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A RESEARCH ON: FORMULATION AND EVALUATION OF BAEL FRUIT POWDER

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ABSTRACT

Aegle marmelos belonging to family Rutaceae, is commonly famous as Bael and has various therapeutic properties. It is native to India and found throughout South Asia. In India, this fruit is grown in Indo-Genetic plains and Sub-Himalayan zone, in NorthEast India and dry and deciduous forest of central and southern India. Aegle marmelos is a widely distributed plant and grown in India, Ceylon, China, Nepal, Sri Lanka, Myanmar, Pakistan, Bangladesh, Nepal, Vietnam, Laos, Cambodia, Thailand, Indonesia, Malaysia, Tibet, Sri Lanka, Java, Philippines and Fiji. Annual Indian Production of bael in 2015-16 was only 85.83 tones. Among Indian states, Odisha leads in production (48.56 tones) followed by Jharkhand (35.59 tones), Madhya Pradesh (1.46 tones), Hariyana (0.19 tones) and Himachal Pradesh (0.03 tonnes) (NHB, 2016). The fruits are differ in height and size of the tree, fruit shape, average weight of fruit, fruit rind, fibre content, colour, TSS, Ascorbic acid, average fruit yield etc... as per the varieties of bael. Aegle marmelos tree is mostly valued for its valuable fruits, which is oval or round shaped with the size ranges from 5-25 cm in diameter. The bael fruit has a hard, woody outer shell and from inside it has sweet, thick and aromatic pulp. In the bael fruit pulp, the seeds are present in edges and seed is enclosed by thick greasy and clear mucilage. The pulp of the bael fruit is a natural source of essential antioxidants and bioactive compounds. The pulp has laxative properties and is even considered as the best laxatives known so far.

KEYWORDS: Aegle marmelos; fruit; laxative; bael.

INTRODUCTION

India has a rich source of plant as a natural or herbal medicine and it is being used from thousands of years ago. This is absolutely true belief that natural plants are very healthier, energetic and mostly safer than synthetic drugs. Among the natural herbs and plants, bael (Aegle marmelos) fruit is beneficial for the chronic dysentery, diarrhoea, anticancer, cholesterol, peptic ulcer, inflammation and constipation. The most valuable part of the tree is fruit because it contains many vitamins like vitamin C, vitamin A, thiamine, riboflavin, niacin and minerals like calcium and phosphorus. The bael fruit pulp contains many functional and bioactive compounds such as carotenoids, phenolics, alkaloids, coumarins, flavonoids and terpenoids due to this reason bael has multiple therapeutic properties such as anti in inflammatory, antipyretic and anti diabetic.

Bael fruits have high nutritional composition as it contains minerals (phosphorus, Potassium, calcium, magnesium, iron, copper, zinc, chromium), fat, fibre (hemicellulose, cellulose, lignin, Pectin), protein, carbohydrate, vitamins (b1, b2, b3,c), amino acids (threonine, valine, methionine, isoleucine, samhita, a comprehensive Compilation of all the essential ayurvedic information, which identified bael as a necessary item in ayurvedic Medicine. In ayurveda, all the parts are used in the form of 'panchang' to cure diseases like diarrhea, dysentery And ulcer and, dyslipidemic activity, immunomodulatory activity, anti-proliferative activity, woundhealing activity, anti-fertility, insecticidal activity.[11]

Beal is a subtropical plant and grows as much as an altitude of 1200 m above sea level. It is the most important medicinal fruit crop of Formulation And Evaluation Of Bael Fruit Powder. Bael cultivation in India is mainly done in the states of Uttar Pradesh, Uttaranchal, Jharkhand, Madhya Pradesh, Rajasthan. All the plant elements like leaves, roots, barks, seeds and fruits of Bael are necessary ingredients of many ancient formulations against numerous diseases. Bael fruits are rich source in vitamins, minerals and many types of nutrients. Candy, panjiri, toffee, jam, etc... products are prepared by the fruit.

The bael fruit is known for its medicinal properties and is one of the most nutritious fruits. In the present study unripe and ripe bael fruit pulp (Aegle marmelos) was used to develop powder in the laboratory. Purpose of this was to study the sensory evaluation of developed powder. There are four different techniques were used separately for drying unripe and ripe bael fruit pulp these were mechanical tray drier, solar try drier, open sun light and shade drying and developed powder after drying them properly. Results of the present study

indicate that unripe and ripe bael fruit powder samples “liked very much” on six point hedonic scale. The highest score was achieved by shade dried powder as compared to other powders. Hence, it was selected for future research work.

