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Gond Katira, A Natural Coolant: An Overview

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Abstract: ***Gond Katira is obtained from the discharge of Astragalus species. This is also known as Tragacanth gum, which has hydrophilic properties and is considered as natural coolant. Astragalus is a dicotyledonous plant and belongs to the Fabaceae family. Its important species are A. gummifer, A. brachycalyx, A. myriacanthus, A. kurdicus and A. echidna. This natural hydrocolloid after absorption of water swells to form a mucilaginous gel and helps to retain water and body temperature in summers. Tragacanth gum is made of tragacanthin and bassorin, which has anti-inflammatory, immunological, antioxidant and prebiotic effects in our body. During heat stress, Gond katira helps to maintain the cellular homeostasis by preserving osmotic equilibrium. As Gond katira is biocompatible and non-toxic, it is widely used in pharmaceutical, cosmetic and food industries, not only for medicinal product but also as stabilizer and emulsifier. Although Tragacanth gum is used extensively since ancient times, less research is available on the mechanism of its thermoregulation property. A complete understanding on its physiological, physicochemical, biological and therapeutic properties are required to understand it as natural coolant.***
Keywords: Gond Katira, Tragacanth gum, Thermoregulation, Antioxidant activity, Functional foods.

I. INTRODUCTION

Gond katira is gaining a lot of attention in the cosmetic, food, medical and health-care sectors because of its ability to biodegrade and its biocompatibility. Tragacanth gum, which is commonly known as Gond katira, is a naturally occurring polymer and is collected from the exudate of several species of Astragalus (Singh *et al*., 2017). This mucilaginous jellylike substance has great therapeutic value in Persian, Ayurvedic and Unani medicine. Astragalus is native to the arid and semi-arid regions of Central and Middle East Asia. Iran is the leader in production and Export of Gond Katira. This Gond Katira is naturally released as natural mucilaginous and viscous sap from the incisions in stem bark, which solidifies after drying in small nodules or flat ribbon like flakes. It is believed that plants release this sap under high temperature and drought conditions as their defense mechanism. People consume Gond Katira as its cooling and hydrating properties help them against heat strokes, water loss and digestive issues in areas which are extremely hot. This hydrocolloid has a great ability to absorb water, which helps to make a mucilaginous gel, which improves internal hydration and helps to maintain or regulate the body temperature.

As per recent research, Gond Katira has significant medicinal value as it has anti- inflammatory, antioxidant and immunological properties. This gum has exceptional characteristics of biocompatibility and gel forming, so it is widely used in wound healing, drug delivery system and tissue engineering (Frontiers in Materials, 2024, Nagaraja *et al.*, 2021).Further, this healthy hydrogel has soluble dietary fibre, which improves the gut microbiota helping in better regular bowel movements and weight management (Nejatian *et al.*, 2020a). Tragacanth gum is widely used in biomedical applications such as tissue regeneration as it is a widely used polysaccharide, which is commercially available, biodegradable and biocompatible (Nazemi *et al.*, 2023). Furthermore, this polysaccharide, which is anionic and highly branched complex molecule, is widely used in medicine formulations as an emulsifying, stabilizing and thickening agent. Due to its biocompatibility, it is a suitable substance for drug delivery (Zare *et al*., 2019; Ghorbani *et al*., 2021; Shabbir *et al*., 2024).

A. Medicinal properties of Gond Katira

Gond katira (Tragacanth gum), a natural gum is a dried discharge of Astragalus species, has significant therapeutic capabilities. The medicinal value of this natural complex polysaccharide has been supported by modern scientific research and its traditional use in Persian, Unani and Ayurvedic medical systems (Benalaya *et al*., 2024). Recent research found that Gond katira can lower oxidative stress by absorbing free radicals. The molecular structure of Gond katira helps to donate hydrogen atoms and stabilize the reactive oxygen species. This antioxidant property of Tragacanth gum contributes in recovery from chronic diseases like diabetes, cancer, nerve disorders (Gupta *et al.*, 2018). The medicinal value of this hydrogel is further increased as it has strong anti-inflammatory properties. The high mucilage content of this gel helps in ulcer healing. The viscous sap makes a lining on the stomach inner wall and protects it from damage by certain irritants (Tang *et al*.,2023). So, the Gond katira has gastroprotective potential and was traditionally used to cure gastrointestinal disorders.

Gond katira not only improves digestive health but also reduces the intestinal absorption of glucose and encourage hypoglycemic activity. This helps in controlling after meal glucose level in diabetic patients. Consumption of Tragacanth gum boosts cytokine production and stimulates macrophages, which helps us to fight against infections and improves our immunity. Recent findings suggest that these healthy hydrocolloids have significant use in wound healing, tissue repairing and tissue engineering (Singh *et al.*, 2017b). Due to its water absorbing potential, this hydrogel is significantly used against dehydration and heat strokes in hot and dry areas. This hydrogel is widely referred as natural moisturizing and cooling agent.

