

Nutrition Facts in Bangladeshi Mustard Honey

Khan Md. Murtaja Reza Linkon, Md. Abdul Hakim*

Department of Food Technology and Nutritional Science, Mawlana Bhashani Science and Technology University, Tangail, Bangladesh

Abstract

Honey in in great triumph on the tremendous using since the ancient times of the world history. The intent of this study was to hit upon the nutrition facts of mustard honey available in Bangladesh. Results divulged that there were found $14.36 \pm 0.04\%$ moisture, $0.19 \pm 0.001\%$ ash, 84.346% total carbohydrate and 71% TSS in mustard honey. It is a matter of great boost that none can jeer at the including this honey in diet planning in nutrition counseling as its $(E_d)_n$ was found 307.63 Kcal / 100 g contributing 34.181Kcal / 100 g DIT level in human physiology.

Keywords

Nutrition Facts, Mustard Honey, Bangladesh, Net Food Energy and Moisture

Received: March 18, 2018 / Accepted: March 29, 2018 / Published online: May 28, 2018

@ 2018 The Authors. Published by American Institute of Science. This Open Access article is under the CC BY license.

<http://creativecommons.org/licenses/by/4.0/>

1. Introduction

Honey, produced by *Apis mellifera* bees in galore used natural food produce, presided over the thousands of years for its nutritive value and healing properties [1-3]. Honey is a remarkable complex natural fluid reported to contain at least 181 compounds including sugars, proteins, vitamins, minerals, HMF (5-hydroxymethylfurfural), enzymes, flavonoids, phenolic acids and many a volatile compounds where the prime constituents are moisture, glucose, fructose, sucrose, proteins, minerals, organic acids, salts and phenolic compounds [4-7]. Honey composition primarily depend on floral sources, seasonal and environmental variations, however, with basic nutrients e.g., sugars, proteins, fats, vitamins (vitamin B complex and vitamin C mainly) including catalase, oxidase, ascorbic acid, phenolic acids, flavonoids, carotenoids, organic acids and Maillard reaction products [8-10].

There is an entire Surah in the Holy Qur'an "Al-Nahl (the Bee)" by name as

"And thy Lord taught the bee to build its cells in hills, on tree and in men's habitations, then to eat of all the produce of the

earth and find skill the spacious path of its Lord, there issues from within their bodies a drink of varying colors, wherein is a healing of men, verily in this a sign for those who give thought."

The multi facet assay of honey anchored in scientific race is regarded as a sweetener, functional food, antioxidant, antimicrobial, antibacterial, antiseptic, bacteriostatic, prebiotics, pro-biotics, anti-cancer, anti-tumour, anti-inflammatory and immune modulatory effects amongst others [11-13]. The antioxidant activity of honey derived from both the enzymatic (e.g., catalase, glucose oxidase and peroxidase) and nonenzymatic substances (e.g., ascorbic acid, α -tocopherol, carotenoids, amino acids, proteins, Maillard reaction products, phenolic acids and flavonoids) [14-16]. According to different studies, the antioxidant potential of honey largely correlated with total phenolics concentration and there are more than 150 polyphenolic compounds reported, including phenolic acids, flavonoids, flavonols, catechin and cinamic acid derivatives [17-19]. It is also an effective activity in preventing lipid oxidation in meat and deteriorative enzymatic browning of vegetables and fruits [20-22]. Under the circumstances stated, the current study was, therefore operated upon to

* Corresponding author

E-mail address: murtaja.kus@gmail.com (K. Md. M. R. Linkon), info.hakim.bd@gmail.com (Md. A. Hakim)

investigate the nutrient contents and dietary quality of mustard honey abet to planning balanced diet for sound health consuming this honey.

2. Methodology

2.1. Study Nature

This study was a cross-sectional study.

2.2. Sample Collection

The topic honey sample i.e. mustard honey was collected from Afsar Ali, the Tangail district unit Bangladesh Apiculturist Welfare Association (BABA) president, a big bug honey cultivator at Sagardighi of Ghatail police station at Tangail in Bangladesh.

