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ORIGINAL ARTICLE

# Formulation development and evaluation of antimicrobial polyherbal gel

## *Développement et évaluation de la formulation d'un gel polyherbal antimicrobien*

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**KEYWORDS**
Polyherbal gel;
Antibacterial Activity;
Patch test

**Summary**
*Objective*. — In the recent years, there has been a gradual revival of interest in the use of medicinal plants in developing countries because herbal medicines have been reported safe with minimal adverse side effect especially when compared with synthetic drugs.
*Method*. — In the present study we prepared gel formulations (formulations A and B) which comprised of ethanolic extract of *Azadirachta indica*, *Curcuma longa*, *Allium sativum*, *Ocimum sactum*, *Cinnamomum zeylanicum* nees and *Tamarindus indica* in a concentration of 0.1 and 0.5%, respectively in a base. The base was prepared by using carbapol 940, propylene glycol-400, ethanol, methyl paraben, propylparaben, EDTA, triethanolamine and required amount of water in a quantity sufficient to prepare 50 g. The prepared formulations were screened for their antimicrobial activity by agar well diffusion technique against *S. aureus*, *B. subtilis*, *A. niger* and *E. coli* which are representative types of Gram positive and Gram negative organisms. The formulations were also evaluated for appearance and homogeneity, pH, viscosity and rheological studies, spreadability, drug content uniformity, skin irritation test (Patch test) and washability.
*Result*. — The results of the studies revealed that both formulation under study viz A and B showed better zone of inhibition as compared with the base. However, formulation B exhibited maximum activity against the selected strains which may be attributed to its greater amount of herbal extracts as compared to formulation A.

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*Conclusion.* — Based on our research, it could be concluded that these formulations possess antimicrobial activity and can be used safely on human skin.



**MOTS CLÉS**
Gel de polyherbal ;
Activité antibactérienne ;
Test de patch

**Résumé**
*Objectif.* — Au cours des dernières années, on a assisté à une reprise progressive de l'intérêt pour l'utilisation de plantes médicinales dans les pays en développement, car les médicaments à base de plantes ont été signalés sans danger sans effet secondaire, surtout par rapport aux médicaments de synthèse.
*Méthode.* — Dans la présente étude, nous avons préparé des formulations en gel (formulations A et B) qui comprenaient des extraits éthanoliques d'*Azadirachta indica*, *Curcuma longa*, *Allium sativum*, *Ocimum sactum*, *Cinnamomum zeylanicum* nees et *Tamarindus indica* à une concentration de 0,1 et 0,5 % respectivement Une base. La base a été préparée en utilisant carbapol 940, propylene glycol-400, éthanol, méthylparaben, propylparaben, EDTA, triethanolamine une quantité suffisante d'eau pour préparer 50 g. Les formulations préparées ont été criblées pour leur activité antimicrobienne par plaque de disque contre *S. aureus*, *B. subtilis*, *A. niger* et *E. coli* qui sont des types représentatifs d'organismes Gram positifs et Gram négatifs. Les formulations préparées ont également été évaluées quant à l'aspect et à l'homogénéité, au pH, à la viscosité et aux études rhéologiques, à l'aptitude à l'étalement, à l'uniformité de la teneur en médicament, à l'essai d'irritation cutanée et à la lavabilité.
*Résultat.* — Les résultats des études ont révélé que les deux formulations à l'étude, A et B ont montré une meilleure zone d'inhibition par rapport à la base. Cependant, la formulation B présente une activité maximale contre les souches sélectionnées qui peut être attribuée à sa plus grande quantité d'extraits d'herbes par rapport à la formulation A.
*Conclusion.* — Sur la base de notre recherche, on peut conclure que ces formulations possèdent une activité antimicrobienne et peuvent être utilisées de manière sûre sur la peau humaine.


## Introduction

More than 80% of the world's population still greatly depends upon traditional medicines for treatment of various skin diseases [1]. In the recent years, there has been a gradual revival of interest in the use of medicinal plants in developing countries because herbal medicines have been reported safe and relatively less adverse side effect especially when compared with synthetic drugs [2]. Herbal treatments applied topically have gained considerable attention due to their widespread use and ill-defined benefit/risk ratio [3]. There are large numbers of medicinal plants which are widely used in the treatment of skin diseases and also known to possess antimicrobial activity [4]. Topical application of gels at pathological sites offer great advantages in a faster release of a drug directly to site of action as compared to cream and ointment [5]. *Azadirachta indica* (neem) and *Ocimum sactum* (black tulsi) are phytochemically rich in steroids, alkaloids, tannins, triterpenes, flavonids and anthraquinone glycosides [6,7]. Both have been known to be used traditionally for their various therapeutic properties like antibacterial, antimicrobial, antioxidant, skin disorder, and wound-healing activity [8,9]. *Azadirachta indica* has been found to be used traditionally for their various therapeutic properties like anti-inflammatory, antipyretic, antimalarial, antiulcer, antidiabetic, neuropharmacological effect, antimicrobial effect and antibacterial effect [10—16]. *Ocimum sanctum* has been found to be used traditionally for their various therapeutic properties like antioxidant, antidiabetic, chemo preventive effect, antiulcer, anti-carcinogenic effects, anti-stress activity and also useful in modulation of immune response [17—22]. *Curcuma longa* has been found to be used traditionally for their various therapeutic properties like antifungal activity, antimicrobial and antibacterial effect [6,23]. *Allium sativum*, *Cinnamomum zeylanicum* and *Tamarindus indica* have been found to be used traditionally for their various therapeutic properties like antifungal activity, antimicrobial effect, hypoglycemic activity and antibacterial effect [24—35]. As per the literature survey, the aforesaid plants have reported for their antibacterial and microbiological effect. Hence, the present investigation was undertaken for preparation of polyherbal gel formulation of ethanolic extract of *Azadirachta indica*, *Curcuma longa*, *Allium sativum*, *Ocimum sactum*, *Cinnamomum zeylanicum* and *Tamarindus indica* followed by the evaluation of the prepared formulation for its physical appearance, pH, viscosity, spreadability,

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