In brief, this gum has a wide range of medicinal properties including antioxidant, immunity booster, gastroprotective, hydrating, cooling, diabetic, anti-inflammatory, wound healing and rejuvenating effects. Gond katira is widely accepted in drugs, dietary supplements and in medicines as it is biocompatible, very less toxic and obtained from the plants. There are preclinical evidence which supports its therapeutic potential, but more research and large no. of clinical investigations are still required to prove its reliability and benefits.

II. CULINARY PROPERTIES OF GOND KATIRA

Gond katira, a natural exudate from different species of Astragalus has unique hydrocolloid properties, which makes a valuable in culinary applications. After hydration, Gond katira soaks water and swells considerably and forms a colorless, flavorless and odorless viscous gel that can be used as a natural thickening agent in a variety of traditional drinks and dishes. In Middle East and South Asian food preparations, Gond katira is widely used during hot seasons in the cool beverages such as sharbat, Falooda and other herbal drinks. Being viscous, this gum adds smooth texture without altering the original flavour and improves the overall taste of beverages and desserts. (Goksen *et al.*, 2023).

In contemporary food industry it is widely used in making frozen desserts such as ice cream. Gond katira is a natural emulsifier and gives a safe substitute for artificial stabilizers in confections and edible film formulations. When Tragacanth gum is used in ice cream making it helps to enhance creaminess and prevents ice crystal formations in ice cream.

Further, due to its low-calorie value and high dietary fibre content, Gond Katira is becoming a useful ingredient in dietary formulation, especially for better gastrointestinal health and weight management.

A. Nutritional profile of Gond Katira

Gond Katira is nutritionally not rich as it is mainly a complex polysaccharide, which is generally indigestible by our digestive system. Additionally certain vital minerals such as Calcium, magnesium, potassium and iron are present in traces. Presence of these trace elements makes it useful in electrolyte balance and hydration. Gond katira also has soluble fibers, where beneficial gut microbiota flourishes and adds mild prebiotic quality in it.

Gond Katira's approximate nutritional profile/ 100 gm is as follows:

Calories:70kcal
Total Fat: 0gm
Total Carbohydrates: 35gm
Dietary Fiber: 30gm
Protein: 5gm
Sodium: 0-9mg

The diagnostic features of tragacanth gum such as water binding, gel forming and fibre content are mainly due to the presence of Tragacanthin and Bassorin in it. As this gum has a high content of soluble and insoluble fibers, Safety and Toxicological aspects have become a desirable component of dietary formulations mainly for low calorie and weight management.

III. GOND KATIRA IS SAFE TO CONSUME:

1) Safe to consume: Gond katira is safe to consume, hence used widely in Food and Pharmaceutical industries. According to several recent in vivo and invitro studies it is found that this gum is safe to take at standard dosage i.e. the concentration commonly used in food or medicines.
2) No Toxic Effect: No cytotoxicity was found on human cells.
3) Hypersensitivity: Although it is safe, people who are working with tragacanth gum powder, sometimes have developed allergic contact dermatitis. This hypersensitivity is generally associated with contact or inhalation rather than oral consumption of Gond Katira.

4) Digestive Issues: Some time due to high dosage consumption it may cause gastrointestinal effects such as abdominal pain, flatulence or digestive problems. These problems may be due to high fibre content in this gum.

5) GRAS: Gond katira is guaranteed as a safe ingredient for consumption in food and healthcare products by its classification as GRAS i.e. Generally Recognised and safe by regulatory bodies.

IV. CONCLUSION

Tragacanth gum, which is commonly known as Gond Katira, is a naturally occurring biopolymer that has significant usage in culinary, nutritional, health care and industrial sectors. Gond katira has the special characteristic i.e. it has the capacity to swell and make a gel in water. This unique property made it a natural stabilizer, emulsifier and thickening agent in both traditional and modern food recipes and in health care products. In addition to this, gum has high soluble fibre content, which facilitates developing gut microbiota, resulting in gastrointestinal health. Furthermore, these soluble fibers add little caloric value to food, and it is widely used in dietary supplements, made especially to fight against obesity or weight loss. In addition to all its benefits, the most significant is its safety to consume at standard dosage. Its exceptional level of safety is supported by regulatory bodies and considered in GRAS (Generally Recognised and Safe) as per the recent scientific studies. Only minimal cytotoxicity or hypersensitivity is reported at work related exposure. Even though its conventional usage in food and pharmaceutical industries is well established, a lot of research is still required to explore the bioactive properties and medicinal benefits, which will help to strengthen its role in functional food and promote health.

In brief, Gond katira has a significant potential in culinary, pharmaceutical and functional food industries by mixing the traditional knowledge with today's scientific knowledge (Shiam *et al*., 2025).

