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# PREPERATION AND ASSESSMENT OF FRUIT-BASED NATURAL GUMMIES FOR CHILDRENS MULTIVITAMIN NEEDS

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## ABSTRACT:

Fruit-based gummies have emerged as a novel and kid-friendly supplement delivery technique due to the growing demand for natural, functional confections. In order to satisfy children's daily multivitamin needs, this study focusses on the production and evaluation of fruit-based natural gummies enhanced with vital vitamins. The main basis was made up of fresh fruit pulps and juices, which were then enhanced in palatability with naturally occurring honey and flavours as well as plant-derived gelling agents like agar-agar (Veg). To ensure compliance with paediatric dietary guidelines, the gummies were fortified with a balanced composition of vitamins A, C, D, and B-complex. Optimising gelling consistency, texture, and flavour while preserving vitamin stability was part of the formulation process. The prepared gummies were assessed for their nutritional profile, microbiological safety, colour, taste, texture, and overall acceptability, as well as their physicochemical characteristics (pH, moisture content, and total soluble solids). To evaluate vitamin retention during storage, stability experiments were carried out. The results showed that the optimised formulation had a good flavour and texture and maintained a high vitamin content while being stored without any signs of microbial contamination. This study shows that fruit-based natural gummies have the potential to be a nutritious, safe, and tasty substitute for traditional synthetic multivitamin gummies for kids.

**KEYWORDS:** agar-agar (Veg), children's nutrition, natural supplements, fruit-based gummies, and sensory evaluation.

## INTRODUCTION:

Consumer preferences have been moving more and more in the direction of natural, functional, and healthier foods in recent years. Of these, fruit-based gummies have become incredibly popular because of their special blend of flavour, practicality, and health benefits. Gummies have always been seen as confections primarily marketed to youngsters. However, as people's awareness of health and wellbeing has grown, gummies' formulation has changed to include natural fruit ingredients including juices, purees, and powders, turning them into functional foods and nutraceuticals. Natural fruit-based gummies are chewable gel-like goods made from fruit-derived raw materials (fresh fruit pulp, concentrates, or freeze-dried powders), natural gelling agents (gelatin, agar, or pectin), and sweeteners. Unlike traditional gummies, which rely largely on artificial colours, flavours, and synthetic ingredients, these gummies prioritise clean-label formulations, with fruit serving as the primary source of flavour, sweetness, and beneficial compounds. Children in the growth stage need appropriate micronutrients to support healthy physical and cognitive development. However, nutritional insufficiency, finicky eating habits, and lifestyle changes frequently result in deficits. Fruit-based multivitamin candies provide a nutrient-dense complement by combining Fruits include natural sugars, fibre, phytochemicals, and antioxidants. Multivitamins help boost immunity, vision, bone growth, skin health, and brain function. Minerals promote bone mineralisation, enzyme function, and haemoglobin synthesis. The addition of fruit components not only improves taste and natural colour, but also adds phytonutrient support, making these gummies both preventative and health-promoting.

Micronutrient deficiency in children remains a global concern, contributing to stunted growth, low immunity, and poor learning ability. Natural fruit-based multivitamin gummies are a clever way to alleviate hidden hunger while keeping consumer appeal. Their popularity is quickly growing in both developed and developing economies, owing to parents' choice for safe, natural, and effective supplementation options.

Both adults and children frequently consume confectionery products. 86.8% of Portuguese youngsters aged 6 to 8 use these goods at least three times each week. Because they are natural and chewy, jellies and gummies are especially well-liked by those under the age of 17. These gel-like products are made up of fruits, sugars (such as glucose and sucrose syrup), acids, fragrances, and food colouring. However, because of their high sugar and food additive content, as well as the presence of undesirable compounds produced by the heat

treatment, like hydroxymethyl-2-furaldehyde or acrylamide, excessive and widespread consumption of jellies and gummies is believed to have a negative impact on public health. Agar-Agar was used as a gelling agent in the preparation of two formulations (F1 and F2). The process entailed heating the materials and then shaping them into different shaped gummies. The prepared gummies were assessed for ash value, pH, swelling index, and physical appearance. Both formulations had a pleasant smell, a dark pink colour, and a glossy look, all of which were indicative of good organoleptic qualities. Each gummy is made with a special blend of potent components, such as honey, Dragon fruit, Pear, Papaya, Plum Fruit.

