



VEGAN HERBAL BIOTIN GUMMIES

Anjali Soni¹, Ashmita Mishra², Gitika Gupta³, Nikita Chaudhary⁴, Dr.Arun Kumar Gupta⁵

Chameli Devi Institute of Pharmacy, Indore

ABSTRACT:

Herbal vegan biotin gummies have gained popularity as a convenient and palatable supplement for individuals seeking to support their hair, skin, and nail health while adhering to a vegan lifestyle. This review aims to provide an overview of the formulation, efficacy, safety, and potential health benefits of herbal vegan biotin gummies.

The formulation of herbal vegan biotin gummies typically involves a blend of biotin, plant-based ingredients, and herbal extracts known for their purported health benefits. These gummies offer an alternative to traditional biotin supplements, often derived from animal sources, catering to the increasing demand for vegan-friendly options.

Efficacy studies have demonstrated the ability of biotin to support the maintenance of healthy hair, skin, and nails, with additional benefits attributed to the synergistic action of herbal ingredients. Herbal extracts such as bamboo silica, horsetail extract, and amla fruit are commonly included for their purported roles in promoting collagen production, strengthening hair follicles, and providing antioxidant support.

Safety evaluations of herbal vegan biotin gummies have indicated a favorable safety profile, with few reported adverse effects. However, individuals with underlying medical conditions or those taking medications should consult healthcare professionals before initiating supplementation.

Potential health benefits of herbal vegan biotin gummies extend beyond cosmetic enhancements, with emerging evidence suggesting their role in supporting overall health and well-being. These benefits may include improved metabolism, enhanced immune function, and reduced oxidative stress, although further research is warranted to substantiate these claims.

In conclusion, herbal vegan biotin gummies offer a convenient and plant-based solution for individuals seeking to support their hair, skin, and nail health while embracing a vegan lifestyle. Future research should focus on elucidating the mechanisms of action and conducting well-designed clinical trials to validate their efficacy and potential health benefits.

KEYWORDS: Hair health, Skin health, Nail health, Plant-based ingredients, Efficacy, Safety, Formulation, Synergy, Antioxidants, Collagen production, Immune support, Metabolic support, Oxidative stress, Regulatory compliance, Consumer acceptance

INTRODUCTION :

Gummies are a large group of chewable sweets made of gelatin, sometimes known as gummi candies, gummy candies, or jelly sweets. In the candy industry, gummy bears, Sour Patch Kids, and Jelly Babies are well-known and incredibly popular. Gummies come in a broad range of forms, but the most popular ones are vibrant representations of animals like worms, bears, or newborns. Numerous companies, including Disney, Kellogg's, Haribo, Betty Crocker, Bassett's, and Hershey's, provide a variety of gummy snacks that are frequently marketed to young children. The word "jelly sweets" is more widespread in the UK, whereas the name "gummi" originated in Germany. The main ingredients of gummy candy are water, gelatin, sucrose, corn syrup, and starch. Furthermore, trace quantities of flavoring and coloring are added. To give gummies a tart flavor, food acids such as malic and citric acids are also added. Other gelling ingredients, such as starch and pectin, are frequently used in place of gelatin to create gummy sweets that are appropriate for vegans or vegetarians.

TYPES OF GUMMIES

1. Baby gummies

The first shaped gum candy to be sold commercially was Jelly Babies. The United Kingdom is where it all began. In 1864, Fryers of Lancashire manufactured them for the first time, marketing them as "Unclaimed Babies". They were (and still are) made as Jelly Babies by Sheffield's Bassett's by 1918.

2. Bears Gummy

Originating in Germany, the gummy bear is known locally as Gummibär (rubber bear) or Gummibärchen (little rubber bear). These candies were made by Bonni confectioner Hans Riegel Sr. under the Haribo brand, which he founded in 1920.

3. Vitamin gummies

There are also a number of gummy bears with many vitamins that are often sold to kids, such as Flintstones Chewable Vitamins.[9] For people who cannot take tablets or who require other supplements to keep healthy, these forms of vitamins provide nutrition and protein.