In this study, Bael pulp was categorized according to its seed and gum components, dried in a stifling air oven, powdered, and analyzed for functional properties, nutritional composition, and sensory profile of the prepared drinks. Protein content was found to be 10.21, 10.21, and 11.08% for sample I, II, and III, respectively, indicating a high amount of protein in Bael fruit. The results showed that the Bael fruit contains a high amount of carbohydrates, fibre, minerals, vitamin C and a low percentage of fat. These phenomena indicate that Bael powder contains high nutritional value. Again, the analysis of the physical and functional properties of the Bael powder sample showed that the bulk density and swelling power were increased in the order of Samples I, II and III, but in contrast, an almost reverse result was obtained for the particle density and percent porosity shown.

REVIEW OF LITERATURE

Sharma kirti, et al, - Aegle marmelos also known as Bael has been familiarly known as a constituent of traditional medication for treating several human ailments. Even though every part of the plant is beneficial leading to their significant use in vital medicines, the leaves and fruits are commonly useful as essential drugs from the ancient times of medicinal system to treat most of the general illnesses of humans. Its fruit consists of vast medicine related benefits which are useful in diarrhoea, dysentery and gastrointestinal disorders. The medicinal properties of Bael work as chief components for discovering and designing of drugs.

MD Tajminur Rahman,et al. -Human diets necessitate the inclusion of fruits. They serve as both a lucrative commercial commodity and a vitally needed dietary staple. Bael (Aegle marmelos L.) is a seasonal fruit, thus in order to make it more widely available, this research concentrated on manufacturing pulp powder and examining its physical and chemical characteristics as well as the sensory assessment of instant drinks manufactured from pulp powder. In this study, Bael pulp was categorized according to its seed and gum components, dried in a stifling air oven, powdered, and analyzed for functional properties, nutritional composition, and sensory profile of the prepared drinks. Protein content was found to be 10.21, 10.21, and 11.08% for sample I, II, and III, respectively, indicating a high amount of protein in Bael fruit. The results showed that the Bael fruit contains a high amount of

carbohydrates, fibre, minerals, vitamin C and a low percentage of fat. These phenomena indicate that Bael powder contains high nutritional value. Again, the analysis of the physical and functional properties of the Bael powder sample showed that the bulk density and swelling power were increased in the order of Samples I, II and III, but in contrast, an almost reverse result was obtained for the particle density and percent porosity shown. The overall acceptance of the prepared drinks was performed for samples I, II and III by sensory evaluation and we found that the samples were least, moderately and highly accepted.

Singh Kishan Kumar, et al, - Beal is a subtropical plant and grows as much as an altitude of 1200 m above sea level. It is the most important medicinal fruit crop of India. Bael cultivation in India is mainly done in the states of Uttar Pradesh, Uttaranchal, Jharkhand, Madhya Pradesh, Rajasthan. All the plant elements like leaves, roots, barks, seeds and fruits of Bael are necessary ingredients of many ancient formulations against numerous diseases. Bael fruits are rich source in vitamins, minerals and many types of nutrients. Candy, panjiri, toffee, jam, etc... products are prepared by the fruit. It may be used for the remedy of diverse problems in person such as, diabetes, liver toxicity, fungal infection, microbial infection, inflammation, pyrexia etc... The bael fruit pulp incorporates many practical and bioactive compounds which include carotenoids, phenolics, alkaloids, coumarins, flavonoids, and terpenoids and has innumerable conventional medicinal uses.

Nosheen Asghar, et al.- The present study adds value to bael fruit pulp by using it in jam production. The functional jams were prepared as T0 (100% apple pulp), T1 (75% apple : 25% bael), T2 (50% apple : 50% bael), T3 (25% apple : 75% bael) and T4 (100% bael pulp), respectively. Results showed that bael pulp was richer in dietary fibre contents while apple pulp showed higher sugar and bioactive compounds before jam production. Decrease in moisture, nonreducing sugars and pH while increase in acidity, total soluble and reducing sugars ($P \leq 0.05$) were observed with non significant changes in dietary fibre for treatments during storage ($P \geq 0.05$). The jam processing significantly decreased the vitamin C and phenolic contents ($P \leq 0.05$). Maximum decrease of vitamin C (53%) and total phenolic content (75%) was found for T0, respectively. The lowest concentration of bioactive compounds in treatments was noted after 60 days of storage. Overall, the jam samples of T2 presented a higher sensory acceptability.

