

Abstract

Bioactives and Other Nutritional Components in the Jaggery Production Process [†]

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Abstract: Jaggery, a non-centrifugal sugar (NCS), is a naturally produced sweetener and a good source of minerals, essential vitamins and bioactives. Jaggery manufacturing is a continuous heat and mass transfer process which involves various unit operations and in which the effectiveness of juice clarification plays an important role in maintaining the nutritional quality and storage life of jaggery. The major components of nutritional interest in NCSs are minerals and bioactives and they are gaining worldwide attention due to their nutraceutical properties. Hence, there is a need to quantify the nutrients present in NCSs as well as assess their biological absorption and function. This work aims to study the potential flow of materials within a jaggery processing unit by combining sampling, analysis and quantification. Sugarcane juice, clarified juice, scum and jaggery were analyzed for their total sugars, total phenolic and flavonoid content, mineral content and antioxidant potential to clearly understand at which step of jaggery manufacturing nutritional losses take place, if at all. A profiling of phenolic and flavonoid compounds was conducted using liquid chromatography–mass spectroscopy. The total ash content in raw cane juice, scum and jaggery was found to be in the range of 0.1–0.4%, 1–3% and 1–2% (dry basis), respectively. It was found that almost half of the mineral contents from sugarcane juice were lost in scum ($p < 0.05$). All the mineral elements showed a similar affinity towards scum. However, through liquid chromatography–mass spectroscopy, it was seen that most of the polyphenols (75%) that positively influence human health, such as oryzarol, hydrocinnamic acids, gentisic acid, hydrobenzoic acids, etc., were retained in jaggery. The same could be validated when looking at the total phenolic and flavonoid contents of sugarcane juice, scum and jaggery along with their antioxidant potential. Some unreported phenolics and flavonoids, such as isoferulic acid, prunitrin and maritimetin, which are known to have anti-inflammatory properties, were detected in selected NCS samples. In order to retain maximum mineral content in jaggery and to ensure the removal of appropriate amounts of scum, technological upgrades must be studied and the clarification step must be optimized and standardized.

Keywords: jaggery; NCS; nutritional profile



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