4. Teeth Gummies

Since the 1930s, tooth-shaped jelly confections have been a huge hit in Australia.[Reference required] They are white and pink, with the pink signifying the teeth and white indicating the gums. They taste a little minty, like toothpaste with mint flavor.

5. Gummy Worms

Gummy worms are shaped like worms and available in a variety of colors and tastes, or a mix of flavors. They may be utilized for a variety of occasions, such as birthday parties, Halloween celebrations, under-the-tea cupcakes, ice cubes, and biscuits.

- **Health Consideration**

Scientists have investigated the possibility of preventing dental decay by incorporating xylitol, a sugar alternative, into gummies.

- **Storage conditions**

When gummy sweets are stored in a setting with high humidity, water molecules from the surrounding air will migrate into the candy, causing moisture migration. It's conceivable that moisture will seep into gummy sweets and raise their relative moisture content if they are placed in an environment with a lot of moisture. The molecular mobility of the candy's particles will increase as the moisture content rises, which might have a number of unfavorable effects, including:

- crystallization of sucrose and the resulting granular texture.
- A surface like sticky sweets.
- flavors seeping out of the candy.
- potential for microbial development.

Gummy candy moisture migration may be avoided by keeping them in an environment where the relative humidity of the candy and its surroundings is the same.

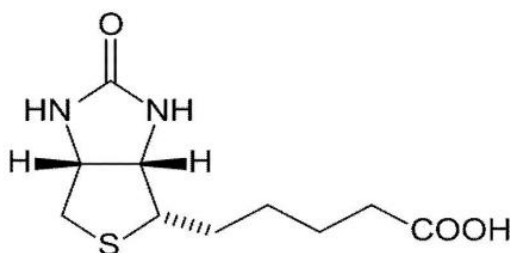
BIOTIN:

It is also known as vitamin H and Vitamin B7. According to definitions, vitamins are a class of complex chemical compounds found in trace amounts in natural foods that are necessary for proper malnutrition and whose absence from the diet results in deficient illnesses. Proteins, carbs, and lipids are connected to each other, however vitamins are a mixed set of molecular substances.

Together, its categorization is based on function rather than chemical properties. The organic structure of vitamins sets them apart from trace elements, which are likewise found in the diet in tiny amounts. For proper health, development, and reproduction, trace levels of vitamins must be consumed through food. If a species that needs a certain vitamin is denied it, it will manifest deficiencies through signs and symptoms. Numerous vitamins have functional properties. Nonetheless, there is a clear distinction drawn between chemicals that are generated in bodily tissues and vitamins. For example, the majority of animal species are capable of synthesizing ascorbic acid, except young animals and stressed animals. Likewise, tryptophan, an amino acid, and vitamin D, which is produced when ultraviolet light interacts with precursor molecules in the skin, may be used to generate niacin in the majority of species. Thus, vitamin C, niacin, and vitamin D could not always meet the traditional definition of a vitamin under particular circumstances and for particular animals. Traditionally, vitamins were classified into two categories according to whether they were soluble in water or fat-based solvents. As a result, vitamins A, D, E, and K are classed as fat-soluble, whereas vitamins C and the B complex are categorized as water-soluble. Foods include fat-soluble vitamins in combination with lipids. It appears that the fatsoluble vitamins are absorbed by comparable processes to those involved in fat absorption, coupled with dietary lipids. Ample bile flow and healthy micelle production, which are conducive to fat absorption, also facilitate the absorption of fat-soluble vitamins.

