BRAZIL NUT POWDERED MILK: AMINOACID PROFILE

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RESUMO – Apreciada pelo seu sabor exótico e considerada um alimento nutricionalmente rico, a castanha-do-Brasil é constituída principalmente por ácidos graxos insaturados e proteínas de alto valor biológico. O objetivo deste estudo foi avaliar o perfil de aminoácidos no leite em pó de castanha-do-Brasil utilizando um sistema de HPLC. Os valores dos aminoácidos ácido glutâmico (34,92), serina (7,02), glicina (7,89), arginina (27,26), valina (8,68), metionina (12,36) e leucina (12,82) foram mais elevados do que o leite de soja. Em conclusão, o perfil de aminoácidos revelou o leite em pó da castanha-do-Brasil como uma fonte de proteína não láctea. Essa abordagem fornece um produto alternativo ao leite de soja para os consumidores alérgicos ao leite de vaca, mas mais estudos são necessários para avaliar as suas propriedades funcionais em saúde.

ABSTRACT – Appreciated for its exotic flavor and considered a nutrient-rich food, Brazil nut is composed mostly of unsaturated fatty acids and high biological value proteins. The aim of this study was to evaluate the profile of amino acids in Brazil nut powdered milk using an HPLC system. The Brazil nut powdered milk was featured and the aminoacid profile was evaluated. The amino acids values of glutamic acid (34.92), serine (7.02), glycine (7.89), arginine (27.26), valine (8.68), methionine (12.36) and leucine (12.82) were higher than soymilk. In conclusion, the aminoacid profile revealed the Brazil nut powdered milk as a source of non-dairy protein, especially to vegan and to healthier consumer’s diet. This approach provides an alternative product instead soymilk to consumers allergic to bovine milk, but further studies are necessary to evaluate their functional properties in health.

PALAVRAS-CHAVE: Bertholletia excelsa, triptofano, secador por pulverização, proteína

KEYWORDS: Bertholletia excelsa, tryptophan, spray drier, protein

1. INTRODUCTION

Brazil nut (Bertholletia excelsa H.B.K.) is one of the most popular Amazonian fruits. In addition to playing an important role in the human diet, it is also used to produce a variety of food products. It has reached new consumer groups, and it is known as one of the fruits that make up the Amazon diet; it is part of the native cuisine, which has positive effects on health and longevity. Appreciated for its exotic flavor and considered a nutrient-rich food, Brazil nut is composed mostly of unsaturated fatty acids and high biological value proteins (Costa et al., 2011).
The Brazil nut (Bertholletia excelsa H.B.K.) clinical benefits are well-known, specially due to the Selenium antioxidant action (Freitas-Silva and Venâncio, 2011). Consequently, it was considered as raw material for biologically active food components known as functional foods (Kluczkovski et al., 2015). Such foods may be used to prevent and/or treat diseases (Yang, 2009; Maranhão et al., 2011; Cominetti et al. 2012; Cardoso et al., 2015; Huguenigen et al., 2015).

Brazil nut has significant nutritional properties that can help in the prevention of certain chronic diseases such as heart diseases. The nutrient composition of Brazil nut can produce beneficial effects due to its antioxidant and antiproliferative activities that are associated with a lower risk of developing atherosclerosis and cancer. The consumption of three to five nuts a day for 16 weeks improved the lipid profile and microvascular function in obese adolescents, possibly due to the right content unsaturated fatty acids and bioactive substances (Kluczkovski and Martins, 2016).

Fresh almond extract produces thick, white, used as substituent cow’s milk. the nut milk is rich in protein and is considered a valuable by-product in regional cuisine, with good market potential in many states. Several methods can be applied in order to obtain the functionality in food, and the atomization by spray drying seems to be a consolidated tool for powdered foods (Costa et al., 2015). Some of the products can be obtained from plants and vegetables such as: pitaya fruit, orange juice and barberry (Tze et al., 2012; Sabhadinde et al., 2014; Sharifi et al., 2015). Other atomized products are proteic sources such as soymilk and milks from other vegetables (Jinapong et al., 2008; Osthoff et al., 2010). In this context, Brazil nut powdered milk was obtained by atomization and evaluated concerning the aminoacid profile, as a possible alternative of vegetable milk.

2. MATERIAL AND METHODS

2.1 The Brazil nut powdered milk featuring

After prior selection, the almonds were immersed in solution of sodium hydroxide (2%) and dehulled manually under running water. These almonds were pressed into hydraulic press to remove the oil. Brazil nut meal from the press was stored under freezing (-18°C). To obtain the Brazil nut meal extract was homogenized in a blender with water (75°C). The obtained product was centrifuged, obtaining the extract, and the wet flour (not used in the experiment). After cold centrifugation was added carboxymethylcellulose and gum arabic and homogenized again. The extracts were placed in nylon-polyethylene bags with a capacity of 100 ml and thermally sealed, pasteurized (72°C for 20 minutes), cooled by immersion in ice to reach room temperature (20°C), were stored under refrigeration.