**Honey** is a naturally occurring sweet material that is made by honeybees (Apis mellifera) from plant secretions or nectar. Since ancient times, it has been utilised as a medicinal substance in addition to a sweetener. Honey is a natural substitute for refined sugar and artificial syrups because it provides kids with a special combination of energy, vitamins, antioxidants, and antibacterial qualities. It should be introduced cautiously, nevertheless, taking safety precautions like age limitations into account (babies under one year old should not be given it due to the danger of botulism). It is a functional food since it includes more than 180 bioactive components. Its medicinal and nutritional qualities are ascribed to carbohydrates (about 80%) mostly fructose (38%) and glucose (31%), which provide you energy quickly. Water (17–20%) trace levels of proteins and amino acids, such as arginine, lysine, and proline. Vitamins: Vitamin C, folate, and trace levels of the B-complex (B2, B3, B5, and B6). Minerals include iron, zinc, potassium, magnesium, calcium, phosphorus, and selenium. Enzymes that aid in digestion and have antibacterial properties include glucose oxidase, diastase, and invertase. Flavonoids and polyphenols: kaempferol, gallic acid, quercetin, and chrysin (antioxidant, anti-inflammatory). Gluconic acid is an organic acid that contributes to honey's acidity and antibacterial properties. The tropical cactus fruit known as dragon fruit (Hylocereus spp.) is prized for its rich nutritional profile, sweet pulp, and colourful skin. Dragon fruit, sometimes referred to as the "superfruit," is gaining popularity in children's diets because of its health advantages, appealing colour, and mild flavour. It can be added to functional foods like candies, smoothies, and yoghurts, or it can be eaten raw or as juice. Honey's capacity to organically improve flavour is one of the main justifications for its use in herbal multivitamin gummies. Customers may be discouraged from consuming several herbal extracts on a regular basis due to their harsh or bitter taste. These flavours can

be covered up by honey's inherent sweetness, which makes the gummies more appealing and simpler for customers to eat—especially young ones or those with sensitive palates.

**Dragon fruit** is low in calories but high in vital nutrients that are good for kids' immune systems and growth. 80–85% water content (hydrating fruit) 11–13 g/100 g of carbohydrates (natural energy source) 3 g/100 g of dietary fibre (helps with digestion) 1–2 g of protein per 100 g Vitamins. Vitamin C improves skin health and immunity. The metabolism is supported by B-complex vitamins (B1, B2, and B3). Minerals Phosphorus, calcium, and magnesium promote bone development. Iron promotes the production of haemoglobin and guards against anaemia. Antioxidants that guard against oxidative stress include betalains, carotenoids, and polyphenols.

**Pear** is a nutrient-dense fruit, pears (Pyrus communis) are high in dietary fibre, vitamins (particularly C and K), potassium, and antioxidants. It is appropriate for compositions intended for youngsters due to its gentle sweetness.

**Agar-agar (Veg)** is a common vegan gelling agent made from red algae, a natural polysaccharide. Agar, in contrast to gelatin, does not melt at normal temperature and instead creates solid, stable gels. Agar and pear juice can be combined to create natural, healthful fruit gummies.

The genus **Prunus,** which is part of the Rosaceae family, contains the nutrient-dense and adaptable plum. Plums are among the first fruits that humans tamed, having been grown for thousands of years in places like China, Eastern Europe, and the Caucasus Mountains. There are more than 2,000 varieties of them in the world, and their colours range from red to purple to yellow to green to even blue. In terms of nutrition, they are low in calories and high in dietary fibre, antioxidants, and vitamins A, C, and K, all of which promote healthy digestion and the immune system.

The tropical fruit **papaya** is prized for its impressive nutritional profile, sweet flavour, and vivid orange flesh. Native to southern Mexico and Central America, the *Carica papaya* is now grown in many tropical and subtropical regions of the world, including sections of Africa, the Philippines, and India. Because of its rapid growth, papaya trees usually produce fruit in six to twelve months. Its oval-shaped fruit, which can weigh several kilogrammes, has a central hollow that is filled with spherical, black seeds that taste like pepper but are edible.

Packed with vitamins and enzymes, papaya is particularly prized for its high levels of dietary fibre, vitamin C, vitamin A (from beta-carotene), and folate.