Musale Yogesh, et al - Bael, Aegle marmelos (Linn.) Correa ex Roxb., a tree of Indian origin is known from pre-historic time. It has a great mythological significance for Hindus.

Utilization of bael in day-to-day life has great nutritional, environmental as well as commercial importance. It has been in use from time immemorial in traditional systems of medicine for relieving constipation, diarrhoea, dysentery, peptic ulcer and respiratory infections. Aegle marmelos commonly known as bael (or bel), belonging to the family Rutaceae, is a moderate sized, slender and aromatic tree. Alkaloids, coumarins, terpenoids, fatty acids and amino acids have been isolated from its different parts.The fruits, bark, leaves, seeds, and roots of bael contain bioactive Formulation And Evaluation Of Bael Fruit Powder compounds such as coumarin, xanthotoxol, imperatorin, aegeline, and marmeline. These compounds can provide anti diabetic, anti cancerous, anti fertility, antimicrobial, immunogenic, and insecticidal activities.

Banhot Monika, et al.- The bael fruit is known for its medicinal properties and is one of the most nutritious fruits. In the present study unripe and ripe bael fruit pulp (Aegle marmelos) was used to develop powder in the laboratory.Purpose of this was to study the sensory evaluation of developed powder. There are four different techniques were used separately for drying unripe and ripe bael fruit pulp these were mechanical tray drier, solar try drier, open sun light and shade drying and developed powder after drying them properly. Results of the present study indicate that unripe and ripe bael fruit powder samples “liked very much” on six point hedonic scale. The highest score was achieved by shade dried powder as compared to other powders. Hence, it was selected for future research work.

SV Anadani, et al.- The bael fruit is known for its medicinal properties and is one of the most nutritious fruits. In the present study unripe and ripe bael fruit pulp (Aegle marmelos) was used to develop powder in the laboratory. Purpose of this was to study the sensory evaluation of developed powder. There are four different techniques were used separately for drying unripe and ripe bael fruit pulp these were mechanical tray drier, solar try drier, open sun light and shade drying and developed powder after drying them properly. Results of the present study indicate that unripe and ripe bael fruit powder samples “liked very much” on six point hedonic scale. The highest score was achieved by shade dried powder as compared to other powders. Hence, it was selected for future research work.

AIM AND OBJECTIVE

Aim – To formulate e and evaluate different pharmacological activity of bael fruit powder.

OBJECTIVE

- The main objective to formulate the bael fruit powder it may act as an anti diarrhoeal agent.
- It may be an antimicrobial agent and radio protective potential activity.
- It might have anticancer potential and act as anti inflammatory agent.
- It have anti ulcer properties and may be a diuretic.
- To formulate the bael fruit powder to obtain the maximum therapeutic as well as pharmacological effect.
- The main purpose of formulate the herbal bael fruit powder to use the natural ingredients instead of the using chemicals.
- The bael fruit powder have the maximum absorption capacity than other formulation hence gives the maximum therapeutic effect.

PLAN OF WORK

- Review of literature survey
- Collection, identification and authentication of herbal drug material
- Pharmacognostic evaluation of herbal drug material
- Processing of herbal drug material
- Formulation of bael fruit powder
- Evaluation of bael fruit powder

Pharmacognostic Account

Synonyms: Golden apple, stone apple, wooden apple

Biological source: It is the dried as well as fresh part of the fruit acquired from the plant Aegle Marmelos.

Family: Rutaceae

Chemical Constituents

1. Skimianine
2. Fagarin
3. B -carotene
4. Marmin
5. Vitamin A
6. Citral

Uses

1. It may be an antimicrobial agent and radio protective potential activity.
2. It might have anticancer potential and act as anti inflammatory agent.
3. It have anti ulcer properties and may be a diuretic.
4. It used as an antioxidant.
5. It used as an nutritional complement.
6. Its far used in the ayurvedic coaching.
7. It is used as an anti diabetic and antilipidemic.

Material and Method Collection and Authentication of Plant Material.

