Title: Natural alternatives in sports nutrition: Formulation and quality evaluation of an isotonic sports drink using dates of Ajwa variety (Phoenix dactylifera L.)

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Abstract: This study explores the formulation and evaluation of a novel isotonic sports drink using dates of Ajwa variety (Phoenix dactylifera L.) as a natural alternative to synthetic ingredients commonly found in commercially available sports beverages. Ajwa dates were selected for their rich bioactive components, including natural sugars, phenolic compounds, and essential minerals, which align with the functional requirements of isotonic drinks. Three formulations (ASD1, ASD2, ASD3) were developed by varying the ratio of Ajwa date pulp to deionized water, and these formulations were evaluated for their physicochemical properties, mineral content, antioxidant capacity, microbiological safety, and sensory acceptance. The ASD2 (25 % pulp) emerged as the most promising, with the highest sensory scores (8.2/9 in overall acceptability). ASD2 demonstrated excellent physicochemical stability over a 90-day storage period, maintaining an osmolality of 297 ± 3.17 mOsm/kg, suitable for rapid hydration. The formulation achieved an optimal pH of 4.62 ± 0.12 and provided 34.01 ± 0.47 kcal/100 g energy, sufficient for replenishing energy during physical activity. Microbiological tests confirmed the safety, with minimal total plate count (1 cfu/mL) and no detected coliforms or molds. Notably, the drink retained its antioxidant capacity, with ascorbic acid levels around 1 mg/100 mL and phenolic content ranging between 2.5 and 3.0 g/kg gallic acid equivalent. The study concludes that the Ajwa date isotonic sports drink is a promising natural alternative for athletes, offering both hydration and additional health benefits. This research highlights the potential for using natural ingredients in sports nutrition and provides a foundation for future studies on the commercialization of such products.

Keywords: Isotonic beverage, Date palm, Sensory, evaluation, Hydration, Osmolality

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