ISSN 2277–7172

Original Article

Anti Microbial effects of Purodil Gel on acne causing Propionibacterium acnes and Staphylococcus epidermidis.

PRAKASH CHANDRA BHATT, SANCHIT SHARMA
Affiliation: Department of Pharmacognosy and Phytochemistry, Faculty of Pharmacy, Jamia Hamdard, New Delhi 110063.
Corresponding author:
PRAKASH CHANDRA BHATT
Centre for Advanced Research in Pharmaceutical Sciences, Microbial and Pharmaceutical Biotechnology Laboratory,
Jamia Hamdard, New Delhi-110062
Email: prakashgrr@gmail.com

Received 02 April 2014; accepted 29 April 2014

Abstract
In the present research two herbal formulations were compared with clindamycin 1% w/w ointment for anti acne activity on acne causing bacteria Propionibacterium acnes and Staphylococcus epidermidis. The herbal formulation (Purodil gel) contains extract of Garcinia indica, Syzygium aromaticum, Glycyrrhiza glabra, Citrus limon, Azadirachta indica, Aloe vera, Hemidesmus indicus, Acorus calamus, Coriandrum sativum and Berberis aristata shows better anti microbial activity against Propionibacterium acnes, Staphylococcus epidermidis than herbal formulation containing extract of Aloe barbadensis, Azadirachta indica, Curcuma longa and Salix tetrasperma. Anti acne activity of Purodil gel is comparable with clindamycin 1% w/w.

Key words: Purodil gel, anti acne activity; Propionibacterium acnes; Staphylococcus epidermidis

Introduction:
Acne vulgaris is a very common disorder of skin human beings aged 20 to 25 year are affected by this skin disease. This is a disease of pilosebaceous unit occurs most commonly on the face, neck and chest. The main causative factor for acne vulgaris is bacterial infection with Propionibacterium acnes, Staphylococcus epidermidis and Staphylococcus aureus [1]. These bacteria mainly accumulate in the follicular duct and grow. Particularly P. acne bacteria increase sebum production and inflammation at the pilosebaceous site, the bacteria produces propionic acid form indole or/and nitrate. Finally block the pore and overgrows [2].

There are wide range of pharmaceutical, cosmetic preparation are available in the market in the form of ointments, gels and creams for treatment of Acne vulgaris [3]. The preparations are made of up herbal extract to synthetic antimicrobial agents. Commonly used antibiotic for treatments acne vulgaris includes clindamycin, erythromycin, tetracycline and minocycline [4]. However use of antibiotics in the form of topical and oral preparation causes number of adverse reactions that includes dryness, scaling, erythema, Burning and itching effects to skin [5]. Therefore more research is now focused to develop newer herbal preparation for treatment of acne vulgaris which can effectively inhibit the different causative bacteria [6]. Cosmetic preparation containing extract of neem (Azadirachta indica), nutmeg (Myristica fragrans), cinnamon oil, rosemary oil, tea tree oil, daru haldi (Berberis aristata) are reported to have very beneficial effect on acne due to anti-microbial, anti-inflammatory and anti-oxidant activities of different phytochemical constituents [7,8].

In the present research a poly herbal gel (Purodil Gel) was prepared by using unique combination of herbal
extracts of *Garcinia indica*, *Syzygium aromaticum*, *Glycyrrhiza glabra*, *Citrus limon*, *Aloe vera*, *Hemidesmus indicus*, *Acorus calamus*, *Coriandrum sativum*, *Berberis aristata*, oil of *Azadirachta indica* and Distillate of *Mentha viridis* and tested for its anti acne activity.

**Material and Methodology**

**Microorganisms:**

Acne causing microbial cultures *Propionibacterium acnes* MTCC 1951 and *Staphylococcus epidermidis* MTCC 9041 were procured from microbial type culture collection (MTCC), institute of microbial technology, Chandigarh, India. The bacterial cultures were preserved at 4°C and sub cultured in every 30 days intervals. The medium used for *P. acnes* is nutrient agar supplemented with 0.1% thiglycollate and *S. epidermidis* is grown in nutrient agar slants.

**Preparation of purodil gel:**

All the plant material were purchased from the local market from New Delhi, India and authenticated by Dr. H. B. Singh, Chief Scientist Herbolgy. Voucher specimens of each herbal ingredient were deposited in the quality assurance department of AYUSH Pharmaceuticals for the future reference.

Pharmacopeial standards ingredients were used in the purodil gel formulation. *Garcinia indica*, *Syzygium aromaticum*, *Glycyrrhiza glabra*, *Citrus limon*, *Azadirachta indica*, *Aloe vera*, *Hemidesmus indicus*, *Acorus calamus*, *Coriandrum sativum* and *Berberis aristata* were weighed as per batch size requirement and extracted in 95% alcohol for 4 hours. The extract was filtered and concentrated to 25%/w/w of the batch size. Preservatives were added in this extract. *Azadirachta indica* oil and distillate of *Mentha viridis* was prepared as per the method of Ayurvedic Pharmacopoeia of India. Carbomer (0.75%/w/w) was dispersed in 40 ml de mineralized water under continuous and uniform stirring. 10% w/w distillate of mentha was incorporated in the carbomer suspension. 25% w/w of combined alcoholic extract was added with 10% w/w HCO4. Oils and fragrance were dissolved in 10% w/w of HCO4 was also added to the gel. Triethanolamine was added in QS till clear gel was formed.

