." Expressed all the more intricately – it is a book containing the names and depictions of plants, more often than not with data on their virtues(properties) – and specifically their restorative, tonic, culinary, dangerous, dreamlike, sweet-smelling, or mysterious forces, and the legends related with them. A natural may likewise group the plants it depicts, may give plans for herbal concentrates, tinctures, or mixtures, and now and then incorporate mineral and creature medicaments notwithstanding those acquired from plants. Herbals were frequently represented to help plant recognizable proof. ^[1]

Extrudate

Material that has been extruded through a die.

Brief portrayal of the extrudate production process:

"The raw materials are blended. In an expulsion procedure, water is included and the blend is heated to the point of boiling. The blend is then constrained under high pressure through a little opening into the environment, giving the item its trademark shape and consistency." ^[2]

An extruder is a typical machine in industry, utilized in expulsion tasks, yet in addition utilized in trim activities, for example, infusion embellishment and blow shaping. In plastic industry, the screw extruder is the most widely recognized.

Expulsion might be persistent (hypothetically creating uncertainly long material) or semi-constant (delivering numerous pieces). The expulsion procedure should be possible with the material hot or cold. ^[3]

In 1797, Joseph Brahma protected the principal expulsion process for making lead pipe. It included preheating the metal and after that constraining it through a bite the dust by means of a hand-driven plunger. The procedure was not additionally created until 1820 when Thomas Burr built the main water driven controlled press. As of now the procedure was designated "squirting". In 1894, Alexander Dick extended the expulsion procedure to copper and metal compounds.

Process:

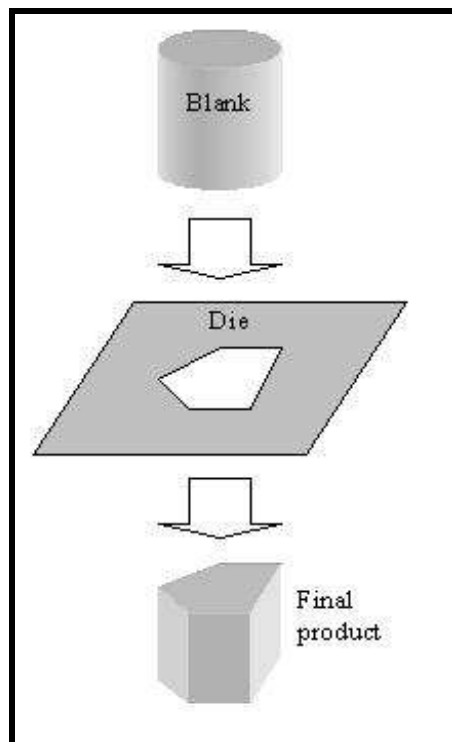


Figure-1: Extrusion of a round blank through a die.

Dietary supplement:

A dietary supplement is planned to give supplements that may some way or another not be expended in adequate amounts.

Supplement as for the most part comprehended incorporate nutrients, minerals, fiber, unsaturated fats, or amino acids, among different substances. U.S. experts characterize dietary enhancements as substance, while somewhere else they might be delegated drugs or different items.^[4]

As indicated by the United States Food and Drug Administration (FDA), dietary supplements are items which are not pharmaceutical medications, sustenance added substances like flavors or additives, or customary nourishment, and which likewise meet any of these criteria:

1. The item is expected to enhance an individual's eating routine, in spite of it not being usable as a meal substitution.
2. The item is or contains a nutrient, dietary component, herb utilized for herbalism or organic utilized as a restorative plant, amino corrosive, any substance which adds to other nourishment eaten, or any concentrate, metabolite, fixing, concentrate, or mix of these things.
3. The item is marked as a dietary enhancement.^[5]

In the United States, the FDA has diverse checking strategies for substances relying upon whether they are introduced as medications, sustenance added substances, nourishment, or

dietary enhancements. Dietary enhancements are eaten or taken by mouth, and are managed in United States law as a sort of sustenance as opposed to a kind of medication. Like nourishment and dissimilar to drugs, no administration endorsement is required to make or sell dietary enhancements; the producer checks the wellbeing of dietary enhancements however the legislature does not; and instead of requiring hazard advantage examination to demonstrate that the item can be sold like a medication, chance advantage investigation is just used to appeal to that sustenance or a dietary enhancement is perilous and ought to be expelled from market. ^[6]

Types of dietary supplements

There are many types of dietary supplements.