2.3. Expement Running Laboratories

This study was carried out at Food Technology and Nutritional Science department laboratory of MawlanaBhashani Science and Technology University at Tangail and Bangladesh Council of Scientific and Industrial Research at Dhaka in Bangladesh.

2.4. Study Duration

This study was conducted from March 2015 to February 2016.

2.5. Analyzing Nutrient Contents and Dietary Quality

This honey sample was analyzed for moisture, protein, fat and ash as per the AOAC 2005 procedure in food engineering [23]. The TSS was measured using hand refractometer, p^H using p^H meter and total carbohydrate, net food energy $(E_f)_n$, DIT and total food energy $(E_f)_T$ using Hakim 2017 modeling in bioenergetics [24, 25].

2.6. Data Analysis

Standard mean (SM) and standard deviation (SD) were came to fight applying SPSS 16 program. Microsoft word (MW) and microsoft excel (MExcel) were in widespread use to represent the data at their respective section in nutritional statistics.

3. Results

3.1. Nutrient Contents Analysis

Mustard honey is in galore nutrient contents density. The nutrient content of fresh collected mustard honey was analyzes in respect of moisture, protein, fat, ash, carbohydrate and TSS contents. The results were found to

have $14.36 \pm 0.04\%$ moisture, $1.102 \pm 0.001\%$ protein and 84.346% total carbohydreate. The ash conent was $0.19 \pm 0.001\%$ and the TSS was 71% respectively (table 1).

Table 1. Nutrient Contents of Mustard Honey.

Parameters	Amounts (%)
Moisture	14.36 ± 0.04
Ash	0.19 ± 0.001
Protein	1.102 ± 0.001
Fat	0.002 ± 0.00
Total carbohudrate	84.346
TSS	71

3.2. Biochemical Analysis

The p^H content of mustard honey sample was obtained 6.98 at $27^\circ C$ room temperature.

3.3. Energy Boosting Analysis

The energy content and the DIT content were analyzed through the combined action of the laboratory technique plus mathematical formula in food technology. From the biostatistician investigation, the total food energy $(E_f)_T$ content was found 341.81 Kcal / 100 g while the DIT was 34.181 Kcal / 100 g considering net food energy $(E_f)_n$ 307.63 Kcal / 100 g in the study concerned mustard honey sample (figure 1).

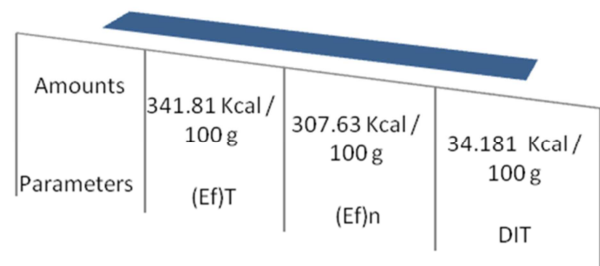


Figure 1. $(E_f)_T$, $(E_f)_n$ and DIT content of mustard honey sample.

4. Discussions

The analysis of nutrients contents and its allied food energy properties of mustard honey wasmeasured according to the biochemical methodology discussed earlier and from the revealed results applying different laboratory technology in food engineering and different mathematicalformulas ferequently used in nutritional mathematics. The moisture content was laid to trace @ 14.36% aliving within the standardlimit $\leq 20\%$ recommendedby the international quality regulations [26]. The investigatedhoney sample was in good quality, as indicated by the lowmoisture content [27-29]. This honey has high TSS contribution i.e., 71% relying ample sugar densityin the honey solution to focus the solution strength. There was found lowprotein ($\approx 1.102\%$) which isdesired to produce tender and crisp produces and ash contentdenoted the

mineral contents in honey to aid smooth continuation of body electron transport system (ETS) at cell biology in nutritional physics [30-36]. There was 84.346% available carbohydrate in this studied honey to be used to fuel the fuel for alcohol fermentation in human dietetics [37-43]. The sample honey was obtained to have slightly acidic in biochemical nature as the pH was < 7 (6.98 at 27°C RT) [44-49]. There were high (E_d)_n content (307.63 Kcal / 100 g) of honey sample associated with energy intake levels and weight gained consuming honey indicating the mustard honey the superactive energy yielder to give instant energy at LDC in human dietetics [50-53]. The mustard honey can be included at diet planning in nutrition counseling as an awesome nutrients' sources for sustaining body soundness @ ideal body weight reaching traits in different communities at different SAEs in different countries prevailing different geospatial differences across the globe [54-63].