The fruit pulp of Aegle marmelos were collected from the herbal garden. After authentication, the fruit pulp were collected by scooping the pulp using sterile scoop and blade, shade dried and then milled into coarse powder by a mechanical grinder.[1]

- Organoleptic Evaluation: Organoleptic evaluation refers to evaluation of the formulation by color, odor, taste, texture, etc. The organoleptic characters of the samples were evaluated based on the textual methods.[2]
- Cleaning and sorting of bael: Damaged and non-edible portion were discarded. Bael fruit was first washed with tap water for few minutes and then rinsed with distilled water to remove the dust, dirt and other adhering impurities.
- Pulping: Pulp was removed from the fruit after applying the force to crack fruit. Destoning: Removed seeds & other non-edible part manually from pulp.
- Drying: Drying the fruit pulp under different methods of drying. Dehydration of fruit pulp Standardization of drying method for unripe and ripe bael fruit pulp was carried out using standard methods of drying.
- Method used for drying Unripe and ripe bael fruit pulp were dried using different methods i.e. sun drying, shade drying, solar tray drying and oven drying. Method of drying conditions was standardized before conducting the experiment.

Drying was carried out in following manner.

(a) Sun drying Fruit pulp were spread singly on a clean and dry muslin cloth placed on clean cemented floor under open sun shine. Drying process was continued up to three days till the completion of constant weight. The minimum and maximum temperature ranged from 22- 30 °C during the month of January.[13]

(b) Shade drying Fruit pulp were dried under the shade on a clean and dry muslin cloth placed on the cemented floor till the weight of the samples remained constant. Drying was continued up to five days at room temperature 16-18 °C.[14]

(c) Solar tray drying Fruit pulp were loaded uniformly in a tray and kept for dehydration in the drier. The tray had to be changed in relation from lower shelf to the upper one in order to ensure uniform drying of the entire mass and to avoid burningof the lower one due to excessive heat. The temperature of the solar drying of 5-7 °C is higher than normal day temperature. Fruit were completely dried in two days.[12]

(d) Oven drying Fruit pulp were spread on the trays and kept for dehydration in the oven. The trays had to be changed in relation for lower shelf to upper one in order to ensure uniform drying of the entire mass and to avoid burning of the lower one due to excessive heat. The temperature of the drying ranged from 60- 65 °C. The fruit were completely dried in two-three days.[3]

Preparation of Bael fruit powder

The rigid exocarps of the fruits were cautiously broken. Subsequently, the pulp was separated from the shell and transferred into a clean stainless-steel container. The samples were classified into three distinct categories. Sample-I refers to the pulp of this particular group, which consists of gum and seeds. In a similar vein, Sample-II is comprised of gum while simultaneously excluding seeds. On the other hand, Sample- III is characterized by pulp devoid of seeds and gum. The samples were afterwards subjected to drying in a warm air oven (Universal Oven UN55, Memmert GmbH + Co. KG, Bu¨chenbach, Germany) at a temperature of 60 ± 5 ◦C. Soon after, the desiccated specimens were carefully blended (JP1009, Jaipan Industries Ltd., Maharashtra, India) and sieved using a mesh aperture of 1 mm (sieve no. 18). In order to facilitate future investigations, the powder was hermetically enclosed within a glass container and also preserved under ambient conditions at a temperature of 25 ± 5 ◦C.[4]

PROCEDURE OF BAEL FRUIT POWDER PREPARATION

INTERACTION OF BAEL FRUIT POWDER

- Medication for diabetes (antidiabetes drug) interact with bael.

Bael might decrease blood sugar level diabetic medication are also used to lower blood sugar. Taking bael along with diabetic medication might cause your sugar to drop too low. the dose of the diabetic medication might need to be changed.

- Various mediction used for glucoma, alzheimer disease, and other conditions(cholinergic drug) interact with bael.

Bael might increase certain chemical in the brain, heart, and elsewhere in the body. Some medication used for glucoma, alzheimer disease and other conditions also affect these chemical. Taking bael with this medication might increase the chance of side effect.

