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The Effect of Using Gum Arabic (Segalia Senegal) Creams on Whiting and Tightening the Skin as an Alternative to Chemical Cosmetics

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Abstract Gum arabic is a natural plant exudate of acacia trees. It is a complex polysaccharide with a branched structure and has excellent functional properties, such as high solubility and low viscosity. It is used in food products due to its emulsifying properties. Gum arabic is one of the best drying agents for plants and contributes to improving the quality and physical properties of powders like productivity, bulk density, and solubility. The results of physical examination in our investigation revealed that the gum Arabic had a specific weight of 1.0055, an Relative density of 1.0034 grams per centimeter, an PH level of 4.6 and a viscosity of 7.22 CPS. while the chemical examination for gum Arabic included Humidity at 25%, 30% was 6.70, 2.44 , while total sugars content at concentrations of 25% and 30% was 41.10, 39.12 /100gram dry weight. Finally total acidity values at concentrations of 25%, 30%, reaching 0.11% and 0.19%, respectively. Gum arabic contains natural chemicals, such as alkaloids and flavonoids, which accelerate the healing process of wounds and scars when applied topically. Gum arabic has a range of properties that tighten the face, improve skin texture, and smooth wrinkles, leaving the skin soft and supple. It also reduces puffiness under the eyes, as some cosmetic products, including anti-aging face creams, contain gum arabic.

Key words: Gum Arabic, Whitening cream, Skin tightening, Cosmetics.

INTRODUCTION

Gum Arabic is the air-dried sticky or gummy substance obtained from the branches and trunks of Acacia cultivation, particularly Acacia senegal (Hashab) and a closely related species Acacia seyal (Talha), which belong to the Fabaceae family [1-3]. The gum arabic tree is a natural medicinal plant native to the Arabian Peninsula and Pakistan [4]. The name "gum arabic" was derived from Arab contributions when it was shipped to Europe around 4000 BC [5].Under of stress conditions such as heat, drought, poor nutrition and disease ,trees produce gum. This gum may become infected by microbes (bacterial and fungal) that enter through intentionally or accidentally made cracks in the trunks of acacia trees stimulating gum production [6].Chemically, gum arabic is a neutral or relatively acidic mixture of polysaccharides and glycoproteins. It is characterized by a high protein content of around 97%, consist of D-galactose and L-arabinose) and a low protein content of less than3% [7]. Gum arabic is a natural substance that has been used by people for centuries because of its numerous benefits. It is rich in natural fibers that dissolve in water, as well sugars and proteins [8-9]. Thanks to its high content of soluble fiber, gum arabic can help maintain heart health. Fiber can contribute to lowering total cholesterol and harmful cholesterol levels in the blood, by reducing cholesterol absorption in the intestine and increasing bile secretion [10].The sugars arabinose and ribose were initially discovered and isolated from gum arabic which is the original source of these sugars. The components of the gum are identical, but the composition and molecular weight of the gum vary from species, ranging from 260,000-1,160,000 grams. [11]. The Arabic pigment is primarily non-renewable occurring naturally as a mixture of calcium, magnesium, potassium, and sodium salts of the polysaccharide arabic acid [12].The composition and quality of gum Arabic can vary based on factors such as the elements within the same species, environmental conditions such as climate, rainfall, and humidity) as well as period and method of extraction and processing [13].The aim of this study was to investigate the various effects of gum

Arabic on skin whitening. Many cosmetics contain heavy metals such as lead, mercury, talc, and copper as either components or impurities. Research has long shown that these metals can easily be absorbed and cause various skin problems [**14**]. Gum arabic possesses anti-inflammatory properties, making it a potential treatment option for rheumatoid arthritis. Scientific evidence supporting the benefits of gum arabic for arthritis sterms from a study conducted by researchers at the University of Khartoum. Volunteers with rheumatoid arthritis were instructed to consume 30 grams of ground gum arabic mixed with 200 ml of water each morning for eight weeks. The use of certain metals in cosmetics including the presence of metal it in the human body, has garnered [**15**]. For example, mercury is found in skin bleaches and other cosmetics.by inhibiting the production of melanin, it lightens the skin, however, which leads to skin lightening , continued use of products containing mercury can lead to inflammation of the liver and urinary system. Therefore, its presence in human creams has become a widespread issue for public health [**16**].