5. Conclusion

The study examines the positive prevalence of mustard honey guaranteed for the A1 nutrition potentials, pointing the low moisture content, high TSS, the lowest protein and ash content. The high (E_d)_n and DIT content revealed its supremacy in adhering this honey in daily diet in nutrition counseling. A passion for consuming this honey can be formed as it in good nutrition value contours in keeping with the CAC honey quality parameters.

Conflicts of Interest

The authors have declared that no conflicts of interest exist.

References

- [1] Crosby WA. Ecological imperialism: the biological expression of Europe 900-1900. Cambridge University Press, London 2004; p. 188.
- [2] Aboud F, De C, Sinacori A, Massi S, Conte P and Alonzo G. Palynological, physicochemical and aroma characteristics of Sicilian honeys. *J Api Product Api Med Sci* 2011; 3 (4): 164-173.
- [3] Linkon KMMR, Prodhan UP, Hakim MA and Alim MA. Study on the physicochemical and antioxidant properties of nigella honey. *Int J Nutr Food Sci* 2015; 4 (2): 137-140.
- [4] White JW. Composition of honey. In honey, a comprehensive survey; Crane, E., Russak: New York, NY, USA, 1975; p. 157-206.
- [5] Moniruzzaman M, Khalil MI, Sulaiman SA and Gan SH. Physicochemical and antioxidant properties of Malaysian honeys produced by *Apis mellifera*. *BMC Complimentary Altern Med* 2013; 13 (1): 43.
- [6] Honey Color and Flavor. National Honey Board 2011.
- [7] Khalil MI, Moniruzzaman M, Boukraa L, Benhanifia M, Islam MA, Islam MN, Sulaiman SA and Gan SH. Physicochemical and antioxidant properties of Algerian honey. *Molecules* 2012; 17 (9): 11199-11215.
- [8] Waika to Honey Research Unit 2007.
- [9] Khalil MI, Sulaiman SA and Gan SH. High 5-hydroxymethylfurfural concentrations are found in Malaysian honey samples stored for more than one year. *Food Chem Toxicol* 2010; 48: 2388-2392.
- [10] Islam A, Khalil I, Islam N, Moniruzzaman M, Mottalib A, Sulaiman SA and Gan SH. Physicochemical and antioxidant properties of Bangladeshi honeys stored for more than one year. *BMC Complimentary Altern Med* 2012; 12 (1): 177.
- [11] Kinoo MS, Mahomoodally MF, Puchooal D. Anti-microbial and physicochemical properties of processed and raw honeys of Mauritius. *Advanc Infect Disease* 2012; 2: 25-36.
- [12] Islam M, Khalil M and Gan SH. Toxic compounds in honey. *J Appl Toxicol* 2014; 34 (7): 733-42.
- [13] Schramm DD, Karim M, Schradr HR, Holt RR, Cardetti M and Keen CL. Honey with high levels of antioxidants can provide protection in healthy human subjects. *J Agric Food Chem* 2003; 51: 1732-1735.
- [14] Ferreira ICFR, Aires E, Barreira JCM and Estevinho LM. Antioxidant activity of Portuguese honey samples: different contributions of the entire honey and phenolic extract. *Food Chem* 2009; 114: 1438-1443.
- [15] AIML, Daniel D, Moise A, Boris O, Laslo L and Bogdanov S. Physico-chemical and bioactive properties of different floral origin honeys from Romania. *Food Chem* 2009; 112: 863-867.
- [16] Gheldof N and Engeseth NJ. Antioxidant capacity of honeys from different floral sources based on the determination of oxygen radical absorbance capacity and inhibition of in vitro lipoprotein oxidation in human serum samples. *J Agric Food Chem* 2002; 50: 3050-3055.
- [17] Aljadi AM and Kamaruddin MY. Evaluation of the phenolic contents and antioxidant capacities of two Malaysian floral honeys. *Food Chem* 2004; 85: 513-518.
- [18] Meda A, Lamien CE, Romito M, Millogo J and Nacoulma OG. Determination of the total phenolic, flavonoid and proline contents in Burkina Faso honey, as well as their radical scavenging activity. *Food Chem* 2005; 91: 571-577.
- [19] Bertonceli J, Dobersek U, Jamnik M and Golob T. Evaluation of the phenolic content, antioxidant activity and color of Slovenian honey. *Food Chem* 2007; 105: 822-828.
- [20] Chen L, Metha A, Berenham M, Zangerl AR and Engeseth NJ. Honeys from different floral sources as inhibitors of enzymatic browning in fruits and vegetables homogenates. *J Agric Food Chem* 2000; 48: 4997-5000.
- [21] Alvarez-Suarez JM, Giampieri F, Gonzalez-Paramas AM, Farni E, Astolfi P and others. Phenolics from monofloral honeys protect human erythrocyte membranes against oxidative damage. *Food Chem Toxicol* 2012; 50: 1508-1516.
- [22] Tanvir EM, Afroz R, Motallib MA, Hossain Mi and others. Antioxidant and antimicrobial activities of BAU Kul (*Zizyphus mauritiana*), an improved variety of fruit in Bangladesh. *J Food Biochem* 2015; 39: 139-47.

