



COMPARATIVE PROXIMATE COMPOSITION AND ANTIOXIDANT VITAMINS CONTENTS OF TWO HONEY VARIETIES (LIGHT AMBER AND DARK AMBER) FROM SOKOTO STATE, NIGERIA

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ABSTRACT

The proximate composition and antioxidant vitamins analysis of two varieties of honey (dark amber and light amber) were carried out using standard methods. The values for moisture, ash, crude lipid, crude protein and crude carbohydrate contents of the two honeys, (light amber and dark amber) are 9.39 ± 0.15 , 0.55 ± 0.05 , 1.51 ± 0.11 , 1.64 ± 0.06 and 86.89 ± 0.93 % (for light amber) and 13.03 ± 0.47 , 0.68 ± 0.11 , 3.44 ± 0.42 , 1.87 ± 0.11 and 81.57 ± 0.47 % (for dark amber) respectively, while fibre was not detected in both samples. Both samples showed high amount of carbohydrate, that of light amber being higher. The antioxidant vitamins (vitamins A, C and E) content of the two honeys are 4.08 ± 0.21 , 2.22 ± 0.10 and 0.28 ± 0.03 (mg/dl), (for light amber), and 4.42 ± 0.06 , 2.61 ± 0.11 , and 0.26 ± 0.02 (mg/dl), (for dark amber) respectively. Both samples showed high content of Vitamin A, with that of dark amber being higher. The results suggest that both honeys are nutritionally good source of energy and possess some antioxidant vitamins.

Keywords: Comparative, proximate composition, antioxidant vitamins, honey

INTRODUCTION

Honey consists basically of a complex mixture of carbohydrates, especially glucose and fructose, organic acids, amino acids, minerals, vitamins, enzymes, pollens, and pigments (Schramm *et al.*, 2003). It is a mixture of concentrated aqueous solution of inverted sugars and complex mixture of other saccharides, amino acids, proteins, organic acids, vitamins, minerals, Maillard reaction products and both enzymatic and non enzymatic antioxidants, including glucose oxidase, catalase, ascorbic acid, flavonoids, phenolic acids and carotenoid derivatives (Almamary *et al.*, 2002; Gheldof and Engeseth, 2002). Its nutritional quality, medicinal, and sensory properties have attracted thousands of consumers (Carlos *et al.*, 2009).

The honeybee (*Apis mellifera*) is the species that produces large quantity of honey in Dange town, Sokoto State, Nigeria. Bees obtain all their nutritional components from nectar, pollen and water. Nectar is reduced to honey containing predominantly carbohydrates with very little protein, vitamins and minerals (Yaghoobi *et al.*, 2008). Whiteland Doner (1980) reported that fully ripened honey consists of levulose/fructose (41%) and dextrose / glucose 35% and 22 others, which are more complex than the monosaccharides present in quite minute quantities. Of the 22 complex sugars, the oligosaccharides identified are maltose, isomaltose, maltulose, nigerose, turanose, kojibiose, laminarihirose, α , β -trehalose and gentibiose. Ten trisaccharides are present: melezitose, maltotriose, 3- α -isomaltosylglucose-1-ketose, panose, isomaltotriose and isomaltopentaose. Most of these sugars do not

occur in nectar but may arise from enzymes added by honeybee during honey ripening or by chemical action in the concentrated acid sugar mixture of honey (Gheldof *et al.*, 2002).

The presence of phytochemicals such as flavonoids and phenolic acids, may suggest the role of honey, along with fruits and vegetables, as a nutritional source of natural antioxidants responsible for protecting human health as was earlier reported (Gheldof *et al.*, 2002; McKibben and Engeseth 2002; Schramm *et al.*, 2003; Tonkset *et al.*, 2001 and Tonks *et al.*, 2003). Its antibacterial, anti-inflammatory, antioxidant and anticancer properties have been extensively discussed (Orsolice *et al.*, 2005; Swellam *et al.*, 2003; Blasa *et al.*, 2006 and Board, 1972). Vitamin C and most of the vitamin B complex are present in variable amounts (Oszmianski and Lee, 1990). Apart from being a high-energy substance, honey has high digestibility, high acidity as well as high taste appeal. By this characteristic antioxidant property, honey when applied at 10% has been found to inhibit enzymatic browning in apple slices and grape juice (Khan, 1985). This study was designed to investigate the proximate composition and antioxidant properties of two varieties of honey samples obtained from Dange Shuni local government area of Sokoto State, being the predominant producer of honey around the Metropolis.