Chemical structure

One of the sulfur atoms in the ring of biotin's chemical structure is involved in metabolism. as well as a transverse bond that spans the ring. Sulfur is attached to the monocarboxylic acid by a thioether bond. Due to the three asymmetric carbonations in biotin's rather unusual structure, eight distinct isomers are conceivable. Only one of these isomers—d-biotin—has vitamin action. L-biotin's stereoisomer is dormant. Long, white needles form when biotin crystallizes out of a water solution. It melts at 232 and 233 degrees Celsius. Free biotin is almost insoluble in lipids and organic solvents but soluble in hot water and diluted alkali. For the most part, biotin is stable under normal circumstances. Rancid lipids and choline inactivate it, while nitrous acid and other strong acids, strong bases, and formaldehyde destroy it (Scott et al., 1982). Under UV light, it eventually deteriorates.



3. Metabolism

Biotin is present in natural materials in both bound and free forms, but much of the bound biotin is not readily available to animal species, particularly in poultry feeds. Natural sources of biotin include fruit, milk, and vegetables, where it exists in both free and bound forms, the latter being linked to proteins in animal tissues, plant seeds, and yeast. The availability of biotin is influenced by the susceptibility of these protein-biotin linkages to digestion. Biotinidase, found in pancreatic juice and intestinal mucosa, releases biotin during the digestive process. In most species, biotin is absorbed from the intestinal tract through a sodium-dependent active transport process. Studies suggest that absorption is highest in the duodenum, followed by the jejunum and then the ileum.

Research on animals indicates that biotin is absorbed intact in the early part of the small intestine. There is also absorption from the hind gut in pigs. Postileal absorption of biotin appears to be less efficient than absorption from the small intestine, even with microbial synthesis in the postileal tract. Biotin circulates in the bloodstream in both free and bound forms, with a serum glycoprotein also exhibiting biotinidase activity. Limited information is available on biotin transport, tissue deposition, and storage in animals and humans. Biotin is transported in plasma as a free water-soluble component, taken up by cells via active transport, and attached to its apoenzymes. Homeostatic mechanisms ensure biotin provision in response to needs. Biotin is distributed in cells, with higher quantities in the liver and kidneys, corresponding to the localization of biotin-dependent enzymes. Biotin metabolism investigations are challenging due to biotin-producing microorganisms in the intestinal tract. Urinary biotin excretion can exceed dietary intake, and efficient conservation, along with recycling of biocytin, is deemed important in meeting biotin requirements.

4. Function

Biotin is an essential coenzyme involved in the metabolism of carbohydrates, fats, and proteins. It plays a crucial role in converting carbohydrates to proteins and vice versa, as well as converting proteins and carbohydrates to fats. Biotin is particularly important in maintaining normal blood glucose levels when dietary carbohydrate intake is low.

The coenzyme functions as a carboxyl carrier in four enzymes: pyruvate carboxylase, acetyl CoA carboxylase, propionyl CoA carboxylase, and 3-methylcrotonyl CoA carboxylase. In these enzymes, biotin has the capacity to transport carboxyl units and fix carbon dioxide in tissues. Biotin also serves as a prosthetic group in various enzymes, where the biotin moiety acts as a mobile carboxyl carrier. This biotin prosthetic group is covalently linked to the ϵ -amino group of a lysyl residue in the biotin-dependent enzyme.

EFFECTS OF DEFICIENCY

Ruminants:

Biotin plays a crucial role in the normal functioning of the thyroid, adrenal glands, reproductive tract, and nervous system. However, its impact on the cutaneous system, particularly in livestock and poultry, is most pronounced, leading to severe dermatitis as a major clinical sign of deficiency. In animals like calves, hindquarter paralysis and decreased urinary excretion of biotin signify biotin deficiency, which can be corrected with biotin injections. A potassium-biotin interrelationship has been observed in calves, where deficiency in both elements can lead to progressive paralysis.

