

# Chapter 5

## Compositional Analysis of the Physico–Chemical Properties of Honey Samples From Imo and Enugu States, Nigeria

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### ABSTRACT

*The addition of artificial substances to honey in order to increase its volume or lower its cost is rampant. This study analyzes eleven honey samples from Enugu and Imo States, Southeastern Nigeria, for physico-chemical attributes such as pH, moisture, protein, fats, ash, polyphenols, free acidity, HMF, conductivity, and sugar. The pH of the samples ranged from 2.82 to 3.86. Moisture content varied from 4.60% - 14.81%; ash 0.25 - 2.53%; protein 0.77- 1.45%; fat 0.01 - 0.23%; polyphenol 1.24 - 11.23%; free acidity 17.52 - 19.04 meq/kg; HMF 50.03 - 103.33 mg/kg. The sugar analyses revealed that all honey samples contained the recommended amount*

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*of sugar for quality honey, with significant differences across locations. However, sucrose values slightly exceeded the recommended limit of 5 g for quality honey. Conductivity and HMF values were also above the recommended standard. Most tested parameters conform to international standards, making the honey suitable for human consumption.*

## **INTRODUCTION**

Honey is a delicious, viscous sweetener made naturally by bees for their own nourishment from the nectar or secretion of plants flowers. Honey has a long history of human consumption as a natural food source and is also used as an ingredient in various food preparations. It is used in both alcoholic and non-alcoholic beverages as sweeteners and in confectionaries as flavoring agents (Durrani *et al.*, 2011; Eleazu *et al.*, 2013). Although the food ranking system did not qualify honey as a dense source of traditional nutrients apart from the sugar content, it did emerge as a veritable source of vitamin B2, vitamin B6, iron, and manganese (Alvarez-Suarez *et al.*, 2010; Vanhanen *et al.*, 2011). Thus, honey has been used since ancient times not only as food but also as medicine and in cosmetics. Honey has been credited with many biological and therapeutic purposes, such as the treatment of colds, skin wounds, and various gastrointestinal diseases. This beneficial role is attributed to both the antimicrobial and anti-inflammatory properties of honey that arise from its low acidity and high sugar content, mainly glucose and fructose components (Amril and Ladjama, 2013). Raw honey contains glucose oxidase, which combines with water to produce hydrogen peroxide, a mild antiseptic. In addition, other enzymes found in honey also help in the healing process (Khalil *et al.*, 2010). Honey also contains phytochemicals such as flavonoids and other polyphenols that make it a potent functional ingredient and an antibacterial agent (Khalil *et al.*, 2010; Gulfraz *et al.*, 2011; Ramanauskiene *et al.*, 2012).

Honey comes in a range of colours including white, amber, red, brown, and almost black (Eleazu *et al.*, 2013). Its flavour and texture also vary with the flower nectar from which it is produced. Commercial honey is sold in individual containers or in bulk in the form of raw or processed honey. The latter is usually pasteurized, clarified, or filtered, and at times fortified. Raw honey is of the highest organic quality (Ramanauskiene *et al.*, 2012). However, microorganisms of interest in honey are those that can withstand the concentrated sugar content, acidity, and antimicrobial action of honey. These include certain yeasts and spore-forming bacteria (coliforms), indicative of the sanitary condition of the honey (Eleazu *et al.*, 2012).

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