The Brazil nut powdered milk was obtained according to Lima et al. (2016), by atomization in a Mini Spray Dryer (Model MSD 1.0) by Labmaq Brasil® with 1.0 mm vacuum diameter. The drying operating conditions were (a) Temperature: 140°C inlet and 90±3°C outlet; and (b) 6.5 mL/min feeding flow.

2.2 Aminoacid profile

The total aminoacids were evaluated according to White et al. (1986) and Hagen et al. (1989), using an HPLC system. For the Tryptophan analysis the Spies (1967) method was used.
2.3 Statistical Analysis

Tukey’s tests were used to study differences between the means.

3. RESULTS AND DISCUSSION

According to table 1, the amino acid profile of Brazil nut powdered milk, when compared with soymilk sample reported by Nti et al (2015), shows high values for amino acids in glutamic acid (34.92), serine (7.02), glycine (7.89), arginine (27.26), valine (8.68), methionine (12.36) and leucine (12.82).

Table 1. Amino acid composition of Brazil nut powdered milk and Soymilk

<table>
<thead>
<tr>
<th>Amino acids</th>
<th>Results (g/16g N)¹</th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Brazil nut powdered milk</td>
<td>Soymilk ²</td>
<td></td>
</tr>
<tr>
<td>Aspartic acid</td>
<td>10.94</td>
<td>11.54</td>
<td></td>
</tr>
<tr>
<td>Glutamic acid</td>
<td>34.92</td>
<td>19.40</td>
<td></td>
</tr>
<tr>
<td>Serine</td>
<td>7.02</td>
<td>5.24</td>
<td></td>
</tr>
<tr>
<td>Glycine</td>
<td>7.89</td>
<td>4.36</td>
<td></td>
</tr>
<tr>
<td>Histidine</td>
<td>1.95</td>
<td>2.82</td>
<td></td>
</tr>
<tr>
<td>Arginine</td>
<td>27.26</td>
<td>7.63</td>
<td></td>
</tr>
<tr>
<td>Threonine</td>
<td>4.96</td>
<td>4.11</td>
<td></td>
</tr>
<tr>
<td>Alanine</td>
<td>5.89</td>
<td>4.14</td>
<td></td>
</tr>
<tr>
<td>Proline</td>
<td>7.47</td>
<td>5.51</td>
<td></td>
</tr>
<tr>
<td>Tyrosine</td>
<td>4.94</td>
<td>3.53</td>
<td></td>
</tr>
<tr>
<td>Valine</td>
<td>8.68</td>
<td>3.92</td>
<td></td>
</tr>
<tr>
<td>Methionine</td>
<td>12.36</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>Cystine</td>
<td>1.46</td>
<td>1.68</td>
<td></td>
</tr>
<tr>
<td>Isoleucine</td>
<td>5.63</td>
<td>3.97</td>
<td></td>
</tr>
<tr>
<td>Leucine</td>
<td>12.82</td>
<td>6.75</td>
<td></td>
</tr>
<tr>
<td>Phenylalanine</td>
<td>7.06</td>
<td>4.57</td>
<td></td>
</tr>
<tr>
<td>Lysine</td>
<td>4.23</td>
<td>6.66</td>
<td></td>
</tr>
<tr>
<td>Tryptophan</td>
<td>1.1</td>
<td>1.30</td>
<td></td>
</tr>
</tbody>
</table>

¹Average; ²Values reported by Nti et al. (2015) for whole soymilk samples.
Regarding the essential amino acids, Brazil nut powdered milk it consists of all the amino acids with high amount of valine, methionine and leucine. As for the no essential amino acids, those that the organism can synthesize in sufficient quantities, it was possible to identify high levels of glutamic acid and arginine. The levels of aspartic acid, histidine, cystine, Threonine, Alanine, Proline, Tyrosine, Isoleucine phenylalanine, Lysine and tryptophan showed no significant differences when compared with soymilk sample. A study by Hackler and Stillings (1967) checked the content of methionine in heat-processed soymilk of 1.39 and found similar value to that found by Nti et al (2015). It confirmed that the 2S fraction (classified as albumin) from the Brazil nut is the most significant fraction comprising 30 % of the total protein and exceptionally rich in sulfur amino acids such as methionine and cysteine.

According to the amino acid profile the Brazil nut powdered milk can be considered complete concerning the nutritional aspects for a vegetable milk.

4. CONCLUSIONS

The aminoacid profile revealed the Brazil nut powdered milk as a source of non-dairy protein, especially to vegan and to healthier consumer’s diet. This approach provides an alternative product instead soymilk to consumers allergic to bovine milk, but further studies are necessary to evaluate their functional properties in health.

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6. REFERENCES


