

Figure III: Compatibility between Aqueous Extract of *Garcinia mangostana*; Aloe vera Gel and Methyl Paraben

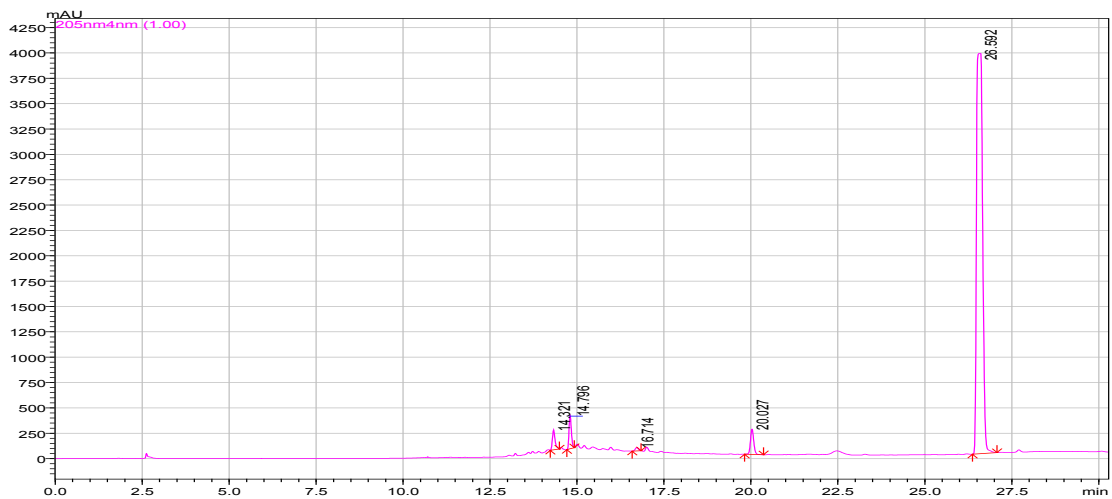


Figure IV: Compatibility between Methanolic Extract of *Garcinia mangostana*, Aloe vera Gel Extract and Propyl Paraben