MATERIALS AND METHODS

Sample preparation

Acacia gum, commonly referred to as Arabic gum, could be purchased from local markets in Baghdad City between February to May 2024. The plants that produce Arabic gum were randomly collected from three separate sites in the local marketplaces. The contaminants were then removed, thoroughly washed, and dried at room temperature. After drying, the gums were crushed into powder using a handheld grinder and stored in dry containers until ready to use. [**17**].

Arabic gum physical testing

Arabic gum viscosity estimation: A size C Ostwald viscometer was used to measure the relative viscosity in order to estimate the gum's viscosity. This was achieved by determining the time it took for the liquid to flow at 25°C was mentioned by [**18**].

Estimating the Gum Arabic Refractive Index

Gum Arabic suspensions at concentrations of 3% and 6% were prepared using a refract-o meter at 30°C following the procedure outlined in reference [**19**]

PH number:

A range of pH values, from 1 to 10, as used to test the viscosity of gum arabic. The sample solution was prepared using various buffer solutions at a 1% concentration: pH 4, 6, 8, and 10 using citrate buffer solution.as well as Tris-HCl buffer solution at pH 8 and pH 10. [**20**].

Determination of density and specific gravity

A density bottle was utilize to estimate the density of gum Arabic at concentrations of 1%, 2%, and 3% at a temperature of 35°C. [**21**],

Preparation of Alcoholic and aqueous extracts

The heated aqueous extract of the plant was prepared using the method described [**22**]. To a 500 mL glass flask, add one gram of dried gum Arabic powder was add along with 200 mL of distilled water. The flask was then placed put on a magnetic thermo heater set at 40°C. The mixture was thoroughly stirred using a magnetic stirrer for 24 hours to extract the active substance. After the mixing process, The solution was filtered through filter papers and a funnel connected to an air vacuum . The filtrate was then transferred to a centrifuge and spun at a speed of 3000 rpm for 15 minutes to precipitate and obtain a clear solution, the filtrate was then dried using a rotary evaporator at a temperature of 40°C for 24 hours. The resulting powder was weighed and saved in the refrigerator at a temperature of 4°C until needed. Alternatively Alcoholic extracts were prepared using 70% ethyl alcohol instead of distilled water.

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Chemical examination for gum Arabic

The moisture content and total acidity of gum Arabic were determined by titration with sodium hydroxide in the presence of phenolphthalein indicator. The total sugars of gum arabic were determined by the Enyon and Lane method. [23].

Statistical analysis

Analysis of variance was conducted using SPSS, where the results were analyzed using one-way ANOVA followed by LSD test to determine significant differences at 5% confidence level, and the results were recorded as means and standard deviations. [24]

RESULTS AND DISCUSSION:

Physical properties of Arabic gum

Table 1 shows the results of the physical properties of gum Arabic. The viscosity was 7.22 CPS, the specific weight was 1.0055, the relative density of the gum was 1.0034 gram/cm3 and the pH of gum Arabic was 4.6.(Figure 1).

Table 1: Arabic gum physical properties

sample	Viscosity	Specific weight	Relative density	pH number
2	7.22	1.0055	1.0034	4.6

