JOURNAL OF PHARMACEUTICAL SCIENCE AND BIOSCIENTIFIC RESEARCH (JPSBR)

(An International Peer Reviewed Pharmaceutical Journal that Encourages Innovation and Creativities)

Anti- Acne Activity Possessed by the Extract of Opuntia Ficus-Indica

Shivani Desai

Research Scholar, Shri Jagdishprasad Jhabarmal Tibrewala University, Jhunjhunu, Rajasthan, India 333001

ABSTRACT:

Acne vulgaris, a disorder of pilosebaceous glands, is very common worldwide. It is not a trivial disease. The cutaneous and emotional scars produced by acne may remain lifelong. The onset of acne is during adolescence and almost all the age groups are affected by it. There are various causes of acne development. Some of the causes of acne are drugs, diet, skin hygiene, atmosphere, climate etc. there are various pathological factors which are involved in acne. Follicular epithelium gets hyperkeratinized along with comedone formation. Sebum production is increased. There is proliferation of the bacteria Propionibacterium acnes. Inflammation is caused due to local immune hypersensitivity. Propionibacterium acnes is one of the most common bacteria which causes acne. Opuntia ficus-indica is known to possess antibacterial activity. The extract of the dried prickles of Opuntia ficus-indica was tested for the antibacterial activity by determining the zone of inhibition and minimum inhibitory concentration. Clindamycin was used as the reference standard. The extract of Opuntia ficus-indica had shown the zone of inhibition of 32.2 mm and 29.7 mm for Propionibacterium acnes and Staphylococcus epidermidis, respectively. The minimum inhibitory concentrations of 1.1% v/v and 1.3% v/v were found for Propionibacterium acnes and Staphylococcus epidermidis, respectively. Hence, the extract of Opuntia ficus-indica was found to have comparable potency against acne inducing bacteria. Hence Opuntia ficus-indica can be employed in the preparation of formulations involved in the treatment of acne vulgaris.

KEY WORDS: Anti- acne, Opuntia Ficus-Indica, Clindamycin, pilosebaceous glands, Propionibacterium acnes

Article history:

Received 10 Oct 2015
Revised 16 Oct 2015
Accepted 20 Oct 2015
Available online 01 Nov 2015

Citation:

Desai S. Anti- Acne Activity Possessed by the Extract of Opuntia Ficus-Indica **J Pharm Sci Bioscientific Res**. 2015 5(6):605-608

For Correspondence:

Shivani Desai

Research Scholar, JJT University, Rajasthan, India

(www.jpsbr.org)

INTRODUCTION:

Acne vulgaris, which is very common, is a disorder of pilosebaceous glands. It is not responsible for impairment of overall health but it is not trivial disease. It affects the patient by producing cutaneous and emotional scars which may last for lifetime. It also results in varied number of psychological problems and may result in decreased employability1. Acne affects people with many physical symptoms such as itching, pain, soreness etc. apart from this, it have a deep impact on the patient's quality of life. Cross- sectional and case-control studies were assessed to observe the impairment of acne on the psychological health of the patient. A variety of abnormalities were observed which includes suicidal ideation, depression, psychosomatic symptoms, anxiety, shame, social inhibition and embarrassment. Effective treatment can improve the condition2, 3. There is a correlation of anger with the quality of life in patients suffering from acne. Anger also affects the satisfaction with acne treatment4.

A large population aging from 15 to 17 years are affected by acne. Even though acne is perceived as a teenage disease, it persists into adulthood as well. A population study carried out in Germany reported that 64% of age

group 20-29 years and 43% of age group 30-39 years are having visible acne5. An another study was carried out with 2000 adult volunteers, which reported that 3% of males and 5% of females had mild acne even in the age group of 40-49 years[6]. In early age (before the age of 12years) there is not enough sebum production to support large number of *Propionibacterium acnes*, thus acne occurring at early age are usually more comedonal instead of being inflammatory[7].