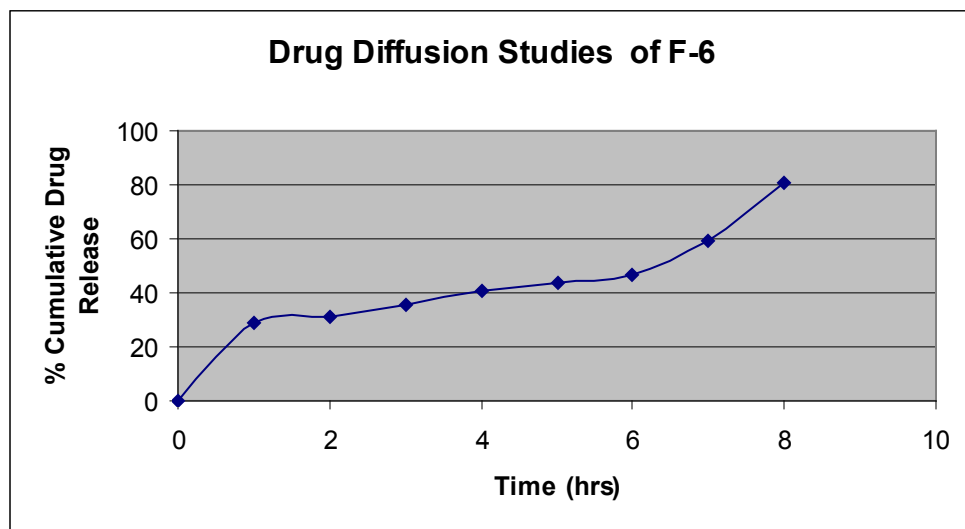


Figure 5: The Drug Diffusion Profile of F-6

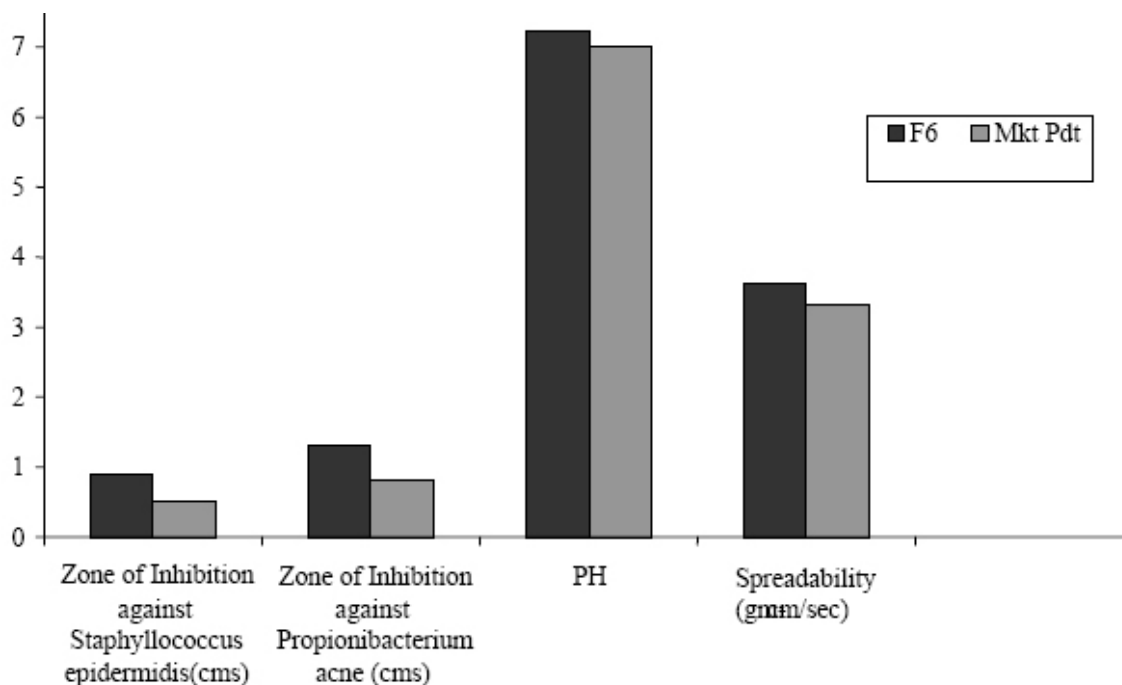


Figure VI: Comparative Evaluation of Gels with Marketed Antiacne Product

**Table IV: Microbial Studies on the Gels**  
**Zone of Inhibition of Poly Herbal Gels against *Staphylococcus epidermidis*:**

Sl. No	Amount of gel	F-1 (cm)	F-2 (cm)	F-3 (cm)	F-4 (cm)	F-5 (cm)	F-6 (cm)
1	500mg (1 MIC)	0.9	0.9	0.9	0.9	0.9	0.9
2	1gm (2 MIC)	1.0	0.9	1.0	0.9	1.0	1.0
3	1.5gm (3 MIC)	1.1	1.0	1.1	1.0	1.1	1.1

**Zone of Inhibition of Poly Herbal Gels against *Propionibacterium acne***

1	500mg (1 MIC)	1.2	1.2	1.9	1.2	1.2	1.3
2	1gm (2 MIC)	1.4	1.4	1.4	1.5	1.4	1.5
3	1.5gm (3 MIC)	1.5	1.6	1.7	1.6	1.6	1.7

The design of a gel for topical delivery is aimed at minimizing the flux of the drug through the stratum corneum and maximizing its retention in the epidermis. Drug diffusion study of the polyherbal gel was essential to confirm that the extract would partition from the vehicle and permeate through the semi permeable membrane which symbolizes the stratum corneum. The study was carried out for a period of 8 hours as shown in Fig V in which the gel demonstrated a maximum % CDR of 81.033% and a flux of 0.0879mg/cm<sup>2</sup>/hr for the aqueous extract of *Garcinia mangostana*. Since the herbal gel has to finally compete with the marketed anti acne gel,

it was deemed fit to conduct the microbial assay on the formulated gels in equivalent quantities (500mg  $\equiv$  1MIC, 1gm  $\equiv$  2MIC and 1.5gm  $\equiv$  3MIC) which showed better zone of inhibition when compared to the marketed clindamycin phosphate gel (500mg of 1% gel) as shown in Table IV.

## DISCUSSION

Currently the problem associated with the antiacne therapy is that the topical products available are either cream based (mostly oily) or associated with adverse effects contributed to their chemical nature. *Garcinia mangostana* is proven (14–15) to be active against methicillin- resistant *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Propionibacterium acne* which are responsible for the outbreak of Acne. The results of the preformulation and antimicrobial studies obtained for the aqueous extract of *Garcinia mangostana* reflect the potential for its delivery as a topical agent for treatment of acne vulgaris which forms the basis of our study. The studies (6) on *Aloe vera* extract have proved to significantly benefit in the control and treatment of acne when used in addition with other antiacne agents. So it was appropriately formulated along with *Garcinia mangostana* extract into a topical herbal aqueous based anti-acne gel. The topical approach is effective because the medication

is applied directly to the lesions and the herbs are less likely to cause side effects. The flux of 0.0879mg/cm<sup>2</sup>/hr obtained for the aqueous extract of *Garcinia mangostana* also demonstrates the potential of the herb for topical delivery. Since the actives are expected to just permeate the skin into the epidermis which is the target for action along with limited absorption, the Log P values(-0.1669) reflect that the mangostins possess ideal hydrophilic-lipophilic balance for permeation into epidermis and solubility values of 44.28ml/gm reflect its low solubility that limits its absorption. The formulated herbal gel also has the added advantage over the currently used antibiotic treatment in the fact that the bacteria which often develop tolerance and resistance to the antibiotics over time may not be seen here.

### CONCLUSION:

Natural remedies are more acceptable in the belief that they are safer with fewer side effects than the synthetic ones. So, a Herbal anti-acne solution which is non-toxic, safe, effective and improves patient compliance by the utilization of herbal extracts would be highly acceptable. In conclusion, the aqueous extracts of *Garcinia mangostana* was formulated along with *Aloe vera* gel into a 1%w/w carbopol-934 gel base in order to deliver it in the form of a non-oily(aqueous) topical therapy for treatment of mild Acne.

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