MEDICINAL IMPORTANCE OF BAEL FRUIT POWDER

Antimicrobial Activity: Many in vitro studies have been reported to inhibit a wide spectrum of pathogenic micro-organisms, including bacteria, fungi, and viruses, by the different extracts of the Bael plant. In a study performed by Rani and Khullar, the methanolic extract of Bael against Salmonella typhi was found to be effective.[15] Similarly, in another study, the ethanolic extract showed antibacterial properties against E. coli, Staphylococcus aureus, Pseudomonas aeruginosa, and Bacillus subtilis.[16] When tested, the leaf extract of the fruit was found to be effective against a variety of gram-positive bacteria, including Bacillus cereus, Staphylococcus aureus, Staphylococcus epidermidis, and Enterobacter aerogenes, primarily at a concentration of 40 g/ml.[17] This could be due to the presence of the compound eugenol and cumin aldehyde through different mechanisms like blockage of protein synthesis or peptidoglycan synthesis at the membrane level.[19] Furthermore, the antiviral activity of various parts of the plant has been demonstrated against human coxsackie viruses B1-B6. The compound marmelide, at a concentration of 62.5 g/ml, shows the most effective viricidal activity by interfering with the early stages of the viral replicative cycle.[18]

Cardio protective Activity: Heart and blood vessel illnesses are the most common causes of cardiovascular disease, which include arrhythmia, stroke, hypertension, myocardial infarction, and atherosclerosis. Several risk factors, like cell-derived micro particles and hypercholesterolemia, are associated with these diseases. Medicinal plants are effective against these cardiovascular diseases, which help in the inhibition of lipid peroxidation, decrease the level of low-density lipoprotein, and enhance endothelial dysfunction.[7] A bioactive compound named linear furanocoumarin marmesinin, extracted from Bael, can protect against lipid peroxidation. In a study performed on albino Wister rats having myocardial injury when tested by the compound at a dosage of 200 mg/kg, the result showed a lower in serum enzyme levels and restored the electrocardiographic changes towards normalcy.[9]

Antidiabetic Activity: Bael extracts are shown to have significantly higher antidiabetic activities when tested using animal models.[8] The fruit extracts of bael have demonstrated protective effects on pancreatic tissues of diabetic rats.[5] Aqueous and alcoholic extracts of fruits admimistrated at a dose of 500 mg per kg of body weight produced hyperglycemia in rabbits. An elevation of vitamin C content was also accompanied by hyperglycemia when rats were administered with bael fruit extracts.[6,1] Further observation of hyperglycemic activity and antihypoglycemic activity of the bael aqueous extracts were made using rat models. These antidiabetic and hyperglycemic effects were further confirmed by Choudhary et al. using aqueous extracts of bael seeds. Bael leaves have also shown the hyperglycemic impact. The bael leaf extracts can decrease Mi receptor gene expression and inhibit aldose reductase activity, anticataract activity, and free radical scavenging activity, and all of them are related to diabeties.[10]

Antiulcer Activity: An ulcer is a common gastrointestinal tract disease that may be caused by the infection of Helicobacter pylori or by using nonsteroidal antiinflammatory drugs. This leads to exposure of acid-pepsin secretions to the upper gastrointestinal tract. Similarly, to evaluate the efficiency of Bael against gastric ulcers and oral administration of 1 g/kg of the aqueous extract of leaves of Bael for 21 days against Helicobacter pylori lipopolysaccharide-induced gastric ulcer in rats showed a significant reduction in the ulcer the responsible compound for antihyperglycemic activity. lesion count, the volume of gastric juice, and acidity and an increase in pH and hexosamine.[19] It has been found that the compound luvangetin present in Bael seed exhibits protective activity against gastric ulcers.[20] In an experiment conducted to study the antiulcer activity of unripe Bael fruit extract in experimental rats, the result showed significant inhibition of gastric mucosal damage which may be due to the presence of phenolic compounds in the plant. The phenolic compound is a source of antioxidants and exhibits a powerful gastroprotective property which may act through inhibition of oxidative stress induced in the gastroduodenal mucosa.[8]

Bael prevents inflammatory bowel disease (IBD): Inflammatory bowel disease (IBD), clinically characterized by bloody diarrhea, cramping and abdominal pain, is an immunologically mediated chronic and relapsing inflammatory disease affecting the lining of the intestine. Studies have shown that feeding a single dose of methanolic extract of bael (200 mg/kg), ameliorated DNBS-induced ulcerative colitis. Bael inhibited the DNBS-induced decrease in food and water intake, wasting and restored the stool consistency.[10] Bael reduced

the gross changes, mucosal damage and disease activity index. Histopathological study showed that bael administration decreased the infiltrative neutrophils and inflammation. The biochemical assays showed a decrease in the levels of NO, LPx and MPO. Concomitantly the levels of antioxidant enzyme in the bael treated colitis cohort were increased.[6]