- [23] AOAC. Official methods of Analysis of AOAC. International, Washington, DC: Association of Official Analytical Chemist (1990); 2005; 16; 1546.
- [24] Loisselle FB and Casey JR. Measurement of intracellular pH. *Methods in Molecular Biology* 2010; 673: 311.
- [25] Hakim MA. Modeling food energy in bioenergetics. *J Adv Med Pharmaceut Sci* 2017; 14 (4): 1-7.
- [26] CAC. Revise codex standard for honey. Codex Standards 12-1982. Rev. 1 (1987), Rev 2 (2001) 1, COMSA/ FDHS 002: 2004.
- [27] Hakim MA and Islam MS. Elementary of food science and technology (1stedn.) 2016; p. 43-44.
- [28] Robertson JA and Eastwood MA. An investigation of the experimental conditions which could affect water-holding capacity of dietary fibre. *J Sci Food Agric* 1981; 32: 819-25.
- [29] Hakim MA. Physicochemical properties of dhania honey. *Am J Food Sci Nutr Res* 2015; 2 (5): 145-148.
- [30] Wu L, Candille SI, Choi Y, Xie D, Jiar L, Li-Pook-Than J, Tang H and Snyder M. Variation and genetic control of protein abundance in humans. *Nature* 2013; 499 (7456): 79-82.
- [31] von Engelhardt W and Zimmermann J. Theory of earth science. Cambridge University Press 1988; p. 101-4.
- [32] Nickel EH. The definition of mineral. *The Canadian Mineralogist* 1995; 33 (3): 689-90.
- [33] Hollenhorst PC, McIntosh LP and Graves BJ. Genomic and biochemical insights into the specificity of ETS transcription factors. *Ann Rev Biochem* 2011; 80: 437-71.
- [34] Li R, Pei H and Watson DK. Regulation of Ets function by protein protein interactions. *Oncogene* 2000; 19 (55): 6514-23.
- [35] Hakim MA. Biophysical modeling of cellular energy in human dietetics: an appraisal in nutritional physics and cell biology. *Am J Food Sci Nutr Res* 2017; 4 (4): 125-29.
- [36] Hakim MA. Biophysical modeling of dietary energy in biochemical modeling. *Eur J Biophys* 2017; 5 (3): 57-61.
- [37] Flitsch SL, Ulijn RV. Sugars tied to the spot. *Nature* 2003; 421 (6921): 219-20.
- [38] Jenkins DJ, Jenkins AL, Wolever M, Thomson LH and Rao AV. Simple and complex carbohydrate. *Nutr Review* 1936; 44 (2): 44-9.
- [39] Robinson V. The story of medicine. New York: New Home Library 1944.
- [40] Hakim MA. Mathematical modeling of energy balancing for diet planning in nutritional physics. *Int J Nutr Diet* 2017; 5 (1): 29-41.
- [41] Hakim MA, Talukder MJ and Islam MS. Nutritional status and hygiene behavior of government primary school kids in central Bangladesh. *Sci J Public Health* 2015; 3 (5): 638-642.
- [42] Rahman A et al. Dietary practices, health status and hygiene observance of slum kids: a pilot study in an Asian developing country. *JP J Biostat* 2016; 13 (2): 195-208.
- [43] Rahman A and Hakim MA. Measuring modified mass energy equivalence in nutritional epidemiology: a proposal to adapt the biophysical modelling approach. *Int J Stat Med Res* 2016; 5 (3): 219-223.
- [44] Bates, Roger G. Determination of pH: theory and practice. Wiley 1973.
