



Consumer perception of carriers of a satiating compound. Influence of front-of-package images and weight loss-related information



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ABSTRACT

Nowadays it is common to find dietary supplements on the market with the same health promoting compounds as certain functional food products. However, there is a lack of research comparing these two categories of carriers (food and supplements) for the same functional ingredient. This work focuses on konjac glucomannan (KGM) due to its recognized body weight reduction-related effect: when it swells in the stomach in the presence of sufficient water, it produces a sensation of fullness. In this context, the objectives of the present work were to gain knowledge about consumer perception of KGM and its different carriers or forms of presentation (in a food item or in capsules). In addition, the relative importance of the carrier, front-of-package images and weight loss-related information were studied by different sensory techniques, such as word association, projective mapping and conjoint analysis. The results showed that consumers formed negative perceptions when the information was not sufficiently complete and that they considered a food product containing KGM better than KGM capsules. Regarding the front of the package, health benefit-related images were more attractive than verbal information.

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1. Introduction

Konjac glucomannan (KGM) is a soluble dietary fiber. It is a polysaccharide of the mannan family, obtained from the root tuber of the *Amorphophallus konjac* plant (An, Thien, Dong, Dung, & Du, 2010; Chua, Baldwin, Hocking, & Chan, 2010), which has been used in manufacturing food and consumed for over 1000 years in the East (Walsh, Yaghoubian, & Behforooz, 1984). Currently, in the markets of the Western world, various types of food products containing KGM are commercially available and glucomannan supplements are marketed in the form of capsules, pills or powders. In food, KGM is used as an additive with an emulsifying and thickening effect (Iglesias-Otero, Borderías, & Tovar, 2010; Liu, Wang, & Ding, 2013). Besides this use as a texture modifier, KGM is also used for its functional effect on health. In 2010, the European Food Safety Authority (EFSA, 2010) confirmed its positive effect on body weight reduction in the context of an energy-restricted diet. This functional effect is based on its capacity to absorb water in the gastric tract, swelling to produce satiety through stomach distension (Keithley & Swanson, 2005). Although one of the nutritionists' recommendations for overweight people is to consume fiber-rich food, not all fibers contribute to promoting and prolonging satiety, as this depends on their chemical structure and physicochemical properties (Jebb, 2007; Wanders et al.,

2011). For this reason, due to its recognized effect, the present study focuses on KGM as a satiating agent.

When designing a new product with a functional component, the selection of the carrier or form of presentation is an important factor to take into account. It has been observed in a previous work (Krutulyte et al., 2011) that a good fit between carrier and ingredient has a positive influence on the market success of the product. Another factor to take into consideration is the package. It is well known that packaging plays an important role in communicating and attracting people and that it could influence the consumers' in-store decision-making process (Underwood & Klein, 2002). The front-of-package labeling normally includes images and verbal information, which are the first contact with the consumer (Carrillo, Fiszman, Lähteenmäki, & Varela, 2014; Carrillo, Varela, & Fiszman, 2012). For this reason, it is worth studying what consumers understand or perceive from these images and information in the case of products containing or made of KGM.

For this purpose, techniques to gather consumer perception information are the best way to understand their attitudes and preferences (Ares, Deliza, Barreiro, Giménez, & Gambaro, 2010). Word association has been shown to be a good tool for obtaining spontaneous information about consumer perceptions of different kinds of foods (Mitterer-Daltoé, Carrillo, Queiroz, Fiszman, & Varela, 2012; Roininen, Arvola, & Lähteenmäki, 2006). Another useful technique is projective mapping, in which the consumers think of the product as a whole. The results show that this technique provides intuitive and less rational

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responses from consumers. It is also useful for revealing relationships between multiple products in a visual manner (Carrillo et al., 2012; Nestrud & Lawless, 2010). The above two techniques involve the use of stimuli which can be verbal or visual. The participants project their subjective opinions or beliefs about the stimuli in the form of general, overall perceptions (Hofstede, Hoof, Walenberg, & Jong, 2007).

For analyzing specific attributes, other kinds of sensory tool are required. In the present study, the use of conjoint analysis (CA) made it possible to examine preferences for some specific factor (at several levels) quantitatively, and the contribution made by each. CA involves presenting consumers with some choices and identifying the best drivers of those choices (Kimura et al., 2011; Mahanna, Moskowitz, & Lee, 2009).

The objectives of the present study were to gain knowledge about: 1) consumer perception of KGM, through different verbal stimuli; 2) the holistic consumer perception, through different KGM products (both food items and dietary supplements); and 3) attitudes toward specific carriers, front-of-package images and front-of-package weight loss-related information that could influence choice.