There is no clear association of genes and risk factor with the prognosis of acne and its treatment. A great importance of genetic factors have been observed in severe scarring acne. The risk of developing acne doubles with its positive family history. The development of acne in girls is earlier as compared to boys. Some studies reported a correlation between acne and smoking. In polycystic ovary syndrome there is high serum dehydroepiandrosterone and increased insulin resistance. This explanation may be appropriate for the presence of acne in the patients suffering from polycystic ovary syndrome[8, 9]. Monomorphic acne may be precipitated by antiepileptic drugs. Anti- cancer drugs (e.g. gefitinib) may produce acneiform eruptions[10]. Anabolic steroids which are used for increasing the muscle bulk may also lead to development of severe acne forms[11]. Atmospheric conditions also affect the acne conditions. Hot and humid climate increases the chances for acne development[12]. Sunlight, diet and skin hygiene also play a role in acne. A study reported that dairy products, especially milk, increases the risk for acne[13]. According to a study performed by Salma Al Mashat *et al*., 28.4% of the patients suffered from acne due to dietary habits, 20.7% due to bacteria and 15.4% due to poor hygiene. 28.4% of the patients did not know the causes. 3.7% of the patients thought that virus was the cause of acne. 3.3% of the patients related acne to the sexual desire. Hormones were considered as the cause of acne by 88.2% patients[14].

One or more of the following pathological factors are involved in all forms of acne:

- Follicular epithelium gets hyperkeratinized along with comedone formation.
- Sebum production is increased.
- Proliferation of the bacteria *Propionibacterium acnes*.
- Inflammation is caused due to local immune hypersensitivity[15].

It has been recognised that the pus forming bacteria, *Propionibacterium acnes* and *Staphylococcus epidermidis*, triggers the inflammation in the process of causing acne. *Propionibacterium acnes* are anaerobic pathogens. Certain inflammatory mediators and comedogenesis are induced by *Propionibacterium acnes* and hence they play a very important role in the pathogenesis of acne[16, 17].

MATERIALS AND METHODS

The shade dried prickles of *Opuntia ficus-indica* were reduced to fine powder (# 40 size mesh) and around 400 gm of powder was subjected to successive continues hot extraction (soxhlet) with petroleum ether, chloroform, alcohol and water. Each time before extracting with the next solvent the powder material was dried in a hot air oven at 50˚C for one hour. After the effective extraction, the solvents were distilled off, the extracts were then concentrated on water bath and extracts obtained with each solvent were weighed. Its percentage were calculated. The test organisms used in this study were *Propionibacterium acnes* and *Staphylococcus epidermidis*.

Determination of antibacterial activity

The antibacterial activity of *Opuntia ficus-indica* was determined by Disc diffusion method. *Propionibacterium acnes* was incubated in ASLA agar medium for 48 hours under anaerobic conditions and adjusted to yield approximately 1 X 10^8 CFU/ ml. agar plates were swabbed with inoculums. 0.05% polysorbate 80 was added to the agar base used for *Opuntia ficus-indica* extract. Sterile filter paper disc of diameter 6mm were aseptically placed on the inoculated plates and were impregnated with the test material (*Opuntia ficus-indica* extract). The plates were left at ambient temperature for 30 minutes to allow exceed pre diffusion prior to incubation at 37°C for 72 hours under anaerobic conditions in an anaerobic bag with gas pack and indicator tables and the bag was kept in an incubator for 72 hours at 37±1°C.

The culture of *Staphylococcus epidermidis* was prepared in nutrient agar medium at 24 hours under aerobic conditions. Test samples of this aerobic bacterium were incubated at 37°C for 24 hours under aerobic conditions.

The antibacterial activity was estimated by measuring the diameter of the zone of inhibition.

Determination of minimum inhibitor concentration (MIC)

Minimum inhibitory concentration values were determined by agar dilution method.

The test materials were added aseptically to 20 ml aliquots of sterile molten agar at appropriate range of test material. The resulting agar solutions were vortexed at high speed for 15 seconds or until completely dispersed, immediately poured into sterile petri plates then allowed to set for 30 minutes. Plates were then inoculated with the *Propionibacterium acnes*. Inoculated plates were left until the inoculums had set and then incubated under anaerobic conditions at 37°C for 72 hours in gas bag with gas pack and indicator tablets and the bag was kept in an incubator for specified duration at specified temperature.