V. FUTURE POTENTIAL

Although we are using Gond katira in our traditional practices for a long time, very less is still known about its medicinal and industrial capabilities, especially at the molecular level and clinical levels. To better understand the role of this gum in food and health care industries, research must be done at molecular level. The biologically active components should be isolated, characterized for understanding their role in human health, particularly in the field of gastrointestinal microbiota
control, metabolic disorders, anti-inflammatory mechanism etc.

Due to advancements in biological materials and nanotechnology, the Gond katira is now used in novel drug delivery systems, wound healing treatments and tissue engineering. Due to gel forming and biocompatibility features, Gond katira is a suitable candidate for such performance. Additional research on molecular structure and functions of Gond katira may result in the development of clean stabilizer and conditioner in the food and pharmaceutical industry. This may fill the consumers' demand for organic food ingredients. By increasing the production of Astragalus species in semi-arid regions, the rural economy may increase with continuous supply of superior quality gum to industries for various usage.

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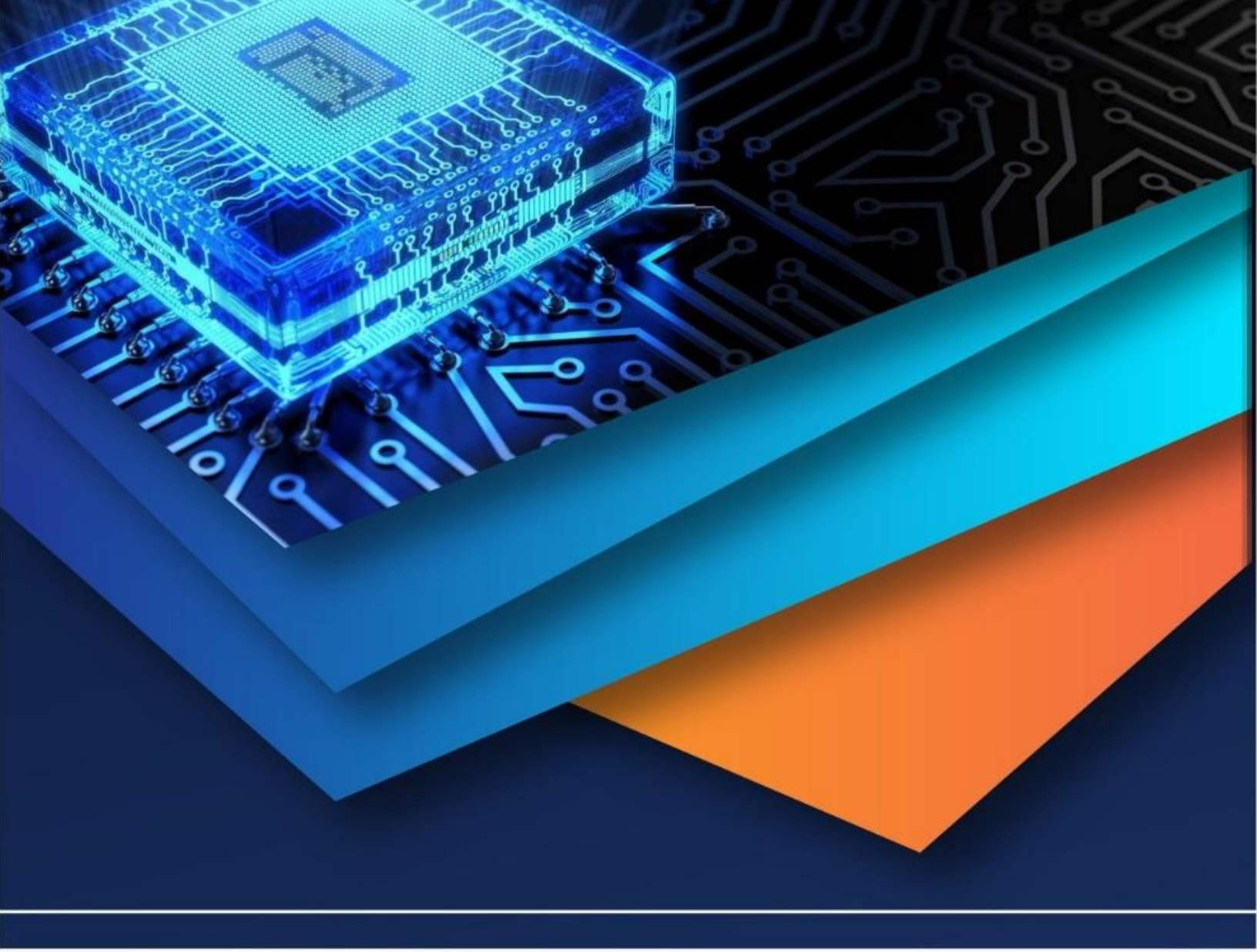

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