Anticancer Activity: Cancer is one of the major causes of death worldwide. Researchers are looking at alternative natural sources of treatment due to the seriousness of the disease and the adverse effects of the drug used to treat it. In a study performed on the leaf extract of Bael, it was discovered to have anticancer properties. When performed in the different cell lines like erythroleukemic HEL, Tlymphoid Jurkat, melanoma Colo38, leukemic K562, breast cancer cell lines (MDAMB 231), and β-lymphoid.[7] Likewise, the compound marmelin extracted from Bael exhibits anticancer properties against human colon cancer (HCT-116), human epithelial type 2 (HEp2), and alveolar epithelial carcinoma cells by suppressing the growth of cancerous cells, leading to apoptosis.[11] In a mouse experiment, the plant's fruit extract demonstrated chemopreventive activity against 7, 12- dimethylbenz anthracene-(DMBA-) induced skin carcinogenesis. In the study, methanolic extract of the fruit at a concentration of 25 mg/kg and 50 mg/kg was seen to be more effective in suppressing hepatocarcinogenesis caused by induction. Phytochemicals present in various parts of the plant and their medicinal value. Parts Bioactive compound Medicinal value Fruit Marmelosin Anthelminthic, antibacterial Luvangetin Antiulcer Aurapten Heartbeat inhibitor, hypertension Psoralen Cytotoxic, antispasmodic, artemiside Marmelide Antiviral Tannin Antidiarrhea, astringent Riboflavin Essential for growth, prevent glossitis and cheilosis β-carotene Glaucoma, cataract Leaves Skimmianine Hypothermic, antimethamphetamine, antipyretic, anticancer Cuminaldehyde Antibacterial Lupeol Anti-inflammatory Eugenol Antioxidant, antiulcer, hepatoprotective Cineol Antiulcer Citronellal Antiseptic Marmesinin Cardioprotective, antioxidant showed anticancer effects against hepatocellular carcinoma cells, human epidermoid carcinoma cells, prostate carcinoma cell lines, human melanoma cells, and human pancreatic adenocarcinoma Aegelin Antidyslipidemic, cardioactive Citral Antiseptic, antiallergic Bark Marmin Antiulcer Fagrine Abortifacient Journal of Food Processing and Preservation 3 of diethylnitrosamine and 2-acetylaminofluorene, respectively.[20,21]

EVALUATION OF BAEL FRUIT POWDER

Organoleptic evaluation

Color - Yellowish orange.

Odor - Latex odor and mild aromatic odor

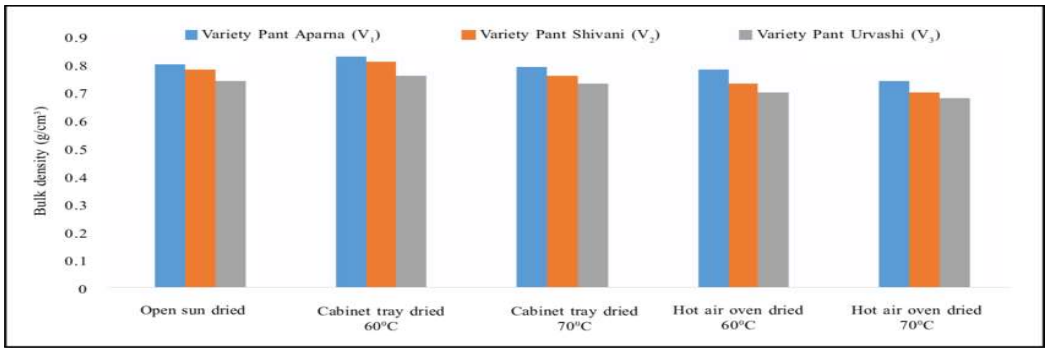
Taste - Bitter taste.