While ruminal and intestinal synthesis of biotin was initially thought to meet the needs of ruminants, supplementation has shown promising results, preventing lameness in dairy cattle and successfully treating claw problems in biotin-deficient dairy cows. Biotin deficiency in dairy cows results in poor hoof quality, and supplementation has been associated with improvements, including increased hoof hardness and changes in hoof conformation. In beef cattle, biotin supplementation has proven effective in reducing the prevalence of sandcracks, a common hoof defect, leading to improved hoof quality and decreased occurrences of other hoof defects. Additionally, both dairy and beef cows supplemented with biotin have shown a reduction in hoof lesions and increased milk production, emphasizing the importance of biotin in overall animal

BRITTLE NAILS:

Brittle nails (BN) can result from factors affecting the production of the nail plate (NP) or causing damage to the NP. Under normal conditions, the NP is a fully keratinized structure composed of approximately 25 layers of densely packed keratinocytes, with a thickness of 0.5–1 mm and a smooth surface. The majority of the NP is derived from the proximal nail matrix (NM), located beneath the proximal nail fold, with around one-third originating from the distal matrix and bed. Normal nail growth relies heavily on vascularization and inflammation, and any impairment in this process can lead to NP abnormalities. Clinical manifestations of BN due to proximal NM damage vary based on the site and extent of the injury. Proximal NM damage results in NP thinning throughout the entire nail length, often accompanied by abnormalities in the superficial NP. In contrast, damage to the distal matrix may alter the shape of the NP free edge without affecting the superficial NP.

BN can be attributed to various factors, including age-related physiological increases in nail fragility. Other potential causes encompass local or systemic factors such as inflammatory nail diseases, onychomycosis, systemic conditions, medication use, and occupational or professional trauma. When no secondary cause is identified, the condition is labeled as idiopathic. Clinically, three main clinical aspects of NF have been described:

1. Lamellar onychoschizia: The problem with nails breaking into layers can happen when the sticky parts between the nail cells don't work well. This makes the nail peel into thin layers horizontally. The hardness of the nail is mainly because of certain amino acids and strong links in the keratin protein. The best condition for nails is a bit acidic. The cells stick together with the help of special particles and fats. Sometimes, the nails can break in a way that looks like small triangles coming off at the edge, especially if someone washes their hands too

much. This mostly happens to fingernails, especially in people who wash their hands a lot, like homemakers, doctors, and nurses. In some cases, the nails can also break in a way that looks like small pieces breaking off from the sides. This kind of nail problem is mostly seen in fingernails and can happen in conditions like lichen planus or during certain therapy.

2. **Superficial granulation of keratin** :- This nail problem is about brittleness, but only on the top part of the nail, not the whole thing. It's not the same as another issue where the nail turns white. People who use nail polish a lot, especially if they keep putting new coats without removing the old ones, might see their nails become granulated. This means the nail's top layer forms small white or yellow patches and lines. It's like the nail is peeling off in tiny bits, causing the white color. This is called pseudoleukonychia.

CAUSES:-

1. **Brittle nail syndrome** - Brittle nails, mainly affecting fingernails, are most commonly observed in women due to weaker intercellular bridges between keratinocytes. Additionally, a decrease in lipid content, especially cholesterol sulfate, in the nail plate, particularly in post-menopausal women, suggests a role of lipids in brittle nail development, while opinions on water content as a cause vary among studies.
2. **Secondary nail brittleness**-Inflammatory nail disorders, including psoriasis and lichen planus, can affect the nail apparatus, often leading to nail fragility. Psoriasis, for example, may cause deep pits or brittleness in the nail plate, with up to 50% of patients experiencing nail abnormalities and brittle nails.
3. A severe deficiency of vitamins, trace elements and aminoacids from daily food intake may result in NF and thinning
4. **Traumas and Alteration of Nail Hydration**:- NF may result from mechanical microtraumas related to regular occupational activities, such as those performed by housekeepers, carpenters, ironworkers, shoemakers, and homemakers. Intercellular lipids can be dissolved and intercellular cohesiveness damaged by occupational exposure to solvents and solutions (chemical/medical workers, photographers, or painters, for example)

Treatment :-

Water-soluble vitamin biotin is found in a variety of foods, including cereals, milk, egg yolks, peanuts, walnuts, and peanuts. Intestinal microorganisms also synthesize this vitamin. Biotin: participates in the formation of keratin and the intercellular cement that holds keratinocytes together; serves as the prosthetic group for a number of vital enzymes; enhances the NP's ultrastructure (onychocytes have more regular distribution and configurations) and tension-resistance. Numerous investigations have shown that individuals receiving biotin supplementation had firmer and harder fingernails . as evidenced by clinical and electron microscopy exams . Generally, a daily dose of 5–10 mg for three–six months is advised.