**Anti acne activity:**

The prepared purodil gel formulation, formulation containing clindamycin 1% w/w and herbal preparation containing Kumari (*Aloe barbadensis*) 1.0 mg; Nimba (*Azadirachta indica*) 0.5mg; Haridra (*Curcuma longa*) 0.5mg; Jalavetasa (*Salix tetrasperma*) 0.1mg were tested on acne associated microbial strains *P. acnes* and *S. epidermidis* for antimicrobial activity for minimum inhibitory concentration calculation. The antimicrobial test was carried out by micro broth dilution method. Different concentrations (1g/ml; 0.5g/ml; 0.25g/ml; 0.125g/ml; 0.072g/ml of purodil gel, clindamycin 1% w/w and herbal preparation was prepared with dimethyl sulfoxide (DMSO) solvent. The test mixture contained 5 ml of microbiological medium with or without 0.1% thiglycollate for anaerobic culture, 100 μl of test solution /DMSO/ml (as per study design) and 10 μl of microbial suspension (approximately 6X 10^6 cells per ml) and Incubated for 24 hr at 37°C in a bacteriological incubator. After 24hr, the optical density (directly proportional to the microbial growth) was measured at 610 nm by a spectrophotometer for micro-dilution anti microbial assay method [9].

**Results:**

The antimicrobial effect of purodil gel, clindamycin 1% w/w and herbal formulation containing Kumari (*Aloe barbadensis*) 1.0 mg; Nimba (*Azadirachta indica*) 0.5mg; Haridra (*Curcuma longa*) 0.5mg; Jalavetasa (*Salix tetrasperma*) 0.1mg on *Propionibacterium acnes* MTCC 1951 is shown in figure 1 and on *Staphylococcus epidermidis* MTCC 9041 is presented in figure 2.

![Figure 1: % Inhibition of the Propionibacterium acnes cell growth treated with purodil gel (PG), herbal formulation (HF) and Clindamycin 1% w/w (CL).](image1)

![Figure 2: % Inhibition of the Staphylococcus epidermidis cell growth treated with purodil gel (PG), herbal formulation (HF) and clindamycin 1% w/w (CL).](image2)
Form the Figure 1, it was confirmed that purodil gel showed similar antimicrobial effect on *P. acnes* MTCC 1951 when compared with formulation containing clindamycin 1% w/w at lower concentration. However it showed better antimicrobial effects on *P. acnes* at higher concentration i.e. at 1g/ml. but when Purodil gel was compared with other herbal formulation containing Kumari (*Aloe barbadensis*) 1.0 mg; Nimba (*Azadirachta indica*) 0.5mg; Haridra (*Curcuma longa*) 0.5mg; Jalavetasa (*Salix tetrasperma*) 0.1mg, Purodil gel shows better antimicrobial effect on *P. acnes*.

As shown in the figure 2, Purodil gel showed similar antimicrobial effect on *Staphylococcus epidermidis* MTCC 9041 when compared with formulation containing clindamycin 1% w/w at concentration (0.5, 0.25, 0.125 g/ml) but it showed better than clindamycin 1% w/w at lowest concentration (0.072g/ml) when, Purodil gel was compared with other herbal formulation containing Kumari (*Aloe barbadensis*) 1.0 mg; Nimba (*Azadirachta indica*) 0.5mg; Haridra (*Curcuma longa*) 0.5mg; Jalavetasa (*Salix tetrasperma*) 0.1mg; Purodil gel showed better antimicrobial effect on *S. epidermidis*. Overall the antimicrobial effect of Purodil gel was more effective in *Propionibacterium acnes* MTCC 1951 than *Staphylococcus epidermidis* MTCC 9041 infection than herbal formulation containing Kumari (*Aloe barbadensis*) 1.0 mg; Nimba (*Azadirachta indica*) 0.5mg; Haridra (*Curcuma longa*) 0.5mg; Jalavetasa (*Salix tetrasperma*) 0.1mg and antimicrobial effect was comparable to clindamycin 1% w/w ointments.

**Discussion**

In the present research two herbal formulations i.e. Purodil gel containing extract of *Garcinia indica*, *Syzygium aromaticum*, *Glycyrrhiza glabra*, *Citrus limon*, *Azadirachta indica*, *Aloe vera*, *Hemidesmus indicus*, *Acorus calamus*, *Coriandrum sativum* and *Berberis aristata* and other herbal formulation (currently being marketed) contained Kumari (*Aloe barbadensis*) 1.0 mg; Nimba (*Azadirachta indica*) 0.5mg; Haridra (*Curcuma longa*) 0.5mg; Jalavetasa (*Salix tetrasperma*) 0.1mg are compared for antimicrobial effect on *Propionibacterium acnes* MTCC 1951 and *Staphylococcus epidermidis* MTCC 9041 with respect to a clindamycin 1% w/w ointments. Form the result it is confirmed that Purodil gel is better for controlling the acne causing bacterial strains like *P. acnes* and *S. epidermidis*. This may be due present of *Garcinia indica* extract in the Purodil gel formulation.

**References:**


Source of support: Nil; Conflict of interest: None declared