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Research Article

# FORMULATION AND EVALUATION OF TOPICAL PASTE WITH HONEY MIXTURE

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**ABSTRACT**

In this present study an attempt has been made to formulate a topical paste with honey mixture by using fusion method. Two types of honey mixtures were prepared by using olive oil and gingely oil and named them HM-1 and HM-2 respectively. Two mixtures were evaluated for preliminary antimicrobial activity. From this, HM-1 was selected for formulation of topical paste. The formulated paste was evaluated for pH, spredability, stability, skin irritancy, penetration and anti microbial activity. The pH and spredability of formulated was found to be 6.5 and 9.5 gm/cc respectively. The formulated paste was stable for 120 days. Skin irritancy test shows negative results. Penetration test shows good penetration power and also shown good anti microbial activity when compared with standard drug.

**Keywords:** Topical paste, Honey, Spredability, Skin irritancy, Anti microbial activity.

## INTRODUCTION

Delivery of drugs to the skin is an effective and targeted therapy for dermatological disorders. This route of drug delivery has gained popularity because it avoids first pass effects, gastrointestinal irritation and metabolic degradation associated with oral administration[1]. Due to first pass effect only 25-45% of orally administered dose reaches the blood circulation[2]. In order to bypass these advantages topical formulation has been selected as topical application. The application of medicinal substances to the skin or various body orifices is a concept as old as humanity.

Medications are applied to the skin or inserted into body orifices in liquid, semi solid, solid form. Pastes, ointments, creams and gels are semi solid dosage form intended for topical application[3].

USP defines pastes as semisolid dosage forms that contain one or more drug substances intended for topical application. Pastes adhere reasonably well to the skin and are poorly occlusive. Because of their physical properties, paste may be removed from the skin by use of mineral oil or a vegetable oil.[4]The base may be anhydrous or water soluble. Their stiffness makes them useful as protective coatings.[5]

Honey is having synonyms madhu, madh, mel, purified honey. Honey is a saccharine substance deposited by the hive bee, *Apis mellifera* and other species of Apis belongs to the family Apidae, in the cells of honey comb.[6] It is having pale yellow to reddish brown colour with pleasant, characteristic odour and sweet, slightly acrid taste .It is contains moisture 14-24%, dextrose 23-36%, levulose 30-47%, sucrose0.4-6% with traces amount of dextrin, gums, ash, vitamins and proteins.

It is used for cold, cough, fever, sore eye and throat, tongue and duodenal ulcers, liver disorders, constipation, diarrhoea, kidney and other urinary disorders, pulmonary tuberculosis, marasmus, rickets, scurvy and insomnia.[7] So in this present study we made an attempt to formulate an topical paste with honey mixtures by fusion method.

## MATERIALS AND METHOD

Honey was purchased from Shri Kannan Departmental stores, Coimbatore. Olive oil and gingely oil, bees wax and white soft paraffin from various laboratories of Cherraan's college of Pharmacy, Coimbatore. All chemicals were analytical grade and used as procured.

**Media used**

Muller Hinton agar medium (Hi media)

Sabourand's dextrose agar medium (Hi media)

**Cultures Used**

**Bacteria cultures used**

*Escherichia coli, Staphylococcus aureus, Bacillus subtilis*

*Pseudomonas aeruginosa, Enterococcus faetalis*

*Proteus vulgaris.*

**Fungal cultures used**

*Saccharomyces cerevsiae, Candida albicans*

**Preparation of honey mixtures-1&2**

To weighed quantity of honey, add olive oil and gingely oil in a mortar, mixed well and triturated. Then add small amount of melted bees wax with continuous trituration until smooth and uniform paste was obtained. It was packed in container and labeled it as HM-1 &HM-2 respectively. The composition of honey mixtures were described in table-1.

**Table 1: Composition of honey mixtures**

| S. no | Ingredients | Honey mixture-I | honey mixture-II |
|---|---|---|---|
| 1. | Honey | 50% | 50% |
| 2. | Bees wax | 21% | 21% |
| 3. | Olive oil | 29% | - |
| 4. | Gingely oil | - | 29% |

**Preliminary antimicrobial studies of honey mixtures: [14]**

The prepared honey mixtures were evaluated for preliminary anti microbial studies by using cup plate method. The results were represented in table-2.

From this study, honey mixture-1 was selected for the formulation of topical paste.