The test samples of *Staphylococcus epidermidis* were prepared in nutrient agar medium and incubated for 24 hours at 37°C under aerobic conditions. Following the incubation period, the plates were observed and recorded for the presence or absence of growth. From the results, the MIC was recorded as the lowest concentration of test substance where the absence of growth was observed.

Clindamycin was used as a reference standard in this study.

RESULTS AND DISCUSSION

The extract of *Opuntia ficus-indica* had shown the zone of inhibition of 32.2 mm and 29.7 mm for *Propionibacterium acnes* and *Staphylococcus epidermidis*, respectively. The minimum inhibitory concentrations of 1.1% v/v and 1.3% v/v were found for *Propionibacterium acnes* and *Staphylococcus epidermidis*, respectively.

Test Sample	Zone of inhibition (mm)		MIC	
***Opuntia ficus-indica* extract**	***P. acnes***	***S. epidermidis***	***P. acnes***	***S. epidermidis***
	32.2	29.7	1.1% v/v	1.3% v/v
Clindamycin	37.5	33.9	0.7% v/v	0.9% v/v

CONCLUSION

The extract of *Opuntia ficus-indica* was found to have good potency against acne inducing bacteria, viz. *Propionibacterium acnes* and *Staphylococcus epidermidis*.

REFERENCES

1. Guy F. Webster (2002), "Clinical review- Acne vulgaris", British Medical Journal, 325:475-479.
2. Kubota Y. *et al*. (2010), "Community based epidemiological study of psychosocial effects of acne in Japanese adolescents", Journal of Dermatology, 37:617-622.
3. Hahm BJ *et al*. (2009), "Changes of psychiatric parameters ad their relationships by oral isotretinoin in acne patients", Journal of Dermatology, 36:255-261.
4. Rapp DA *et al*. (2004), "Anger and acne: implications for quality of life, patient satisfaction and clinical care", British Journal of Dermatology, 151:183-189.
5. Schafer T. *et al*. (2001), "Epidemiology of acne in the general population: the risk of smoking", British Journal of Dermatology, 145:100-104.
6. Cunliffe WJ *et al*. (1979), "Prevalence of facial acne vulgaris in late adolescence and in adults", British Medical Journal, 1:1109-1110.
7. Friedlander SF *et al*. (2010), "Acne epidemiology and pathophysiology", Semin Cutan Med Surg, 29:2-4.
8. Ehrmann DA (2005), "Polycystic ovary syndrome", England Journal of Medicine, 352:1223-1236.
9. Chen MJ *et al*. (2011), "High serum dehydroepiandrosterone sulfate is associated with phenotypic acne and a reduced risk of abdominal obesity in women with polycystic ovary syndrome", Human Reproduction, 26:227-234.
10. Valeyrie-Allanore L. *et al*. (2007), "Drug- induced skin, nail and hair disorders", Drug Safety, 30:1011-1030.
11. Melnik B. *et al*. (2007), "Abuse of anabolic androgenic steroids and bodybuilding acne: an underestimated healthproblem", J Dtsch Dermatol Ges, 5:110-117.
12. Tucker SB *et al*. (1983), "Occupational tropical acne", Cutis, 31:79-81.

13. Spencer EH *et al*. (2009), "Diet and acne: a review of the evidence", International Journal of Dermatology, 48:339-347.

14. Salma AL Mashat *et al.* (2013), "Acne awareness and perception among population in Jeddah- Saudi Arabia", Journal of the Saudi Society of Dermatology and Dermatologic Surgery, 01-03.

15. Chandan Ray *et al*. (2013), "Acne and its treatment lines", International Journal of Research in Pharmaceutical and Biosciences, 3(1):1-16.

16. Jain A. *et al*. (2002), "Anti-inflammatory effects of erythromycin and tetracycline on *Propionibacterium acnes* induced production of chemotactic factors and reactive oxygen species by human neutrophils", Dermatology online Journal, 8:2.

17. Tsung HT *et al*. (2009), "Invitro antimicrobial and anti-inflammatory effects of herbs against *Propionibacterium acnes*", Food Chemistry, 119:964-968.