ECRONICON OPEN ACCESS

EC NUTRITION
Editorial

Potential Use of the Gums in Nutrition and Health: An Overview

Maritza Martínez*

Centro de Investigaciones en Química de los Productos Naturales "Dra Gladys León de Pinto", Universidad del Zulia, Maracaibo, Venezuela

***Corresponding Author**: Maritza Martínez, Centro de Investigaciones en Química de los Productos Naturales "Dra Gladys León de Pinto", Universidad del Zulia, Maracaibo, Venezuela.

Received: October 10, 2017; **Published:** October 13, 2017

The gums are hydrocolloids able to modify the rheological properties of the aqueous systems in which they participate [1]. They are used in different industries as emulsifiers, gelling agents, adhesives, flocculants, encapsulants, lubricants, among other applications [2].

The gums are grouped, according to their origin, into five categories [3]: gum exudates, seed gums, plant or animal extracts, yeasts produced by microorganisms, and those produced by chemical or enzymatic modification.

The nutritional value of gums is generally associated with their use as "dietary fiber" [4]. This has been defined as a plant cell wall material which is not degraded by human endogenous intestinal secretions, among them cellulose, hemicellulose, pectin and lignin; the last is the only one which is not a carbohydrate. Actually non-structural cell wall contents, such as "gums", are regarded as dietary fibers [5].

The dietary fibers can be classified as insoluble and soluble, which are poorly and highly fermented by the gut microflora, respectively; the gums are grouped in the latter type. Their fermentation yields water, carbon dioxide, methane, hydrogen and short fatty acids (SCFAs), principally acetic, propionic and butyric acids [6].

Very high values of dietary fiber, of more than 80%, have been reported for arabic and guar gums [2]. Gum arabic, like other fiber materials, is universally recognized as a food additive, but its regulatory status as a "dietary fiber" of other soluble and insoluble plant/algal polysaccharides remains the matter of discussion and some uncertainty [7]. In Venezuela, species that produce gum with dietary fiber contents comparable to those mentioned above, have been identified and commercially accepted [2,8].

Consumption of gum, as dietary fiber, is associated with physiological effects such as:

- Decreased total serum cholesterol and LDL-cholesterol [9].
- Modification of the glycemic and insulinemic response [10].
- Decreased ammonia concentration in the intestinal lumen [11].
- Contribution to mineral nutrition [2].
- Protection against colon cancer [6].

These physiological effects are basically related to the physicochemical, functional and structural features exhibited by gums in the intestines:

Fermentation in the colon

SFCAs, a product of the fermentation of gums in the colon [5], decrease the intestinal pH by inhibiting the enzymatic synthesis of secondary bile acids, lithocolic and deoxycholic acids, the main agents causing colon cancer [12].

Dietary fiber has a positive influence on the microbiological flora in the caecum. It is a source of fermentable carbon for the bacteria living in the large gut, thus promoting increased numbers of bacterial cells, especially *Bifidobacterium* and Bacteroides, in the caecum.

Their amount is increased on the expenses of potential pathogenic strains, such as *Escherichia coli* and *Salmonella* sp., thus preventing the growth of pathogens in the gut [13].

Studies have shown that *Prevetolla ruminicola*-like bacterium is the predominant organism that is most likely responsible for fermentation of gum arabic to propionate. Propionate produced by bacterial fermentation from GA is the major SCFA metabolized by the liver, particularly as a gluconeogenic substrate. It is utilized at a faster rate than amino acids, thus reducing amino acids deamination and luminal ammonia generation. The decrease in luminal ammonia concentration may enhance diffusion of urea down its concentration gradient from the blood into the lumen; as such, nitrogen is trapped for elimination in the feces [11].

Adsorption of bile acids

Studies have been reported a reduction of serum cholesterol up to 10.4%, ingesting 30 g/day of GA for 30 days. In the same way, guar gum and ß-glucans from oats have been described to contribute to the improvement of total cholesterol and LDL-cholesterol in individuals with hypercholesterolemia [11], and a decrease in TAG and VDL-cholesterol due to the ingestion of bread prepared with *Hymenaea courbaril* seed gum in patients with dyslipidemias [2].