MATERIALS AND METHODS

Collection of the Sample

The two varieties of honey (dark amber and light amber) were obtained from Dange central market in Dange town, Sokoto State, Nigeria.

Proximate Chemical Composition and Trace Elements Estimation

Nutritional compositions of the two honey samples were estimated with standard techniques. Moisture content (AOAC, 1990), ash (Oyenuga, 1987), crude protein by Micro kjehdahl method (AOAC, 1990), crude lipid by Soxhlet method, crude fibre (AOAC method, 1990), carbohydrates (by difference) , vitamin A (Lowry *et al.*, 1983), vitamin C (Tillmans method, 1930) based upon the reduction of the dye (2,6-dichlorophenolindophenol) by an acid solution of ascorbic acid, determined by titration and vitamin E by colorimetric method (Lowry *et al.*, 1983) based on the reduction of ferric ions to ferrous ions, which form red colour with dipryridyl. The ash solutions were prepared with wet digestion (Raganna, 1986).

The results were expressed as means \pm standard deviations of three replicate determinations.

RESULTS AND DISCUSSION

The results of proximate composition (Table 1), shows both samples have high carbohydrate content (86.89 \pm 0.93 and 81.57 \pm 0.47 %) and high moisture (9.39 \pm 0.15 and 13.03 \pm 0.47 %) for light amber and dark amber, respectively. This suggests honey to be a good source of energy (especially for the diabetic patients because of its high fructose content). The protein (1.64 \pm 0.06 and 1.87 \pm 0.11 %) and lipid (1.51 \pm 0.11 and 3.44 \pm 0.42 %) contents for light amber and dark amber respectively are relatively low, indicating that honey is not a good source of protein

and some amino acids. This is in support of the earlier finding which stated little protein content in honey (Postmes *et al.*, 1995).

The small amount of ash content (0.55 \pm 0.05 and 0.68 \pm 0.11 %) also suggests that honey contains small amount of minerals like Ca, Mg, Fe, K, Na etc. These results are in consonance with reported values of 17.1% water, 82.4% carbohydrates, 38.5% fructose, 31% glucose and 12.9 % other sugars and 0.5% proteins, amino acids, vitamins, phenolic compounds, organic acids and multiple minerals, among other minority constituents (White and Doner1980; Garcia *et al.*, 1986; Garrett and Grisham, 2001 and Montenegro *et al.*, 2003).

The concentrations of vitamins A, C and E as 4.08 \pm 0.21, 2.22 \pm 0.10 and 0.28 \pm 0.03 mg/dl for light amber and 4.42 \pm 0.06, 2.61 \pm 0.11 and 0.26 \pm 0.02 mg/dl for dark amber respectively, showed both honeys to containrelatively high amounts of vitamins A and C indicating possession of antioxidant properties by both samples, as well as good for maintenance of normal vision. This conforms to Satyanarayanaand Chacrapani(2008) report, that honey contains high amounts of vitamin A.

On comparative basis, the study revealed that light amber honey contains more carbohydrates than dark amber honey while the latter contains more protein, lipid, moisture and more vitamins A and C than the former. This suggests dark amber honey to be better than light amber honey in terms of nutritional value as well as antioxidant potential.

Table 1: Proximate composition of the two honey varieties

SAMPLES	PARAMETERS (% Composition)					
	Moisture	Ash	Protein	Lipid	Fibre	Carbohydrate
Light Amber	9.39 \pm 0.15	0.55 \pm 0.05	1.64 \pm 0.06	1.51 \pm 0.11	ND	86.91 \pm 0.93
Dark Amber	13.03 \pm 0.47	0.68 \pm 0.11	1.87 \pm 0.11	3.44 \pm 0.42	ND	80.98 \pm 0.47

The values are expressed as means \pm Standard Deviation (n=3), ND = Not Detected

Table 2: Antioxidant vitamins contents of the two honey varieties

SAMPLES	VITAMINS(mg/dl)		
	Vitamin A	Vitamin C	Vitamin E
LIGHT AMBER	4.08 \pm 0.21	2.22 \pm 0.10	0.28 \pm 0.03
DARK AMBER	4.42 \pm 0.06	2.61 \pm 0.11	0.26 \pm 0.02

The values are expressed as means \pm Standard Deviation (n=3)

CONCLUSION

Both honeys are a good source of energy and natural antioxidants. Honey is therefore, considered to be a valuable food and medicinal material, that nourishes,

heals as well as protects the body againstcertain diseases, with dark amber honey having more potentials than light amber.

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