Nutrients

Nutrient is a natural compound required by a life form as an essential supplement in constrained sums. A natural concoction compound (or related arrangement of mixes) is known as a nutrient when it can't be blended in adequate amounts by a living being, and should be gotten from the eating regimen. In this way, the term is restrictive both on the conditions and on the specific life form. For instance, ascorbic corrosive (nutrient C) is a nutrient for people, yet not for most different creatures. Supplementation is significant for the treatment of certain medical issues yet there is little proof of advantage when utilized by the individuals who are generally solid.

Dietary component

Dietary components, generally called "dietary minerals" or "minerals", are the concoction components required by living beings, other than the four components carbon, hydrogen, nitrogen, and oxygen present in like manner natural atoms. The expression "dietary mineral" is obsolete, as the substances it alludes are compound components as opposed to genuine minerals.

Herbal medication

Herbal medication is the utilization of plants for therapeutic purposes. Plants have been the reason for restorative medications through a lot of mankind's history, and such conventional prescription is still generally polished today. Present day prescription perceives herbalism as a type of elective drug, as the act of herbalism isn't carefully founded on proof assembled utilizing the logical strategy. Current prescription, does, notwithstanding, utilize many plant-inferred mixes as the reason for proof tried pharmaceutical medications, and phytotherapy attempts to apply present day measures of viability testing to herbs and medication that are gotten from normal sources. The extent of Herbal medication is here and there reached out to incorporate parasitic and honey bee items, just as minerals, shells and certain creature parts. ^[7]

Amino acids and proteins

Amino acids are naturally significant natural mixes made out of amine (- NH₂) and carboxylic corrosive (- COOH) practical gatherings, alongside a side-bond explicit to every amino corrosive. The key components of an amino corrosive are carbon, hydrogen, oxygen, and nitrogen, however different components are found in the side-chains of certain amino acids.

Amino acids can be partitioned into three classes: basic amino acids, unimportant amino acids, and contingent amino acids. Fundamental amino acids can't be made by the body, and should be provided by nourishment. Superfluous amino acids are made by the body from fundamental amino acids or in the ordinary breakdown of proteins. Restrictive amino acids are normally not basic, aside from in the midst of sickness, stress, or for somebody tested with a deep rooted ailment

Basic unsaturated fats

Basic unsaturated fats, or EFAs, are unsaturated fats that people and different creatures must ingest in light of the fact that the body requires them for good wellbeing however can't combine them. The expression "fundamental unsaturated fat" alludes to unsaturated fats required for natural procedures however does exclude the fats that lone go about as fuel.

Bodybuilding enhancement

Working out enhancements are dietary enhancements ordinarily utilized by those engaged with weight training and sports. Working out enhancements might be utilized to supplant dinners, upgrade weight gain, advance weight reduction or improve athletic execution. Among the most generally utilized are nutrient enhancements, protein, extended chain amino acids (BCAA), glutamine, basic unsaturated fats, supper substitution items, creatine, weight reduction items and testosterone promoters. Enhancements are sold either as single fixing arrangements or as "stacks" - restrictive mixes of different enhancements promoted as offering synergistic focal points. While numerous lifting weights enhancements are additionally devoured by the overall population their striking nature and recurrence of utilization may vary when utilized explicitly by muscle heads. ^[8]

Therapeutic employments

The expected utilization of dietary enhancements is to guarantee that an individual gets enough fundamental supplements.

Dietary enhancements ought not be utilized to treat any infection or as preventive medicinal services. A special case to this proposal is the fitting utilization of nutrients. Dietary enhancements are pointless on the off chance that one eats a decent diet. Enhancements may make hurt in a few different ways, including over-utilization, especially of minerals and fat-

dissolvable nutrients which can develop in the body. The items may likewise cause mischief identified with their quick retention in a brief timeframe, quality issues, for example, defilement, or by antagonistic associations with different nourishments and medication.

Literature review

This section covered entire information about the plant material selected.