2. Methods

2.1. Participants

Two studies were designed, each with a different group of participants. Table 1 shows the demographic information of the groups. In the first study, 42 selected participants filled out a questionnaire based on word association (WA), followed by a projective mapping task. In the second study, taking into account the results from the first study, another questionnaire was prepared, based on a conjoint analysis (CA) design, and was answered by 128 participants who had not taken part in the first study. In both studies, the participants were volunteers recruited from Valencia science park employees and a consumer association.

2.2. Procedure

2.2.1. General consumer perception of products containing KGM

A two-part questionnaire was used to explore participants' spontaneous perceptions of products containing KGM. Preliminarily, a question regarding the participants' diet style was formulated to select them for completing the task; this question contained six possible options and participants had to choose one of them: 1) I follow a strict diet to lose weight; 2) I follow a special diet to lose weight; 3) I try not to eat foods that contain a lot of calories because I want to lose weight; 4) I try not to eat foods that contain a lot of calories even though I do not want to lose weight; 5) I do not follow any kind of diet to lose weight; 6) Other (please explain). Those who selected options 1 or 2 were excluded from the study.

Table 1
Sociodemographic profile of the respondents in the two studies, expressed in percentages.

Demographic data	First study (n = 42)	Second study (n = 128)
Gender		
Female	60	56
Male	40	44
Age group		
18–35 years old	43	55
36–50 years old	31	20
51–69 years old	26	25
Diet style		
"I try not to eat foods that contain a lot of calories because I want to lose weight."	33	NA
"I try not to eat foods that contain a lot of calories even though I do not want to lose weight."	26	NA
"I do not follow any kind of diet to lose weight."	41	NA

NA: not applicable.

The first part of the questionnaire was a word association (WA) task based on Slovic et al. (1991) and Carrillo et al. (2014). The consumers had to write down the first four ideas, words, feelings, images or associations that came to their minds when they read the following statement: "Food or dietary supplement that contains konjac glucomannan" ("Before" scenario).

The second part consisted of another WA task after reading the following statement with more complete information: "Food or dietary supplement that contains KGM, a dietary fiber. A relationship has been established between the consumption of glucomannan and the reduction of body weight in the context of an energy-restricted diet". This last statement is a literal quote from the EFSA Opinion (EFSA, 2010) ("After" scenario).

This was a semi-quantitative study that aimed to achieve a better understanding of consumer perception and served as a basis for designing the second study.

After completing the two parts of the questionnaire, the same participants evaluated twelve commercial products containing or made of KGM, based only on their whole, unopened packages, using a projective mapping technique. The samples were two different cereal bars containing KGM; "fettuccini", "rice", and "lasagna" made mainly of KGM; four different brands of KGM in powder form; and three different brands of KGM capsules. Table 2 describes the front-of-package information (Images and Weight control-related information) from the twelve commercial samples. The projective mapping technique with a descriptive step was employed to obtain spontaneous perceptions of the characteristics of these samples and their placement according to their similarities and dissimilarities. The participants were instructed in the use of this technique before starting this second stage, as described in previous studies (Carrillo et al., 2012; Moussaoui & Varela, 2010). After the explanation, each participant was given a 42 × 29.5 cm sheet of white paper and had to place the samples in such a way that samples with similar characteristics were close to each other, with the possibility of grouping very similar samples, while samples with different characteristics were placed further away from each other. In the descriptive step (also known as ultra-flash profiling), after positioning all the samples the participants were asked to write all the terms that they perceived in connection with each sample or group of samples next to them on the paper.

2.2.2. Perceptions about carriers, front-of-package images and weight loss-related information

The second study was designed to compare perceptions of the adequacy of KGM carriers (cereal bars or capsules), and about front-of-package images and weight loss-related information through the conjoint analysis (CA) technique. This technique is useful for identifying and quantifying respondents' preferences for a set of established factors (Green & Srinivasan, 1978; Van Kleef, Van Trijp, & Luning, 2005). It makes it possible to determine what combination of a limited number of factors is the most influential and entails evaluating these individual factors and their levels (utilities or part-worths) through the participants' preferences (Walle, 1997).

A 2 × 3 × 2 experimental design was employed in a rating-based CA study. Three factors were established in view of some associations detected in the projective mapping task (second stage of the first study): carrier, front-of-package images and weight-loss-related information. The two levels for carrier were cereal bar and KGM capsules; the three levels for front-of-package image were konjac plant leaves, tape measure, and abstract curved lines (normally associated with the "diet" concept); and the two levels for front-of-package health-related information were "Helps to lose weight" and "Appetite control" (Fig. 1).

A complete CA model was employed (12 = 2 × 3 × 2). Twelve cards were designed, taking into account all the possible combinations of the following factors and levels (see examples in Fig. 2). The participants rated three parameters on each of the twelve cards using 9-point scales:

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