



Available online at <http://www.urpjournals.com>

International Journal of Research in Cosmetic Science

Universal Research Publications. All rights reserved



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: prakashsgrr@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.

© 2014 Universal Research Publications. All rights reserved

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 subcultured in every 30 days intervals. The medium used for *P. acnes* is nutrient agar supplemented with 0.1% thioglycollate 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 Herborology. Voucher specimens of each herbal ingredient were deposited in the quality assurance department of AIMIL Pharmaceuticals for the future reference.

Pharmacopoeial 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% v/w distillate of mentha was incorporated in the carbomer suspension. 25% w/w of combined alcoholic extract was added with 10% w/w HCO 40. Oils and fragrance were dissolved in 10% w/w of HCO 40 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% thioglycollate for anaerobic culture, 100 µl of test solution /DSMO/nil (as per study design) and 10 µl of microbial suspension (approximately 6×10^4 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.

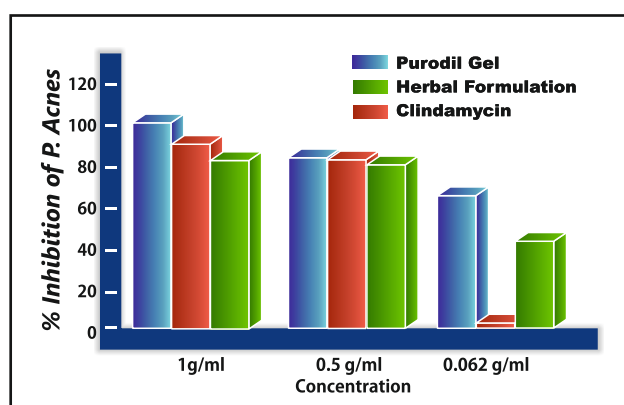


Figure 1: % Inhibition of the *Propionibacterium acnes* cell growth treated with *purodil gel* (PG),herbal formulation (HF) and *clindamycin* 1% w/w (CL).

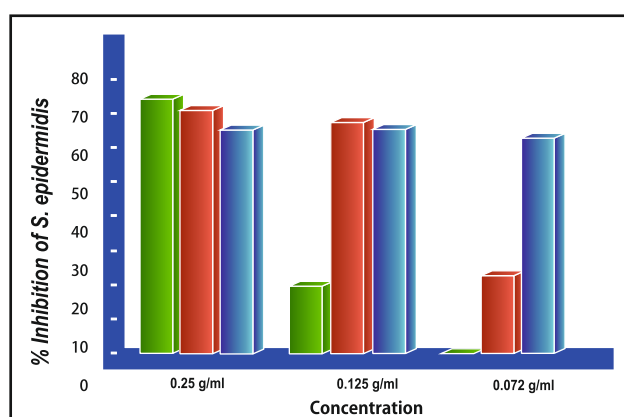


Figure 2: % Inhibition of the *Staphylococcus epidermidis* cell growth treated with *purodil gel* (PG),herbal formulation (HF) and *clindamycin* 1% w/w (CL).

From 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. From 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:

1. S. Kapoor, Swarnalata, Topical herbal therapies an alternative and complementary choice to combat acne, Research Journal of Medicinal Plant, 5(2011) 650-669.
2. P. Hassanzadeh, M. Bahmani, D. Mehrabani, Bacterial resistance to antibiotics in acne vulgaris: An *in vitro* study. Indian J. Dermatol. 53(2008), 122-124.
3. M. Majeed, L. Prakash, Fighting acne and more: effective natural approaches to skin care, Cosmetics and toiletries manufacture worldwide, Sapinsa corporation, USA. (2004) 215-219.
4. T. Tzellos, V. Zampeli, E. Makrantonaki, C.C. Zouboulis, Treating acne with antibiotic-resistant bacteria colonization. Expert Opin. Pharmacother. 12(2011) 1233-1247.
5. S. Pandey, N. Meshya, D. Viral, Herbs play an important role in the field of cosmetics. International Journal of Pharma. Tech. Research. 2(2010) 632-639.
6. S.S. Joo, S.K. Jang, S. Kim, C.J. Geun, H.K. Seok, L.D. Woo, Anti-acne activity of *Selaginella involvens* extract and its nonantibiotic antimicrobial potential on *Propionibacterium acnes*. Phytotherapy Research. 22(2008) 335-339.
7. M. Kanlayavattanukul, N. Lourith, Therapeutic agents and herbs in topical application for acne treatment. Int. J. Cosmet. Sci. 15(2011)1468-2494.
8. G. Amrita, N. Greeshma, M. Deepa, E.H. Poornima, A review on anti-acne potential of medicinal plant extracts against *Propionibacterium acnes*. International Journal Pharm. and Bio Sciences. 3(2012) 987-997.
9. L. Otvos, M. Cudic, Broth microdilution antibacterial assay of peptides. Methods Mol. Biol. 386 (2007) 309-320.

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