Brahmi

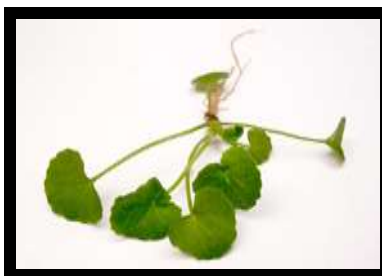


Figure 2: Brahmi Plant

Synonym-Jalbrahmi, Nirbrahmi, Brahmi, Water hyssop

Biological Source-It consist of the fresh leaves and stem of *Bacopa monnieri* Linn. (herpestis moniera).

Family- Scrophulariaceae.

Chemical constituents-as major constituent tetracyclic triterpenoid saponins-bacosides A and B.

Other constituents-

Saponins-Bacoside A1 and A3, hersaponin, betulic acid

Alkaloids-Heepestine, brahmine.

Flavonoids-luteonine-7-glucoside, glycoronyl-7-apigenin.

Uses-

Bacopa has been used in traditional Ayurvedic treatment for epilepsy and asthma.

It is also used in Ayurveda for ulcers, tumors, ascites, enlarge spleen, indigestion, inflammations, leprosy, anemia, and biliousness.^[9]

Pharmacology-

Bacopa monnieri displays in vitro antioxidant and cell-protective effects. It also inhibits acetylcholinesterase, activates choline acetyltransferase, and increases cerebral blood flow. In rats, bacoside A enhances antioxidation, increasing superoxide dismutase, catalase, and glutathione peroxidase activities. Bacopa monnieri augments Th1 and Th2cytokine production.

Several studies have suggested that *Bacopa monnieri* extracts may have protective effects in animal models of neurodegeneration. There have also been preliminary clinical studies suggesting improvement of cognitive function in humans.

Shankapushpi



Figure 3: Shankapushpi Plant

Synonym-shankhvel, shankhini

Biological source-this consists of aerial parts of the plant known as *Canscora decussata*.

Family- gentianaceae.

Uses-

In traditional Ayurvedic medicine, it has been used for centuries as a memory enhancer, nootropic, antistress, anxiolytic, antidepressant, anticonvulsant, tranquilizing and sedative agent. In traditional Chinese medicine, owing to its similarity to the female body part, this plant has been ascribed properties affecting the same (a phenomenon also found in connection with the mandrake, among other plants). It was used traditionally in an attempt to treat sexual ailments, like infertility and gonorrhoea, to control menstrual discharge, and also as an aphrodisiac. This practice aligns with an ancient belief recorded in the Doctrine of Signatures. In animal tests the methanolic extract of *Clitoria ternatea* roots demonstrated nootropic, anxiolytic, antidepressant, anticonvulsant and antistress activity. The active constituents include tannins, resins, starch, taraxerol, and taraxerone.

Beet



Figure 4: Beet Plant

Common name-Garden Beet, Sugar Beet, Spinach Beet, White Beet, Mangel Wurzel, Sea Beet.

Biological source-It consists of the leaves and roots of *beta vulgaris*

Family-Chenopodiaceae.

Chemical constituents-

Beet root has higher sugar content than most vegetables, and some of the other active constituent in Beet root include fiber, proteins, fats, organic acid, complex carbohydrates of starch, gum, beta carotene, saponin, phosphorus, sodium, sulfur, iodine, potassium, magnesium, manganese, iron, calcium, folic acid, many B-vitamins and vitamins C and A. The red color in the beet root is not derived from carotenes, but from anthocyanin, the water-soluble, red betaine pigments, called betacyanin and betaxanthin. [9]

Uses-

In preliminary research, beetroot juice reduced blood pressure in hypertensive individuals and so may have an effect on mechanisms of cardiovascular disease.

Dietary nitrate, such as that from consuming beets, may be a source for the biological messenger nitric oxide which induces the endothelium of arteries to signal smooth muscle, triggering vasodilation and increased blood flow. Betanin, obtained from the roots, is used industrially as red food colorant, to improve the color and flavor of tomato paste, sauces, desserts, jams and jellies, ice cream, sweets, breakfast cereals, etc. Beetroot dye may also be used in ink.

Spinach



Figure 5: Spinach Plant

Common name-Paalak

Biological source-It consist of leaves of *spinacia oleracea*.

Family-Amaranthaceae.

