Revista de Ciências Farmacêuticas Básica e Aplicada
Journal of Basic and Applied Pharmaceutical Sciences

Rev Ciênc Farm Básica Apl., 2015;36(2):195-199
ISSN 1808-4532

Commercial babassu mesocarp: microbiological evaluation and analysis of label information

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ABSTRACT

The babassu mesocarp is easily found in supermarkets and other commercial establishments in Brazil. Despite its widespread use in both pharmaceutical and food industries, the literature has neither scientific studies about microbial contamination for these products nor about legal information expressed on label. The aim of this study was to evaluate the level of microbiological contamination in babassu mesocarp sold in commercial establishments in Teresina-PI/Brazil besides the conformity of label information according to the rules of Brazilian Sanitary Surveillance Agency (ANVISA). Ten samples of babassu mesocarp powder sold in the region were selected for study. Determination of heterotrophic microorganisms was carried out using the seeding technique of Plate Count Agar (CFU g-1). It was used Sabouraud Dextrose Agar medium for cultivation of fungi. For the analysis of label information, the resolutions (RDC), 259 of September 20, 2002, and 360 of December 23, 2003, beyond the law 10,674 of May 16, 2003 were used. The results of levels of contamination for heterotrophic bacteria and fungi showed high contamination for all samples. Most of the label samples were according to the rules. Therefore, the results suggest a more comprehensive monitoring of these microorganisms besides the development of more effective methods for decontamination of these products sold in Brazil.

Keywords: Babassu. Label. Contamination. Food. Pharmacy.

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INTRODUCTION

The palm *Orbignya phalerata* Mart, popularly known as babassu, is a plant of the Palmaceas family and of the Orbignya gender. It is native from Brazil and grows in soils with wide variation in annual rainfall, as the semi-arid tropical and tropical humid with water deficit (Teixeira, 2008). Therefore, its greatest population density remains in northern Brazil, mainly in the states of Maranhão, Piauí, Tocantins and Mato Grosso (Sousa, 2008).

The mesocarp fruits are known as coconut, they have ellipsoidal shapes, looking like cylinders, and consist of four main parts, the epicarp (hard and fibrous outer layer), the mesocarp (intermediate fibrous layer, rich in starch and located between the epicarp and the endocarp) endocarp (inner layer, where stays the almonds) and almonds (nutrient mass, white inner, covered with a brown color film) (Barros, 2011).

A powder is obtained from babassu mesocarp and it is widely marketed in Northeastern Brazil, which is sieved, moistened and finally roasted on high heat. It can also be used raw, without going through the roasting step (Silva et al., 2012). This powder is commonly used by the population as flour for food enrichment due to its rich composition in starch and minerals and also for being extracted from a vegetable that is rich in fiber, resulting in therapeutic effect against constipation, colitis, and even obesity (Maciel, 2003). Its use is also widespread by its therapeutic properties which include the treatment of chronic wounds, gastric and duodenal ulcers, inflammation and obesity (Carvalho Filho, 2003). Therefore it is an excipient of great economic importance for both the food and pharmaceutical industries.

The mesocarp powder is easily found in supermarkets, drugstores and another commercial establishment. Despite its widespread use by the population, in the literature there is no reference to scientific studies that evaluate the microbiological contamination of this product, what would provide information regarding to process and storage conditions, distribution to consumers and its risk to health

(Chisté et al., 2007). Marketed as a food product exempt of registration, this product must follow the laws regarding to food security and nutritional information, since all packed food must be in accordance with the legal requirements of Brazilian Agency for Sanitary Surveillance (ANVISA), as a condition to have their marketing authorized (Silva & Dutra, 2011).

Thus this study aimed to assess the level of microbiological contamination of babassu mesocarp sold in commercial establishments in Teresina-PI, Brazil, and to verify the conformity of label information according to rules of Brazilian Agency for Sanitary Surveillance.

MATERIALS AND METHODS

Mesocarp samples

This study was conducted from May to December 2012. Initially, a screening was performed on the diversity of brands of babassu mesocarp sold in supermarkets, drugstores and grocery stores in the city of Teresina (Piauí, Brazil). Four brands with more representativity in local market and sold in all establishments researched, were selected for analysis. Thus, were collected in two supermarkets, one drugstore and one grocery store. For each brand two or three lots were analyzed, totaling ten. All the samples did not pass the expiration date, and were able to be tested for microbiological quality. Microbiological analyzes were performed at the Laboratory of Food Microbiology of Federal University of Piauí. In the laboratory, each sample was enumerated (1 to 10) and the microbiological and label information analyses were done as described in the next topics.

Microbiological Evaluation

Aseptically, 25 g of each sample was weighed and then transferred to a beaker containing 225 ml of 0.1% saline solution previously prepared. Then, subsequent dilutions were made for the analysis of each sample. The samples were diluted to 10^{-1} to 10^{-5} (for count of bacteria, yeasts and molds).