When ferritin levels are less than 10 ng/ml, iron supplementation combined with vitamin C may be quite beneficial. Studies that link BN with iron deficiency, however, are rarely published .

NF is brought on by zinc deficiencies, both primary and secondary. Long-term administration of 20–30 mg/day of zinc appears to be beneficial in improving BN .

After three months of treatment, subjects with onychoschizia showed that a biomineral formulation containing amino acids (l-cystine, l-arginine, glutamic acid), vitamins (C, E, B6, and biotin), and minerals (zinc, iron, and copper) was well tolerated and effective in strengthening and smoothing fingernails [39]. There is no information in the article on the dose of the individual components.

Biotin deficiency:- Symptoms of biotin deficiency include hair loss (alopecia), conjunctivitis, dermatitis in the form of a scaly, red rash around the eyes, nose, and mouth (this has been termed as the “biotin-deficient face” by some experts), and neurological symptoms, such as depression, lethargy, hallucination, and numbness and tingling of the extremities. The neurological and psychological symptoms can occur with only mild deficiencies while dermatitis, conjunctivitis, and hair loss generally occur only when deficiency becomes more severe. Individuals with hereditary disorders of biotin deficiency additionally have evidence of impaired immune system function, including increased susceptibility to bacterial and fungal infections.

Why to switch over herbal biotin gummies when synthetic ones are available in the market?

Switching to herbal biotin gummies from synthetic ones in the market offers potential advantages rooted in natural ingredients and holistic health. Herbal biotin gummies often derive their biotin from plant-based sources, aligning with the principles of natural and sustainable living. This can be particularly appealing to individuals seeking cruelty-free and environmentally friendly products.

Moreover, herbal formulations may contain additional nutrients, vitamins, and antioxidants from plant sources, providing a synergistic effect that supports overall well-being. The presence of herbal extracts, such as those from fruits or herbs, may contribute to improved absorption and assimilation of biotin in the body.

In contrast, synthetic biotin supplements may lack the diverse array of complementary compounds found in herbal formulations. Some individuals may also experience adverse reactions or sensitivities to synthetic additives commonly present in non-herbal supplements. While scientific studies specifically comparing synthetic and herbal biotin supplements are limited, the broader trend towards herbal and natural alternatives is influenced by a growing awareness of the potential benefits of whole-plant ingredients. Also, the synthetic gummies contain added sugars and preservatives that will not be palatable for diabetic patients, and pregnant and lactating women. This drawback can be rectified by formulating herbal gummies. Herbal biotin gummies can also be easily consumed by vegan consumers, as it contains Agar Agar and Starch as a gelling agent in place of Gelatin.

2. PROFILE OF HERBAL INGREDIENTS:

To create a synergistic blend for herbal biotin gummies, it's essential to select herbs that complement the benefits of biotin and contribute to overall hair, skin, and nail health. Here's a profile of potential synergistic herbal ingredients:

1. Amla (*Emblica officinalis*):

- Benefits:
- Rich in Vitamin C and antioxidants, promoting collagen synthesis for skin health.
- Supports hair health by preventing premature graying and strengthening hair follicles.
- Synergy with Biotin
- Amla enhances collagen production, which is crucial for maintaining skin elasticity and promoting hair growth.

2. Horsetail (*Equisetum arvense*):

- Benefits:
- High silica content supports collagen formation and strengthens hair and nails.
- Known for its anti-inflammatory properties that can benefit skin health.
- Synergy with Biotin:
- Silica in horsetail complements biotin in promoting hair and nail strength.