Chemical constituents-

Spinach has a high nutritional value, especially when fresh, frozen, steamed, or quickly boiled. It is a rich source (> 20% of the Daily Value) of vitamin A, vitamin C, vitamin K, magnesium, manganese, folate and iron.

spinach contains iron absorption-inhibiting substances, including high levels of oxalate, which can bind to the iron to form ferrous oxalate and render much of the iron in spinach unusable by the body. In addition to preventing absorption and use, high levels of oxalates remove iron from the body.

Spinach also has a moderate calcium content. However, the oxalate content in spinach also binds with calcium, decreasing its absorption. The calcium in spinach is the least bioavailable of calcium sources. By way of comparison, the human body can absorb about half of the calcium present in broccoli, yet only around 5% of the calcium in spinach.

Uses-

Food value, Natural Benefits and Curative properties, Constipation Anaemia, Acidosis, Night blindness, Tooth disorders, Pregnancy and lactation.

Turmeric-



Figure 6: Turmeric Plant

Synonym-Indian saffron, Curcuma, Haldi.

Biological Source-Turmeric consists of dried, as well as, fresh rhizomes of the plant known as *curcuma longa* Linn.

Family-Zingiberaceae. It contain not less than 1.5% of curcumin.

Chemical constituents-

The most important chemical components of turmeric are a group of compounds called curcuminoids, which include curcumin (diferuloylmethane), demethoxycurcumin, and bisdemethoxycurcumin. The best-studied compound is curcumin, which constitutes 3.14% (on average) of powdered turmeric. In addition, other important volatile oils include turmerone, atlantone, and zingiberene. Some general constituents are sugars, proteins, and resins.

Excipients-

Glossary

Wheat flour, soyaben powder, oats or barley powder, Red Lenil, Split Green gram, Split Red gram.

Others-salt, sugar, A mixture of ground spices used in Indian cookery.

Wheat flour and soyaben is most commonly used.

Wheat flour-

Wheat flour is a powder made from the grinding of wheat used for human consumption. More wheat flour is produced than any other flour. Wheat varieties are called "soft" or "weak" if gluten content is low, and are called "hard" or "strong" if they have high gluten content. Hard flour, or *bread flour*, is high in gluten, with 12% to 14% gluten content, its dough has elastic toughness that holds its shape well once baked. Soft flour is comparatively low in gluten and thus results in a loaf with a finer, crumbly texture. Soft flour is usually divided into cake flour, which is the lowest in gluten, and pastry flour, which has slightly more gluten than cake flour.^[10]

Soyaben powder-

Soy protein is a protein that is isolated from soybean. It is made from soybean meal that has been dehulled and defatted. Dehulled and defatted soybeans are processed into three kinds of high protein commercial products : soy flour, concentrates, and isolates. Soy protein isolate has been used since 1959 in foods for its functional properties. Recently, soy protein popularity has increased due to its use in health food products, and many countries allow health claims for foods rich in soy protein.

Oat powder-

The oat (*Avena sativa*), sometimes called the common oat, is a species of cereal grain grown for its seed, which is known by the same name (usually in the plural, unlike other cereals and pseudocereals). While oats are suitable for human consumption as oatmeal and rolled oats, one of the most common uses is as livestock feed. ^[11]

MATERIALS AND METHOD

Materials

wheat (*Triticum spp*),oats,barley,soyaben, Red Lenil,Split Green gram,Split Red gram collected. Shankapushpi (*Clitoria ternatea*) and Brahm(*Bacopa monnieri*) collected from local market of pune was used in the experiment.

Powdered form of oats, wheat and many other used. Whereas fresh beetroot, turmeric and spinach leaves were grated and then used. The flour used for preparing the extrudates includes oats, wheat, barley etc.

Formulation-

The extrudate consist of the flour base and the main herbs were used as crude drug.

The flow chart below explains the procedure for preparing the herbal extrudates.

Take 5 parts of flour (Wheat flour, soyaben powder, oats or barley powder)

To it add 1 parts of crude drug

Add pinch of salt and other flavoring agents in required quantity

Add water to this mass and mix it well until it forms a dough

The dough is now passed through an extruder

Extrudates of desired shape and size are obtained

They are baked in sun light at 40-50 degree of C for 30-40 min until they are completely baked.