Determination of heterotrophic microorganisms for bacterial counts (CFU g-1) was carried out using the seeding technique known as Plate Count Agar (PCA). In this, in each sterile Petri dish were added 12 ml of PCA medium. From each of the five mesocarp dilutions (10^{-1} to 10^{-5}) were removed 0.1 ml for inoculation in plates with a Drigalski spatula. The plates were incubated in an inverted position oven at 37ºC for 48 h (Silva et al., 2010). The method of Silva et al. (2010) was carried out for the fungi counts, with Sabouraud Dextrose Agar medium (AS). 12 ml of AS medium were used to each plate and 0.1 ml of each dilution were added, as described in the previous methodology. The plates were incubated oven at 25 ºC for 07 days. After the incubation period, the count of colonies was done with the results expressed as colony-forming units per gram (CFU/g) for both culture media (Silva et al., 2010).

Analysis of label information

The analysis of label information were done according to the resolutions of ANVISA (RDC), 259 of September 20, 2002, and 360 of December 23, 2003, beyond the law 10,674 of May 16, 2003. It was observed the presence of the required information (trade name, list of ingredients, net content, identifying the source and batch, expiry and conservation mode), useful information (phone, email or website and mailbox) and the presence of the term "contains gluten" or "does not contain gluten" as needed.

RESULTS

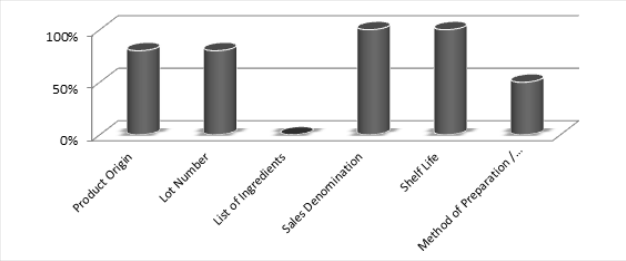
The results for microbiological analyses are shown in Table 1. The babassu mesocarp samples showed high contamination with values ranging from 4.5 x 10^4 to 4.3 x 10^7 CFU/g for heterotrophic bacteria and 10 to 4.8 x 10^7 CFU/g for fungi.

TABLE 1 – Results of microbiological evaluation for heterotrophic bacteria and fungi in samples from powder of babassu mesocarp.

Sample	CFU g^{-1} Heterotrophic bacteria	CFU g^{-1} Fungi
A^1	8.8 x10^4	9.6x10^4
A^2	4.5x10^4	1.45x10^5
A^3	6.08x 10^5	7.04x10^5
A^4	4.3 x 10^7	2.9x10^6
A^5	3.6 x10^7	7x10^3
A^6	4.5x10^5	4.8 x10^7
A^7	1.6 x 10^6	1.62x 10^6
A^8	2.5x 10^6	1.84x10^7
A^9	2.04x10^7	1.9x10^4
A^{10}	1.33x10^7	10

Regarding the analyses of label information, some mandatory items were found according to a specific resolution (RDC number 259, of September, 2002, ANVISA). These items and the quantitative results found for each sample analyzed are shown in Figure 1.

FIGURE 1 - Percentages of labels that agree with Resolution RDC number 259/2002 about the mandatory information.



DISCUSSION

The babassu mesocarp is a product marketed as a food without functional properties. Therefore, it is classified in the food category for registration at ANVISA. Thus, the requirements for the sale are greatly reduced, making the practice easier and with poor supervision.

Since it is a food rich in starch is classified as 'flours, starches and cornmeal' according to RDC number 12 of 02 January 2001, ANVISA. This resolution establishes the microbiological standards for food, separating them into categories with different requirements. For the category that includes mesocarp, there are neither limits for the Standard Plate Count (SPC), nor for heterotrophic bacteria nor for fungi and molds.

The results for microbiological analyses of the collected samples showed high contamination, which confirms the lack of concern by producers about microbial load onto the final product. Even with the lack of concern about the final product, this does not invalidate their marketing, what justify this behavior.

However, the presence of bacteria and fungi, especially in food, can accelerate its deterioration, thereby reducing its nutritional value, altering its organoleptic properties and becoming a public health problem in most of the cases. In this way, although the babassu mesocarp flour does not have contamination parameters for bacteria and fungi, it should be monitored with more control and oversight to avoid health problems. According to Vecchia and Castillos-Strong (2007) this monitoring aims to eliminate any possibility of contamination, mainly fungal toxin producers, since they may affect the quality of food causing serious problems to public health.

The babassu mesocarp is a product used in large proportion because its therapeutic properties, what leads to concern about the influence of this large microbial load, mainly in debilitated consumers by the presence of some pathology or another reason.

If the babassu mesocarp were considered as a phytotherapy product the rules would be different. According to Resolution RDC number 48 of March 16, 2004, of ANVISA, which deals with phytotherapy contamination, besides the Brazilian (2010) and American (2005) pharmacopoeias, which established specifications for herbal products for oral use, that must have a limit of 103 CFU/g or ml for aerobic bacteria and 102 CFU/g or ml for fungi. Therefore if the samples of babassu mesocarp would follow the standards for phytotherapy, all samples analyzed would be reproved for consumption.

