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FORMULATION OF COSMETIC SERUM FROM BAMBOO VINEGAR

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ABSTRACT

THE FORMULATION OF COSMETIC SERUM FROM BAMBOO VINEGAR

This research focuses on implementing the potential of bamboo vinegar (BV) into developing an eco-friendly and natural cosmetic serum that addresses the growing need for sustainable skincare products. BV is a byproduct of bamboo pyrolysis, and it has been recognized for its antioxidant and antimicrobial properties, making it a potent active ingredient in cosmetic formulation. This research aims to determine the optimum BV formulation that maximizes benefits while retaining stability and compatibility by evaluating the serum's texture, color, and odor to ensure user satisfaction. Despite the well-known benefits of BV that could be advantageous as an active ingredient, research on its applications remains limited. Therefore, the preparation of cosmetic serums containing BV involving five formulations utilizing the oil-in-water (O/W) emulsification process were studied. The GC-MS analysis of BV revealed 17 components, the most significant of which are phenol, 2-methyl-, phenol, 2-4-dimethyl, and phenol, 4-methoxy-3-methyl. The BV had substantial antioxidant capabilities, with the maximum total phenolic content and DPPH radical scavenging activity found at 200 and 250 ppm, respectively. Antimicrobial testing showed specific antibacterial activity against *E. coli* and *S. aureus*. The combination of 1 % BV and 8% HA (F4) was appropriate for creating a balanced cosmetic serum with great skin compatibility, stability, and efficacy. Over three months, the prepared serum remained stable and homogeneous, demonstrated significant antioxidant activities, and provided modest sun protection with an SPF of 9.993. Furthermore, F4 showed appropriate antibacterial activity, especially against *S. Aureus*, making it a suitable choice for skincare applications. Thus, a serum containing BV was developed to enhance its benefits while maintaining stability and compatibility with other components. This composition targets skincare concerns such as acne treatment and antioxidant protection. Future research should focus on BV's antioxidant properties, its sun protection capabilities, and synergistic interactions with other natural antimicrobials to improve efficacy. Comprehensive stability studies will assure the BV cosmetic serum's long-term safety and efficacy.

CHAPTER 1

RESEARCH BACKGROUND

1.1 Introduction

Bamboo is the fastest growing plant and belongs to a subfamily of the grass family, which is commonly grown in tropical and subtropical regions (Paudyal *et al.*, 2022). Bamboo belongs to the most prominent family of grasses, the *Poaceae* (*Gramineae*) and constitutes the *Bambusoideae* subfamily (Yeasmin *et al.*, 2015). Bamboo, in general, plays a vital role in human life, mainly in terms of meeting the current economic, ecological, and human essential needs. Bamboo is also frequently used in medicine for treating atherosclerotic, diabetic, hepatic diseases, and nervous system related symptoms (Cheng *et al.*, 2023). Beyond that, bamboo is also beneficial as cosmetic active ingredient due to the extracts of bamboo contained silica (Si), which is an important ingredient to maintaining good skin and hair (Azeez & Orege, 2018). In another study by Albuquerque *et al.* (2022), bamboo (*Phyllostachys pubescens*) leaves have a high carbohydrate content yet are rarely attacked by bacteria, implying that bamboo leaf components may act as an antimicrobial agent.

Bamboo undergoes pyrolysis in producing charcoal and a mix of by-products that includes bamboo vinegar (Alias *et al.*, 2020). In pyrolysis, organic material is thermochemically decomposed at high temperatures. It