The mechanism most clearly implicated is related to increased fecal bile acid. Dietary fiber is believed to sequester bile acids, diminishing the active reabsorption in the ileum and leading to their excretion in the feces. Consequently, it may be the diversion of cholesterol to bile acid synthesis in the liver and the plasma cholesterol concentration diminished [11].

Water absorption capacity

Some gums have the property of forming a network that traps water molecules and its rigidity slows the escape of gases, reduces the density of feces and increases their volume. This causes a dilution of the intraluminal contents limiting the exposure of the colon walls to secondary bile acids, other toxins and potential carcinogens [5].

Absorption capacity of minerals

Gum Arabic has the property to bind cations, especially divalent cations as calcium and magnesium; due to this effect the amount of calcium and magnesium in the caecum rises considerably. Gum Arabic (Acacia Gum) enhances the absorption of sodium and potassium from the diet, therefore the absorption of minerals from the diet [14,15].

High viscosity

The intake of gum as "dietary fiber" increases the viscosity of the contents of the small intestine, increasing the area of absorption of glucose and lipids and delaying its absorption. This increases the time and area of contact with the sensory receptors of the intestinal mucosa, extending the period of satiety, an important aspect in the treatment of the diabetes [10].

The previous reflections serves as a support to propose the use of gums, from different sources and taxonomical genera, as "dietary fibers", once the rules of rigor have been satisfied.

Bibliography

1. Ferrer R., *et al*. "Dilucidación estructural de la fracción oligómero-proteína de la goma de *Acacia tortuosa*". *Ciencia* 9.2 (2001): 277-284.
2. El Kader D., *et al*. "Efecto de la ingesta de un pan integral formulado con goma de *Hymenaea courbaril*". *Investigación Clínica* 52.2 (2011): 109-204.
3. Carr JM. "Hydrocolloids and stabilizers". *Food Technology* 97 (1993): 100.

4. Glickman M. "Hydrocolloids and the search for the oily grail". *Food Technology* 45 (1991): 94-101.
5. Sungsoo Choo S and Orcher ML. "Handbook of dietary fiber" (2001): 679.
6. Kritchevsky D. "Dietary fiber and its effect on cancer incidence". In: Arcos J., Argus MF and Woo YE. Chemical induction of cancer modulation and combination effects Braun-Brum field Inc. (1995): 375-376.
7. Nussinovitch A. "Plant gum exudates of world". CRC Press. Boca Ratón, Florida (2010): 285.
8. Martínez M, *et al*. "Physicochemical parameters of the gum of *Terminalia catappa* L. (almendrón)". *Ciencia* 20 (2012): 25-31.
9. Oda T., *et al*. "Effects of dietary oat, barley & guar gums on serum and lipid concentration in diet-induced hypertriglyceridemic rats". *Journal of Nutritional Science and Vitaminology* 40.2 (1994): 213-217.
10. Tordsdotir I., *et al*. "Dietary guar gum effects on postpandrial blood glucose, insulin and hydroxiproline in humans". *Journal of Nutrition* 119.12 (1989): 1925-1931.
11. Badreldin HA., *et al*. "Biological effects of gum arabic: A review of some recent research". *Food and Chemical Toxicology* 47.1 (2009): 1-8.
12. Micozzi M. "Complementary and Integrative Medicine in Cancer Care and Prevention". Springer Publishing Company LLC., USA (2007): 200.
13. Hill Ml. "Bacteria, dietary fibre and chronic intestinal disease". In: Dietary fibers (Edt.: Birch, G.G.; Parker, K.J.), Applied Sciences, London (1983): 255.
14. Tulung B., *et al*. "Specific Effects of Guar Gum or Gum Arabic on Adaptation of Cecal Digestion to High Fiber diets in the Rat". *Journal of Nutrition* 177.9 (1987): 1556-1561.
15. Wapnir RA., *et al*. "Oral rehydration solutions: enhanced sodium absorption with gum Arabic". *The Journal of the American College of Nutrition* 15.4 (1996): 377-382.

Volume 11 Issue 5 October 2017