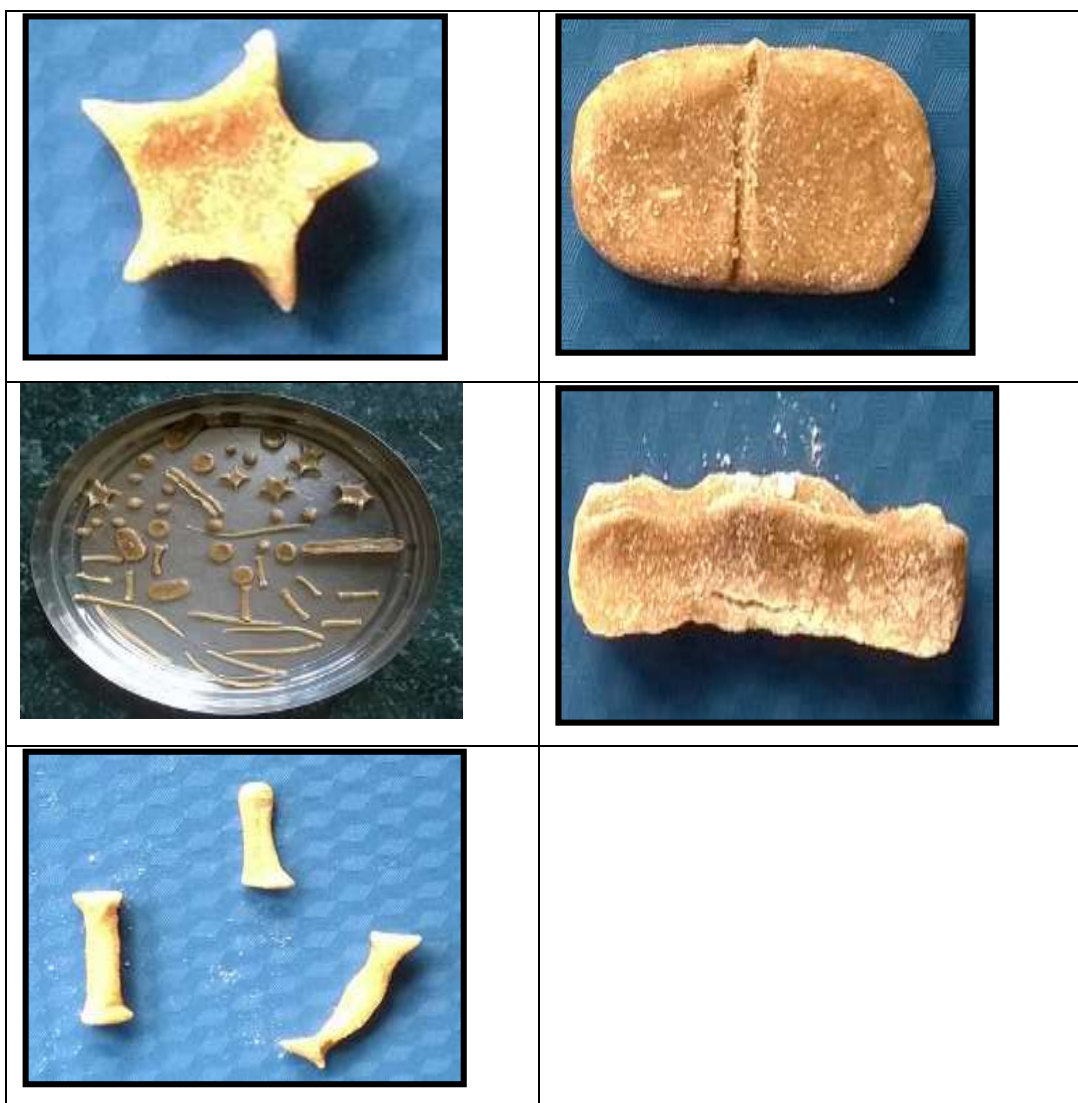
Now they are packed in suitable containers and ready to eat.

RESULTS AND DISCUSSION

Organoleptic properties-

Colour	Red, green and pale yellow
Odour	Characteristic
Taste	Sweet and Sour

Shape-oval, round and star shape.