One of the safest and best fruits for creating kid-friendly sweets is the **Apple** (Malus domestica, Family Rosaceae). Because it tastes good and is naturally sweet, youngsters are more likely to eat gummies without the need for excessive amounts of artificial sweeteners. Pectin, a naturally occurring substance found in apples, provides gummies their soft, chewy feel and serves as a beneficial dietary fibre that helps youngsters avoid constipation and promote digestion. Apples are a good source of essential vitamins, including B-complex vitamins for energy and brain development, vitamin K for bone growth, vitamin C for a robust immune system, and vitamin A for healthy eyes and skin. Additionally, they include elements that promote general growth, such as magnesium and potassium.

Sugar coating was also done to the gummies as it increases the acceptance of children improves in taste and more appealing to children.

**Table 1: Benefits of the Fruits used in the formulation of Multivitamin Gummies.**

| **Sr no.** | **Sources** | **Biological Source** | **Images** | **Therapeutic Uses** | **Vitamins** |
|---|---|---|---|---|---|
| 1. | Dragon Fruit | Fruit of ***Hylocereus Undatus*.** **(White Fleshed)** |  | Antioxidant, Anti-Inflammatory, Supports Digestion, Boost Immunity | **Vitamin B1**(Thiamine) **Vitamin C** (rich source) |
| 2. | Pear | Fruit of **(*Pyrus communis*)** |  | Anti-inflammatory, Bowel Regulation, Heart Health | **Vitamin C Vitamin K (Bone Health)** |
| 3. | Papaya | Fruit of ***Carica Papaya*** |  | Aids Digestion, Wound Healing, Anti-Inflammatory, Rich in Fiber | **Vitamin C, Vitamin E Vitamin K** |
| 4. | Apple | Fruit of ***Malus domestica*** |  | Antioxidant, cardioprotective, Blood Regulation, Oral Health | **Vitamin C (immune booster), Vitamin B1 (Thiamine)** |

| | | | | | |
|---|---|---|---|---|---|
| 5. | Honey | ***Apis mellifera*** (bee Product) |  | Antimicrobial, Energy Booster, Gut health | **Vitamin B2, B3, B5** |

**MATERIALS AND METHOD:**

The primary ingredients for this study were dragon fruit, pears, papayas, apples, and honey, which were purchased from the Srirampur Ahilyanagar local market, chopped into small pieces, and grind into a mixture. Additional excipients used in this study were either food-grade or pharmaceutical-grade, specifically Agar-agar, a gelling agent.

**Table 2: Formulation table**

| Sr. No | Ingredients | Quantity (F1) | Quantity (F2) |
|---|---|---|---|
| 1. | Dragon Fruit | 82 g | **52 g** |
| 2. | Pear | 82 g | **52 g** |
| 3. | Papaya | 82 g | **52 g** |
| 4. | Apple | 82 g | **52 g** |
| 5. | Honey | 14 g | **7 g** |
| 6. | Agar-agar | 4 g | **2.5 g** |
| 7. | Water | Q.s | **Q.S** |

**Procedure of Preparation for Multivitamin Gummies with Fruits:**

**1. Fruit Washing and Cutting:**

- To get rid of dirt and contaminants, fresh fruits were properly cleaned with clean water.
- Next, a sanitised knife was used to cut the fruits into tiny pieces.

**2. Juice Extraction:**

- The chopped fruit pieces were crushed after being put in a mixing bowl.
- To obtain fresh fruit juice, a small amount of water (q.s.) was added during the grinding process.

**3. Agar Base Preparation:**

- At room temperature, agar-agar was dissolved in water.
- The mixture was heated and constantly mixed until it took on the consistency of thick gel.

**Image of Agar Base (Gelling Agent)**

**4. Fruit Juice Incorporation:**

- The prepared fruit juice was gradually added to the agar mixture while it was heating and being stirred.
- To guarantee even blending, the mixture was heated for four to five minutes.

**5. Including an acidulant and sweetener:**

- To improve flavour, honey was added.
- Lemon juice's citric acid was added to enhance flavour and serve as a preservative.

**6. Cooling and Moulding:**

- For approximately two minutes, the mixture was left to cool significantly.
- It was thereafter poured into variously shaped and sized silicone moulds.
- To ensure adequate setting, the moulds were left undisturbed for around 20 minutes.