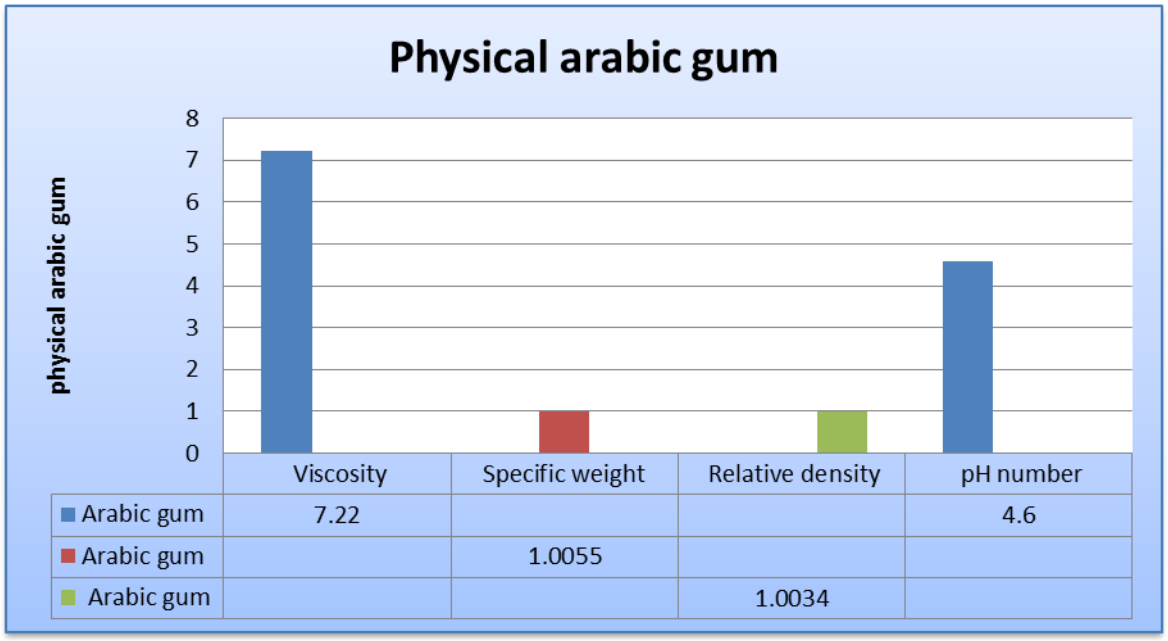


Figure 1: show chart of physical Arabic gum samples

The results of viscosity and PH were agreement with [25], indicating that changes in gums' molecular weights could be due to of their varying viscosity levels. Increased viscosity is the consequence of increasing molecular weight.. While results of specific weight and relative density were agreement with [26] In general, gums manufactured from raw materials have greater specific gravity values than high-purity gum arabic. The degree of dense packing of large molecule in the gums can be assessed by relative density. Further, when gum is utilized at larger concentrations, the gum solution's density values commonly grow. Gum arabic is a mixture of several glycoproteins, a type of protein containing a group of carbohydrates linked by peptide chains. These carbohydrates are either complex sugars or simple sugars. Therefore, when samples of collected gum were analyzed, they were found to contain compounds called arabinose and the pentose sugar ribose. Gum trees increase their production when exposed to harsh conditions such as drought, poor soil, or high ambient temperatures.

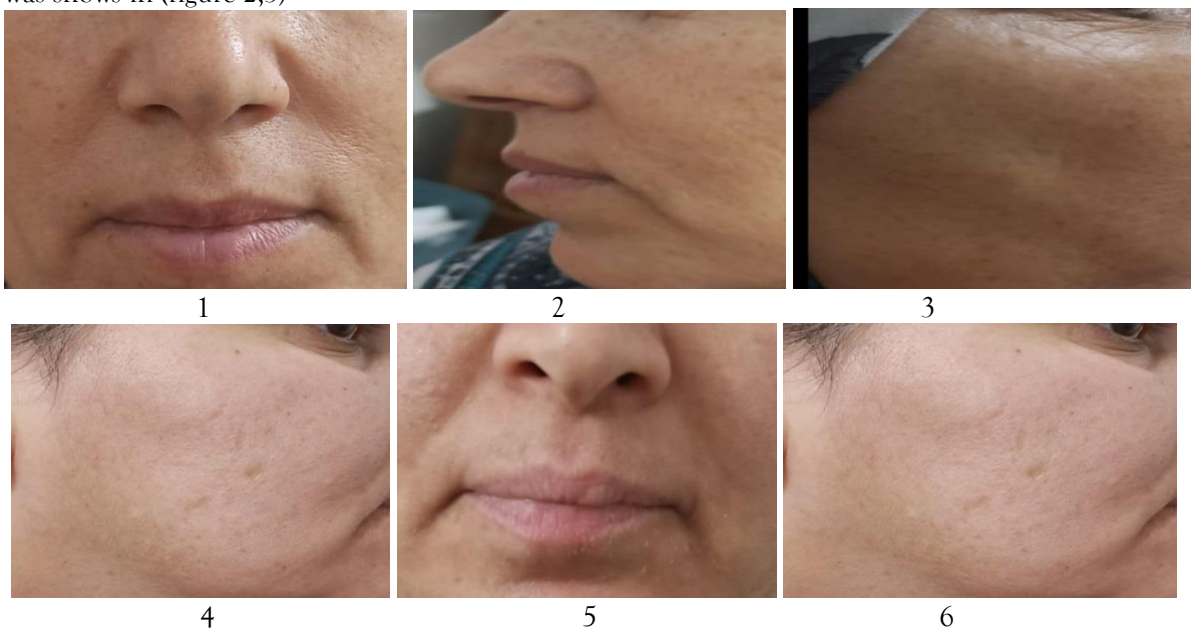
Table 2: Effect of adding different concentrations of gum on the most important chemical parameters of dried gum Arabic powder**.**

Chemical composition	Witness	Gum Arabic concentrations	
		25%	30%
Humidity	8.00±0.44	6.70 ±0.30	2.44±0.29
Sugars	55.67± 0.53	41.10±0.22	39.12 ±0.11
Total acidity	0.30±0.03	0.11±0.01	0.19±0.01

The results indicate that there are no significant differences at the confidence level p ≥ 0.05.