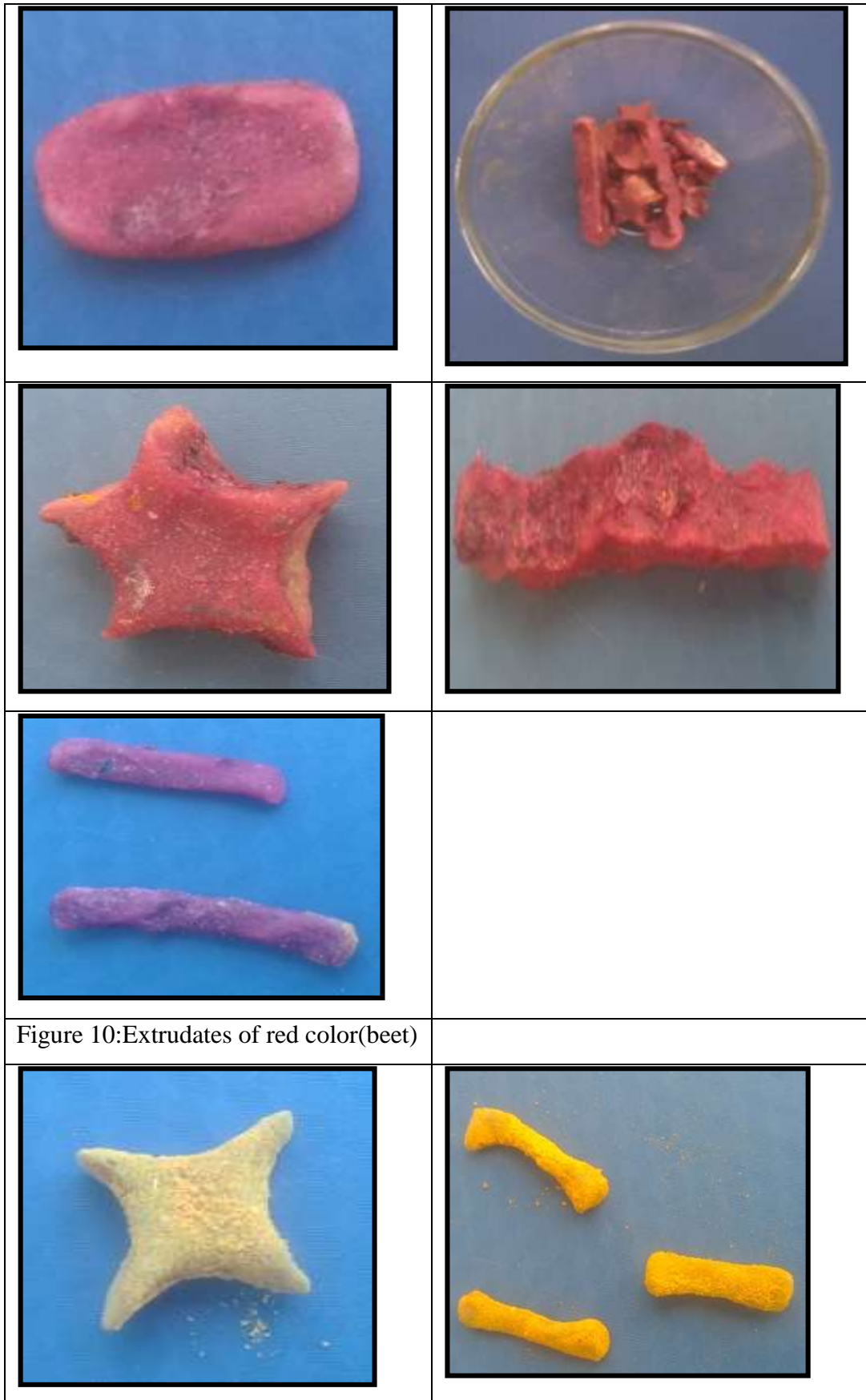


Figure 10: Extrudates of red color (beet)