Size - Length-9.6 cm; Width- 22.6 cm

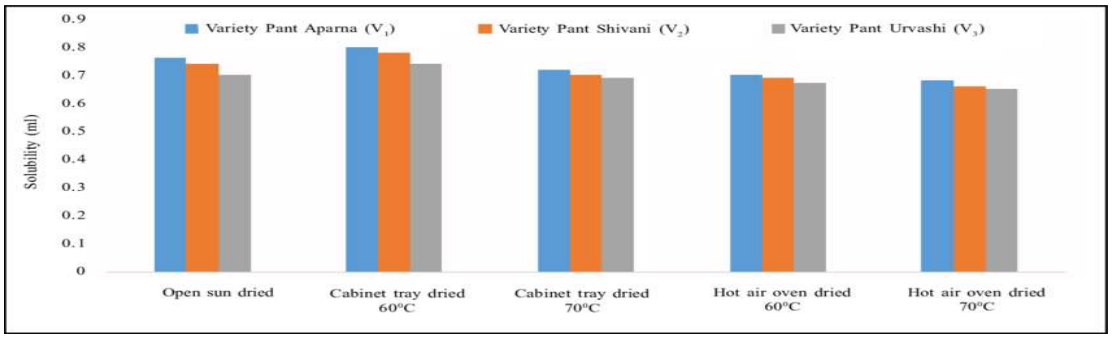
Texture – Smooth

- Bulk Density

A graduated measuring cylinder of 5 ml was weighed, and flour sample filled in to it by constant tapping until there was no further change in volume. The cylinder with the flour sample was weighed and the difference in weight was determined. The experiment was replicated for three times. The average value of bulk density is reported. The bulk density of powders is an important parameter for packaging and storage. Lower bulk density implies greater volume for packaging and reduces the shelf-life because as the more occluded air exist the greater is the possibility for oxidation.



- Solubility



Quality Evaluation

Quality evaluation of prepared bael fruit powder was essential for the efficacy, safety determination. Both physicochemical and phytochemical evaluation was carried out by comparing it with the standard parameters. Sensory evaluation was also performed in terms of sight, smell, taste, touch andhearing.

Sensory Evaluation

Consumer awareness concerning formulation has increased the number of positive attributes desired for these products, apart from refreshment. However, no matter how nutritious the preparation, the taste must be accepted, or it will not be consumed. Sensory analysis was performed by using nine points hedonic rating scale by a panel of five people. The parameters for evaluation include appearance, color, taste, flavor, consistency, and overall acceptability of bael fruit powder.[22]

RESULT AND DISCUSSION

Preparation and evaluation of bael fruit powder is done. physicochemical parameter like appearance, solubility bulk, density and moisture content werw determined. other evaluation test was performed to determined the therapeutic and medicinal uses of bael fruit powder.

CONCLUSION

The research paper of the Aegle Marmelos shows the pharmacological activity against many disease and it have the therapeutic value. the therapeutic as well as pharmacological valu of bael plant is examined and investigated in this paper. This investigation concludes that the bael fruit have treating and preventing property against different medicinal condition like infectious diseases cancer, and viral infection other like used as antidiabetes, analgesic, antipyretic, dietary supplement, appetite improver, antiulcer, antimalarial, and anti-inflammatory. This investigation shows that the Aegle Marmelos active constituents which possess the medicinal value by utilizing this active constituent the new medicinal dosage form can be prepare for the prevention, mitigation, and treatment of the variety of pathogenic illness like cancer, diabetes, and malaria etc. The findings indicate that a substantial quantity of powder can be obtained from SampleIII, which is abundant in protein, carbohydrates, potassium, calcium, and other essential nutrients like vitamin C. From a nutritional standpoint, it can be argued that Bael pulp powder has the potential to provide a novel and valuable source of high-quality powders. The overall suitability of these powders was verified through a sensory evaluation of prepared beverages. Hence, the gum and seed elements can

also be employed in the exploration of additional products that may possess enhanced worth. Therefore, the addition of fruit pulp powder can be an excellent source of value-added food components for the manufacture of commercially processed foods and may supply crucial nutrients for the maintenance of human well-being. A present result indicates that the fruit pulp powder of Bael (Aegle marmelos) offers a good pool of nutrients. Fruit pulp was wealthy source of carbohydrates and vitamin C. In the light of these explored nutritional facts, it can be concluded that the studied part of Bael would exercise as a new source of superior quality food. The results of the present study depicted that the ethanol extract and decoction of powder of fruit pulp confirmed the existence of several polar and non-polar compounds followed by the methanol extract. Lowest components were extracted in acetone.

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