The results shown in (Table 2) indicate the results of the chemical indicators of gum Arabic powder, where the results showed that the humidity of gum arabic at concentrations of 25%, 30% was the lowest (6.70, 2.44) compared to the control sample of 8%. The results were consistent with the results reached by [27], which showed that the low moisture content in gum arabic is one of the advantages of the powder to reduce moisture at the lowest concentration, as gum arabic increases the percentage of solids, which in turn reduces the total water available for evaporation, and thus the moisture content decreased. While Gum arabic with its total sugars content reached 55.67/100gram dry weight, while the content decreased at concentrations of 25% and 30% to 41.10, 39.12 /100gram dry weight. These results were agreement with [28] Increasing the level of malt dextrin addition as a drying agent led to a reduction in the sugar content of gum Arabic. While It is noted from the table that the total acidity values of gum arabic increased at concentrations of 25% and 30%, reaching 0.11% and 0.19%, respectively.

The effect of gum Arabic cream in whitening and tightening the skin of some volunteer woman's. was shows in (figure 2,3)



1 2 3

4 5 6

(Figure 2) : **the cases before use the cream.**

(Figure 3) : The cases after use the cream

This study was agreement with [29,30] showed in paper A European Union Directive specifies that mercury compounds are not allowed as components in cosmetics products. However, phenyl mercuric salts are allowed for use as a preservative in eye makeup and eye makeup removal products at concentrations equal to or less than 0.7 μg/g by weight. Gum arabic contains natural chemicals, such as alkaloids and flavonoids, which accelerate the healing process of wounds and scars when applied topically. with its dietary fiber content, its helps boost the production of natural fibers, like collagen and elastin. Gum arabic is an effective natural ingredient for skin whitening, due to its moisturizing and nourishing properties. Gum arabic blends are used to whiten and even out skin tone and eliminate pigmentation, thanks to its antioxidant properties. the best types of gum Arabic can be found at Elan Store, which offers high-quality natural products to ensure optimal skin care. Gum arabic offers numerous health and beauty benefits for women, due to its very high soluble fiber content. This study was agreement with [31] Honey has been used for centuries to treat coughs and colds, it is available in several forms, including tablets, capsules, powders, and gummies, as well as being found in many skincare products.

This study was agreement with [32,33]. .It is used as an emulsifying, suspending, and stabilizing agent in emulsions, a binder in tablets, and a viscosity-increasing agent. It is most often used in oral and topical dosage forms as a suspending or emulsifying agent, often in combination with tragacanth gum. It is also used in the preparation of lozenges and pastilles and as a binder in tablets, although inaccurate use can lead to tablets with a longer than desired disintegration time. It is also used in the manufacture of cosmetics, confectionery, and other food products. Gum arabic is a staple food and beverage for nomads. A drink of roasted gum mixed with fresh milk is considered one of the best remedies for nomads in countries like Mauritania, where the tree is found. They call the gum "alak," meaning it's a cure for all ailments. Gum powder is used to prepare sweets and nuts in the desert, and it's added to traditional tea, "atay," to give it a more frothy and flavorful taste. In Senegal, gum arabic fruits are used in preparing meals and foods. Considered a legume, they are used as legumes. The gum is extracted from the tree by making a slit in its bark during the hot season, usually between June and May. Due to pressure and heat, the tree secretes the resinous substance as a defense mechanism to protect its bark through the slits. One tree yields about 250 grams of gum. The process only bears fruit on trees over four years old. Consuming the gum while it's still wet on the stem is a delicacy for children in the desert, and it's like ice cream in the city. Gum is an industrial and medicinal substance used for

thousands of purposes in the modern world. Scientific and medical research continues to be conducted on it, and its comprehensive properties remain a mystery to scientists. It is used in the fields of physics, chemistry, advanced industries, and electronics.

Conclusion

Due to its many benefits, gallic acid is widely used as a key component in pharmaceutical, food, and other industrial products.. To elucidate the precise mechanism or mechanisms, constituent or constituents, appropriate dosage responsible for the particular pharmacological or medical effects, more research is needed.

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