Besides the concern about the hygienic quality of the product, the label information available to the consumer should guide him to the quality and quantity of nutritional constituents ingested and should contribute to the promotion of appropriate food choices, working as a tool for nutritional education. The aim of food labeling is the better understanding by consumers about the importance of that product. This importance reinforces the need of control by the competent organizations and the need of commitment by food industry to provide quality to the declared information (Grandi & Rossi, 2010).

The definition of labeling is given by the Resolution RDC number 259, of September 2002, ANVISA, which establishes technical standards for labeling of packed food. According to it the labeling is defined as any inscription, legend, image, graphic or descriptive matter, written, printed, stamped, embossed, lithographed or glued on the food package.

In this label some mandatory items must be present, according to the same resolution. These mandatory items include 'product origin', 'lot number', 'list of ingredients', 'sale denomination', 'shelf life' and 'method of preparation/ instructions'.

Relative to the items 'product origin' and 'lot number', 80% of all samples were in agreement with the specifications (Figure 1). According to the Guidance Manual for Consumers the 'lot number' is part of the production control and if there is any problem with the product on the market, it could be collected or analyzed by the lot to which it belongs (traceability) (Brasília, 2005). Thus the absence of this identification remits to the absence of quality assurance.

For the 'list of ingredients', the babassu mesocarp is a single-ingredient product so it is not necessary the accordance to this rule. Regarding to the item 'sale denomination', 100% of the samples were in accordance to the law, showing the term 'babassu mesocarp'. Within this designation the inclusion of additional word or phrases to avoid the mistake by consumers, with respect to the nature and physical condition of the food, is optional. 50% of analyzed samples contained additional phrases such as '100% natural' or 'the babassu coconut'.

All the samples showed the term 'shelf life' with the correct date, meantime, only 50% of the samples were adequate to the item 'method of preparation/instructions', the others did not show this information.

Another requirement is on RDC number 360, December, 2003, ANVISA. It talks about the mandatory nutrition labeling that applies to foods produced or marketed, whatever its origin, packed in the absence of the client and ready to be offered to the consumer, which includes the babassu mesocarp. 80% of the samples were adequate and 20% did not bring any kind of nutritional information.

As previously showed, food have fewer rules than medications for marketing even for microbiological contamination or label information. However the babassu mesocarp is widely used due to its therapeutic properties plus it is becoming a potential excipient for pharmaceutical industry. So, selling it only considering its nutritional properties could result in some mistakes and health problems.

Another mandatory requirement came up with the Federal Law number 10,674 of 2003, in which the term "gluten-free" or "contains gluten" when needed, is required.

Since depending on the treatment of the mesocarp, it may or may not contain this ingredient, so one of this information will be necessary. These phrases should be written with emphasis and easily read as a measure for celiac disease prevention. All analyzed labels in the study presented this information highlighted suggesting the prevalence of products with this ingredient, which cannot be guaranteed due to reduced sample size.

Even the few requirements relating to the marketing of babassu mesocarp powder, there are still non-conformities in some products available on the market. The absence of similar studies with larger samples precludes statistical comparison however the results already indicate the need for greater care related to the sale of this product.

CONCLUSION

The presence of microorganisms related to hygienic conditions demonstrates the need for actions that ensure the quality and safety of this type of product. It is very important to have a more comprehensive monitoring related to these microorganisms since the Brazilian legislation does not define any parameter for check the maximum limit in food. The labeling of babassu mesocarp flour marketed in Teresina-PI was mostly presented according to the requirements however for samples that were not, it is suggested the need for inspections by the competent institutions.

RESUMO

Mesocarpo de babaçu comercial: avaliação microbiológica e análise de rótulos

O mesocarpo de babaçu é encontrado facilmente em supermercados e em outros estabelecimentos comercias e apesar de sua ampla utilização, tanto na indústria farmacêutica e de alimentos, na literatura não há trabalhos científicos que avaliem sua contaminação microbiológica ou informações legais necessárias para rótulos. O objetivo do estudo foi avaliar o nível de contaminação microbiológica do mesocarpo de babaçu, vendidos no comércio de Teresina-PI, bem como verificar a conformidade das informações dos rótulos com as normas da Agencia de Vigilância Sanitária (ANVISA). Foram selecionadas dez amostras do pó comercializadas no mercado regional. Para a determinação de microrganismos heterotróficos foi realizada a técnica de semeadura utilizando o meio Plate Count Agar, para fungos, utilizou-se o meio Sabouraud Dextrose Ágar e para a avaliação dos rótulos tomaram-se como base as resoluções, RDC 259, de 20/09/2002, RDC 360, de 23/12/2003, e a Lei nº10.674, de 16/05/2003. Os resultados dos índices de contaminação para bactérias heterotróficas e fungos mostraram-se bastante elevados. Quanto à rotulagem, a maioria das amostras estava de acordo com as regras. Com os resultados obtidos sugere-se um monitoramento mais abrangente desses microrganismos além do desenvolvimento de métodos de descontaminação mais efetivos para esses produtos comercializados no Brasil.

Palavras-chave: Babaçu. Rótulos. Contaminação. Alimentos. Farmácia.

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Received on January 8th 2014

Accepted on May 6th 2014