**7. Storage and Coating:**

- The gummies were kept in a refrigerator for a full day for setting and taking proper shape and size.
- To enhance beauty and palatability, a sugar coating was applied.

**8. Evaluation:**

- The prepared gummies' texture, flavour, stability, and shelf life were all assessed further.



**The procedure was Performed in Hygienic way home vessels were used for formulation of gummies and were coated with sugar powder for good taste acceptibility.**

**Evaluation Parameters of Fruit based Multivitamin Gummies:**

**1. Physical Appearance**

Inspection was used to assess the formed gummies' visual qualities, including colour, clarity, homogeneity, and surface consistency. The candy was lightly rubbed between the thumb and index finger to evaluate tactile qualities including stickiness and grit.

**2. Ph Measurement**

A digital pH meter was used to measure the candies' pH. To determine the pH, a gummy sample was dissolved in distilled water, and the pH meter's electrode was submerged in the mixture.

**3. Swelling Index**

By measuring the difference in gummy weight before and after submersion in water, which indicates the amount of water absorbed, the swelling capacity was assessed. First, the weight of the gummy ($W_0$) was noted. After that, it was immersed for ten seconds at room temperature (25–30°C) in 100 mL of distilled water. Following removal, the gummy was weighed once more (W□) and any extra surface water was carefully wiped with filter paper. The following formula was used to calculate the

Ws = weight of chewable gummy after soaking.

Wo is the chewable gummy's weight prior to soaking.

$$\text{Swelling Ratio} = \frac{\text{Weight at time t}}{6.00}$$

## RESULT AND DISCUSSION:

**Table 3: 1. Organoleptic Properties**

| Parameters | Observation |
|---|---|
| **Colour** | Dark Pink |
| **Odour** | pleasent |
| **Appearance** | Glossy,Smooth |

**Table 4: pH Test of Both Bataches**

| Sr. no | Batch | Observation |
|---|---|---|
| 1. | F1 | **7.**14 |
| 2. | F2 | 7.1 |

## DISCUSSION

The light pink colour of the prepared candies suggests the presence of natural pigments derived from fruits like papaya, apple, pear, and dragon fruit. By adding natural vitamins and antioxidants, these fruits improved the formulation's nutritional value in addition as adding an eye-catching hue. The gummies' taste, smell, and general acceptance were all enhanced by using jaggery and honey as natural sweeteners, which also removed the need for artificial colouring or sweeteners.The gummies' glossy look and pleasant smell indicated that the right amount of heat, mixing, and gelling had taken place during formulation.The proper application of agar-agar, which produced good consistency and surface smoothness, is responsible for the glossy texture. The formulations were neutral, as evidenced by the pH values of both batches, which were 7.14 for Batch F1 and 7.1 for Batch F2. This pH range makes the medication safe, stable, and non-irritating to the oral mucosa, making it perfect for oral administration. Differences in fruit content or the quantity of jaggery and honey used could be the cause of the small discrepancy between the two batches.All things considered, both batches had favourable organoleptic qualities, such as colour, texture, look, and odour, all of which have a significant impact on consumer preference, particularly in formulations intended for children.

## CONCLUSION

The study effectively illustrated how to make natural fruit-based gummies with components like agar-agar, papaya, apple, pear, jaggery, honey, and dragon fruit. The manufactured gummies had a neutral pH (around 7.1), were light pink, glossy, and had a pleasing smell, all of which suggested good stability and oral compatibility. The formulation method worked well for creating a gummy that is safe, tasty, and natural without the use of artificial additives. As a result, these natural gummies can be a tasty and nutritious supplement choice,

particularly for kids. Overall, the designed gummies showed acceptable consumer acceptability with desired organoleptic features, such as colour, taste, odour, and texture. This recipe is healthier than commercially available synthetic gummies because it only contains natural ingredients. These natural candies have the potential to be further developed as functional food supplements or nutraceuticals, providing both flavour and health advantages.

The study concluded that it is possible to make fruit-based natural gummies with favourable physical properties, palatability, and stability. These gummies have the potential to be produced commercially as a natural, safe, and nutrient-dense confection that is especially appropriate for children's nutritional supplements with more standardisation and optimisation.

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