3. Bamboo Extract (*Bambusa vulgaris*):

- Benefits:
- Contains silica, essential for maintaining connective tissue and promoting skin elasticity.
- Supports hair health by strengthening hair strands.
- Synergy with Biotin:
- Bamboo extract's silica content complements biotin in supporting healthy skin, hair, and nails.

4. Gotu Kola (*Centella asiatica*):

- Benefits:
- Enhances collagen production for skin elasticity.
- Known for its wound-healing properties, beneficial for skin health.
- Synergy with Biotin:
- Supports overall skin health and complements biotin in promoting wound healing.

5. Rosemary (*Rosmarinus officinalis*):

- Benefits:
- Exhibits antioxidant properties that protect the skin from free radical damage.
- Supports a healthy scalp and may stimulate hair growth.
- Synergy with Biotin:
- Rosemary's antioxidant properties complement biotin in promoting overall skin health.

6. Lavender (*Lavandula angustifolia*):

- Benefits:
- Calming and anti-inflammatory, beneficial for skin health.
- May have antimicrobial properties beneficial for acne-prone skin.
- Synergy with Biotin:
- Lavender's anti-inflammatory properties complement biotin in supporting skin health.

7. Chamomile (*Matricaria chamomilla*):

- Benefits:
- Soothing and anti-inflammatory, promoting skin health.
- Known for its calming effects, which may benefit stress-related skin issues.
- Synergy with Biotin:
- Chamomile's calming properties complement biotin in supporting overall skin well-being.

8. Calendula (*Calendula officinalis*):

- Benefits:
- Possesses anti-inflammatory and antimicrobial properties.
- Supports wound healing and soothes irritated skin.
- Synergy with Biotin:
- Calendula's healing properties complement biotin in promoting skin repair.

Formulation Considerations:

- Dosage: Determine optimal concentrations of each herb for efficacy.
- Flavor: Ensure the selected herbs contribute positively to the overall taste of the gummies.
- Compatibility: Confirm compatibility and stability of herbal extracts in the gummy formulation. Creating a balanced blend of these synergistic herbal ingredients alongside biotin can result in a comprehensive formula for herbal biotin gummies aimed at promoting holistic hair, skin, and nail health.

CONCLUSION:

In conclusion, the development and popularity of vegan herbal biotin gummies represent a significant advancement in the dietary supplement industry, offering a convenient and palatable option for individuals seeking to support their hair, skin, and nail health while adhering to a vegan lifestyle. Through a comprehensive review of the formulation, efficacy, safety, and potential health benefits of these gummies, several key insights have emerged.

The formulation of vegan herbal biotin gummies involves a careful blend of biotin, plant-based ingredients, and herbal extracts known for their purported health benefits. While challenges such as herbal ingredient standardization, taste and texture optimization, and biotin stability exist, advancements in formulation technologies and quality control measures continue to address these issues.

Efficacy studies have demonstrated the ability of biotin to support hair, skin, and nail health, with herbal ingredients providing additional synergistic benefits. Herbal extracts such as bamboo silica, horsetail extract, and amla fruit have shown promise in promoting collagen production, strengthening hair follicles, and providing antioxidant support.

Safety evaluations of vegan herbal biotin gummies have generally indicated a favorable safety profile, with few reported adverse effects. However, caution should be exercised, particularly among individuals with underlying medical conditions or those taking medications, who should consult healthcare professionals before initiating supplementation.

While the potential health benefits of vegan herbal biotin gummies extend beyond cosmetic enhancements to include metabolic support, immune function enhancement, and oxidative stress reduction, further research is needed to validate these claims and elucidate underlying mechanisms of action.

Overall, vegan herbal biotin gummies offer a promising solution for individuals seeking to support their overall health and well-being while embracing a vegan lifestyle. Continued research, innovation, and regulatory oversight are essential to ensure the quality, efficacy, and safety of these products, ultimately empowering consumers to make informed choices for their health and dietary needs.

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