

PYRIDOXOL, PYRIDOXAL AND PYRIDOXAMINE (VITAMIN B₆ VITAMERS) CONTENT IN BRAZILIAN DEHYDRATED BEE POLLEN

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ABSTRACT

Bee pollen is the main protein source for bees and has gained space in the human diet because of the health benefits attributed to its consumption, especially by preventing nutritional deficiencies. Literature describes that this food has different nutrients and among them the vitamin B₆ (pyridoxine). Thus it is known that the physicochemical constitution of this product has a direct correlation with bee plants, making necessary the regionalization of studies in order to characterize it. Vitamin B₆ deficiency causes physical ailments, personality changes and compromise of the immunity. In Brazil there are studies that report the presence of three pyridoxine vitamers (pyridoxol, pyridoxal and pyridoxamine) in bee pollen collected in Pariqueira-Açu city, State of São Paulo, southeastern Brazil, however at concentrations that do not reach the Dietary Reference Intakes (DRI) per serving. In southern Brazil, specifically in Santa Catarina there is a high pollen load production which supplies the national market and exports to Colombia and Uruguay. Due to the economic importance of this regional product, this study aimed to evaluate the contents of the three vitamin B₆ vitamers in 22 lots of dehydrated bee pollen from *Apis mellifera* and harvested on different apiaries installed in the States of Paraná, Santa Catarina and Rio Grande do Sul, Brazil, during the period of August 2011 to August 2012. The samples were stored at -18 ° C until the time of preparation of samples for analysis by High Performance Liquid Chromatography (HPLC). Pyridoxal content ranged from 0.42 to 6.70 mg / 100 g and pyridoxamine from 0.26 to 0.95 mg / 100g. Pyridoxol was not found in all analyzed dehydrated bee pollen samples. Regarding the DRI two batches were considered sources and 20 lots were considered rich in vitamin B₆.

INTRODUCTION

Bee pollen consists of a "mix" of floral pollen, nectar and salivary secretions agglutinated in acorns that are collected in the entry of worker bees into the hive (BRASIL, 2001).

Regarding the physicochemical characterization of this food is known to contain proteins, carbohydrates, lipids, minerals, antioxidant vitamins, B complex and vitamin D (ARRUDA *et al.*, 2013a, b; CAMPOS, CUNHA e MARKHAM, 1997; MELO e ALMEIDA-MURADIAN, 2010; MUNIATEGUI, 1990; OLIVEIRA *et al.*, 2009) as well as phenolic compounds, mainly flavonoids (ALMARAZ-ABARCA *et al.*, 2003, 2007; CARPES *et al.*, 2007, 2008, 2009a, 2009b; LOPES *et al.*, 2011; MENEZES *et al.*, 2010) and the knowledge of the nutritional composition of food consumed in Brazil is of critical importance to evaluate nutrient supply and its consumption by populations (NÚCLEO DE ESTUDOS E PESQUISA EM ALIMENTAÇÃO, 2004).

Arruda *et al.* (2013a, b) have determined the levels of pyridoxol, pyridoxal and pyridoxamine in bee pollen at Pariquera-Açu city, State of São Paulo, southeastern Brazil however at concentrations that did not reach the Dietary Reference Intakes (DRI) per serving according to Brazilian Legislation. In southern Brazil, specifically in Santa Catarina there is a high pollen load production which supplies the national market and exports to Colombia and Uruguay. Due to the economic importance of this regional product, this study aimed to evaluate the contents of the three vitamin B₆ vitamers in lots of dehydrated bee pollen from *Apis mellifera* and harvested on different apiaries installed in the States of Paraná, Santa Catarina and Rio Grande do Sul, Brazil.

MATERIAL AND METHODS

Twenty-two batches of dehydrated bee pollen were collected from hives of *Apis mellifera* during the period from August 2011 to August 2012. Samples were obtained in different places of Paraná, Santa Catarina and Rio Grande do Sul states, Brazil and were analyzed in Food Analysis Laboratory/FCF-USP/Brazil.

All batches were ground in analytical mill (IKA ® Wercke - M20) during standardized time in three series of 30 seconds to carry out the analysis for the determination of the three vitamin B₆ vitamers.

For the determination, 5 g of dehydrated bee pollen were submitted to acid and enzymatic hydrolysis with HCL 0,1 mol/L and fungal diastase enzyme (Merck), respectively. The extract obtained was filtered through a membrane of 45 µm and submitted to chromatographic analysis technique according to Arruda *et al.* (2013a, b). For the chromatographic separation, 20 µL were injected into column C₁₈ reversed-phase Superspher 100 RP-18 endcapped 5 µm/250 x 4.0 mm with pre-column 5 µm/4 x 4 mm Lichrospher 100 RP-18. The mobile phase was composed of phosphate buffer pH 2.5 (0.68% KH₂PO₄) with ion pair (0.014% PIC 7) and acetonitrile (96:4); flow 0.6 mL/min; detected by fluorescence: Ex 296 nm; Em 390 nm.

The experiment were performed in triplicate (n = 3) and the results were expressed as mean ± standard deviation.

RESULTS AND DISCUSSION

Regarding the concentrations of vitamin B₆ vitamers only pyridoxal and pyridoxamine could be quantified in all analyzed samples. Arruda *et al.* (2013a, b) also showed difficulties in quantifying the pyridoxol in some of their samples due to the small amount of this compound presented in dehydrated bee pollen and its fast degradation.

Pyridoxal showed concentrations ranging between 0.42 and 6.70 mg / 100 g and pyridoxamine from 0.26 to 0.95 mg / 100g of dried bee pollen on a dry basis. The recommended portion for consumption of this product is 25 g (CAMPOS, WEDGE and MARKHAM, 1997) so among the batches evaluated 2 samples were considered sources and all other were considered rich in vitamin B₆, considering that its DRI is equal to 1.3 mg / day.

CONCLUSIONS

The consume of dehydrated bee pollen from the Southern region of Brazil could be an excellent complement in regarding of the necessary daily consumption of vitamin B₆ by the population.

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