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Development and Standardization of Toothpaste Incorporating *Moringa oleifera* Leaf Extract

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Abstract

Dental hygiene is an important aspect to control oral infections such as tooth decay and gum diseases. And in novel dentistry, herbal toothpaste is more acceptable and safer with minimum side effects over synthetic preparation. The current study was envisioned to formulate herbal toothpaste by incorporating the leaf extract of *Moringa oleifera* and standardizing it as per the Sri Lankan standard requirements. The toothpaste base formulation was optimized and incorporated with *M. oleifera* leaf extract to develop the Moringa toothpaste. The net mass and extrusive content, consistency, cohesiveness, stability, tube inertness, moisture content, and volatile matter, pH of the Moringa toothpaste were determined to standardize the formulated toothpaste as per the requirement of SLS Standard (275:2014). The anti-bacterial efficacy of Moringa toothpaste was evaluated against *Staphylococcus aureus*, an oral pathogenic bacterium. The contents of elements present in the *M. oleifera* leaf powder that are known to improve oral health including Ca, K, and Mg were also determined. The leaf extract percentage was selected as 5% (w/w) to be incorporated into the optimized toothpaste base formulation. The formulated herbal toothpaste complied with the requirements of SLS Standard (275:2014) indicating acceptable net mass (23.6 g), extrusive content (49.96%), consistency (present), cohesiveness (passed), stability (stable formulation), moisture, and volatile matter content (43.16%) and pH (6.26). In an antibacterial assay, the Moringa toothpaste showed a significant zone of inhibition of 2 ± 0.029 cm indicating its antibacterial potential against *S. aureus* to provide tooth and oral hygiene and to prevent various dental diseases. The contents of Ca, Mg, and K were found as 0.6%, 1.7%, and 0.14% respectively. The formulation development and standardization of *M. oleifera* based herbal toothpaste, having the potential to improve oral health is reported for the first time through this study. This new product can be introduced as an innovative approach to incorporate plants like *M. oleifera* in oral care products.

Keywords: Antibacterial activity, Evaluation, Moringa toothpaste, *Moringa oleifera* leaf powder, Standardization