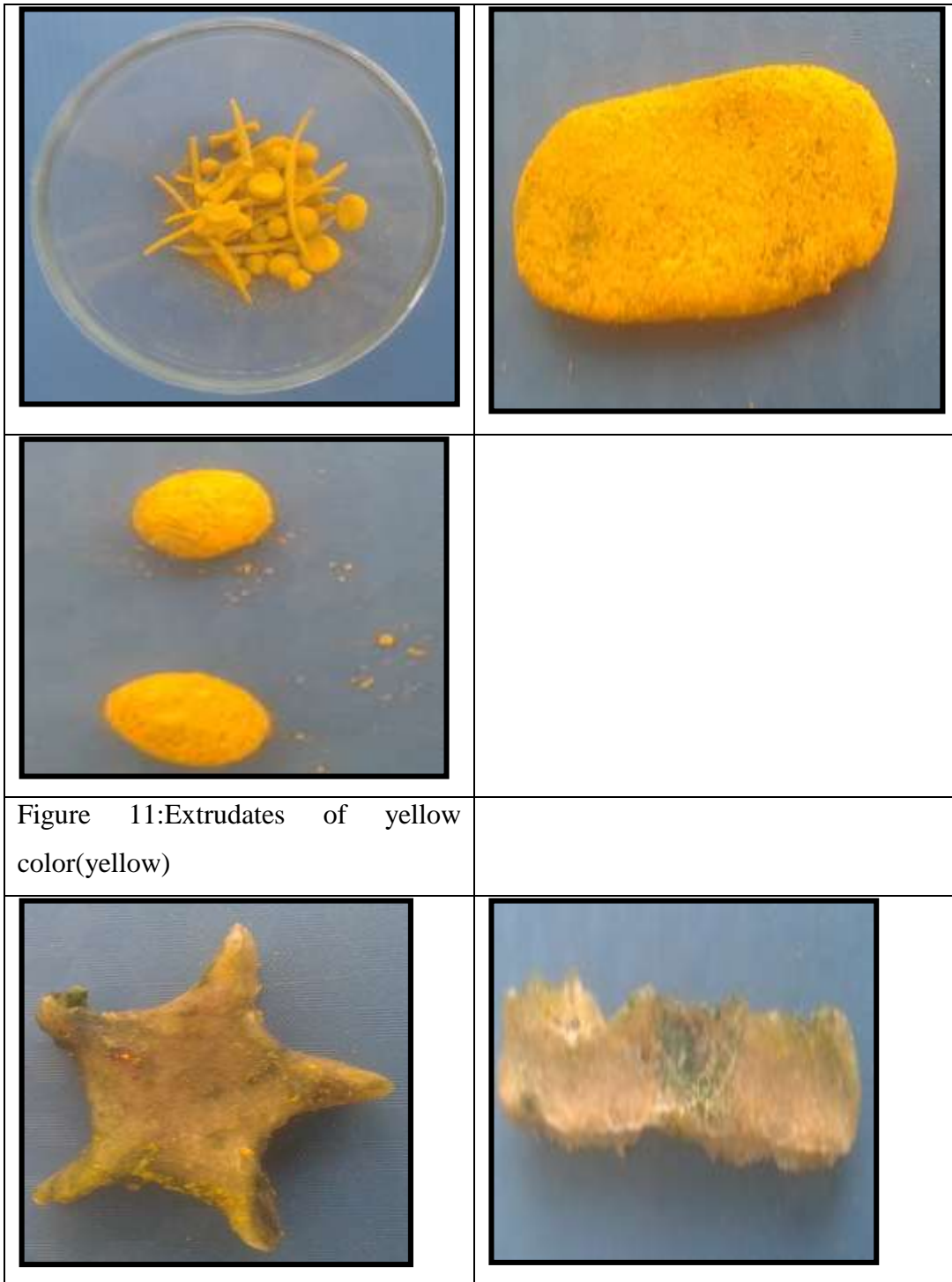


Figure 11: Extrudates of yellow color(yellow)



The quality control parameter were established and proximate analysis was found to be significant. (khandelwal2003)

The herbal extrudate was then evaluated for various organoleptic properties which includes colour ,taste, flavor, acceptance overall liking and analysed survillence method on different volunteer.

DISCUSSION

The plants used are rich sources of vitamins and minerals which are required by the body daily. As the human body is incapable of producing and storing such nutrients hence, they have to be consumed every day. People who suffer from disorders of gall bladder are advised to have 4-5 meals a day. These people can consume these extrudates as a supplement between meals as alternative to other snacks they usually consume.Oats are considered to be healthy as they lower the cholesterol levels in blood and are also safe for consumption for people suffering from diabetes.

CONCLUSION

The necessary vitamins, minerals and other nutrients present in the plants are provided by this formulation and the oat used help in decreasing the cholesterol and reduces the risk of cardiac disorders. The formulation may further be modified in future to make it even more acceptable aesthetically. Further studies may help to understand how such dietary supplement are really helpful to gain the entire nutrient and hence, it will provide as a better understanding of such formulations.

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