- [45] Covington AK, Bates RG, Dust RA. (1985). Definition of pH scales, standard reference values, measurement of pH and related terminology. *Pure Appl Chem* 1985; 57 (3): 531-542.
- [46] Linkon MR, Prodhan UK, Elahi T, Talukder J, Alim MA and Hakim MA. Comparative analysis of the physico-chemical and antioxidant properties of honey available in Tangail, Bangladesh. *Int J Res Eng Technol* 2015; 4 (3): 89-92.
- [47] El Sohaimy SA. Physicochemical characteristics of honey from different origins. *Ann Agric Sci* 2015; 60 (2): 279-87.
- [48] Azedo, LC, Azedo, M. A. A., Sozoa, S. R., Dutra, V. M. L. Protein content and physicochemical properties of honey samples of *Apis mellifera* of different floral origin. *Food Chem* 2003, 80: 249-254.
- [49] Silvia LR, Videira R, Monteiro AP, Valentao P, Andrade PB. Honey from Luso region (Portugal): Physicochemical characteristics and mineral contents. *Microchemical J* 2009; 93: 73-77.
- [50] Hakim MA. Food coloring analysis in four selected dishes. *Am J Biol Life Sci* 2015; 3 (5): 187-189.
- [51] Buba F, Gidago A and Shugaba A. Physicochemical and microbiological properties of honey from north east Nigeria. *Biochem Analytic Biochem* 2013; 2: 142.
- [52] Belay A, Solomon WK, Bultossa G, Adgaba N and Melaku S. Physicochemical properties of the Harena forestry honey, Bale, Ethiopia. *Food Chem* 2013; 141 (4): 3386-92.
- [53] Hakim MA. Trending malnutritional escape velocity in nutritional dynamics. *Int J Prev Med Res* 2018; 4: in press.
- [54] Hakim MA. Malnutrition prevalence and nutrition counseling in developing countries: a case study. *Int J Nurs Health Sci* 2016; 3 (3): 19-22.
- [55] Kamruzzaman M and Hakim MA. Food and nutrition counseling in Bangladesh: a NC4HD approach in health statistics. *Am J Biol Chem* 2017; 5 (1): 1-5.
- [56] Hakim MA. Nutrition counseling in homelessness: a NC4HD nexus. *Int J Health Econ Policy* 2017; 2 (1): 12-15.
- [57] Hakim MA. Simulating the ideal body mass in adult human samples. *Int J Sport Sci Phys Educ* 2017; 2 (4): 57-60.
- [58] Hakim MA. Simulating the ideal body weight in human populations. *Int J Biochem Biophys* 2017; 5 (4): 79-82.
- [59] Rahman A and Hakim MA. Modeling health status using the logarithmic biophysical modulator. *J Public Health Epidemiol* 2017; 9 (5): 145-150.
- [60] Rahman A and Hakim M. An epidemiological study on hygiene practice and malnutrition prevalence of beggars children in Bangladesh. *Int J Nutr Diet* 2016; 4 (1): 29-46.
- [61] Hakim MA and Rahman A. Simulating the nutritional traits of populations at the small area levels using spatial microsimulation modeling approach. *Computation Biol Bioinform* 2018; 6: in press.

- [62] Rahman A and Hakim MA. Malnutrition prevalence and health practices of homeless children: a cross-sectional study in Bangladesh. *Sci J Public Health* 2016; 4 (1-1): 10-15.
- [63] Rahman A. Estimating small area health related characteristics of populations: a methodological review. *Geospat Health* 2017; 12: 495.