**Table 2: Preliminary antimicrobial studies of honey mixtures**

| S.no | Name of strains | Diameter of zone of inhibition(in mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | H1 | H2 | O1 | O2 | HM1 | HM2 |
| 1. | *Escherechia coli* | 10 | 12 | 11.25 | 9 | 17.25 | 10 |
| 2. | *Proteus vulgaris* | 20 | 14 | 10 | 10 | 19.25 | 11 |
| 3. | *Pseudomonas aeruginosa* | 15 | 11 | 11 | 10 | 18.30 | 11.75 |
| 4. | *Staphylococcus aureus* | 18 | 12 | 13 | 11 | 10.5 | 10.5 |
| 5. | *Enterococcus faetalis* | 10 | 9 | 9 | 10 | 32.5 | 12 |
| 6. | *Bacillus subtilis* | 17 | 12 | 11 | 13 | 15 | 12 |

H-honey, O1-olive oil, O2–gingely oil, HM-honey mixture

**Formulation of paste[8]**

Mix the required quantity of starch powder (25%) and the honey mixture-1 (25%) in a mortar. Melt the white soft paraffin (50%) on water bath and add small amount of melted base with continuous triturating until smooth. Gradually add remainder of the base and mix until cool and a uniform paste obtained, pack in a suitable container.

**Determination of pH[9]**

pH of ideal formulation was determined by 1% aqueous solution using digital pH meter (ELICO INDIA). PH of formulation represented in table-3.

**Determination of spreadability[10]**

For the determination of spreadability excess of sample was applied in between two glass slides and was compressed to uniform thickness by placing 1000 gm weight for 5 minutes. The time required to separate the two slides i.e., the time in which upper glass slide moves over the lower plate was taken as measure of spreadability(s).

S=m×l/t

Where; m=weight tide to upper slide,

l=length moved on glass slide,

t=time taken.

Spreadability of formulated was represented in table-3.

**Table 3: Physiochemical properties**

| S. no | Formulation | pH | Spreadability |
|---|---|---|---|
| 1. | Topical paste | 6.5 | 9.8 |

**Stability studies[11]**

The selected formulation was packed in a wide mouth container stored at room temperature and examined for 120 days. Results were tabulated in table-4

**Table 4: Stability of formulation**

| S. no | formulation | Stability studies | In days | | | | |
|---|---|---|---|---|---|---|---|
| | | 15 | 30 | 45 | 60 | 90 | 120 |
| 1. | Topical paste | S | S | S | S | S | S |

**S**-stable

**Skin irritation test[12]**

Patches on the back of the rat were shaved and slightly abraded to make them more sensitive. The herbal formulation was placed on the patches and covered with gauze for 4 hours. The skin was observed for signs of redness, inflammation, weeping or scabs.

**Penetration test[13]**

The rabbits were taken and were divided into two groups, each of 2 rabbits, for assessing penetration. Weighed quantity of the formulated paste was rubbed over definite areas of the skin (2.5 cm) for a given length of time (1 hour).Thereafter the unabsorbed paste was collected from the skin and weighed. The differences between the two weights roughly represent the amount absorbed. The penetration power of the formulated paste was shown in table-5.

**Table 5: Penetration test**

| S. no | Sample | Amount applied in grams | Amount of unabsorbed paste | Amount of absorbed paste in 1 hour |
|---|---|---|---|---|
| 1. | Paste | 0.5g | 0.1260g | 0.3740g |
| 2. | standard | 0.5g | 0.2240g | 0.2760g |

**Antimicrobial activity study[14]**

**Anti bacterial activity**

Anti bacterial activity of formulated paste was studied by standard agar diffusion method. The sterilized Muller Hinton agar medium was poured into the sterile petridish and allow for solidification. The inoculation of selected bacterial suspension was done by spreading with sterile cotton swabs. After 10 minutes holes of about 4-5mm in diameter were bored in the medium with sterile borer. The formulation and the standard paste was placed and kept for 4 hours at room temperature for diffusion and then kept in incubator at $37^0$ C. After 18-24 hours of incubation, the diameter of zone of inhibition around each hole was observed. The results were represented in the table-6.

**Table 6: Antibacterial activity of paste**

| S. no | Name of strains used | Diameter of zone of inhibition(in mm) | |
|---|---|---|---|
| | | paste | standard |
| 1. | *Escherechia coli* | 17.75 | 18.25 |
| 2. | *Proteus vulgaris* | 12.75 | 17.25 |
| 3. | *Pseudomonas aeruginosa* | 20 | 10.5 |
| 4. | *Staphylococcus aureus* | 14.5 | 11.5 |
| 5. | *Enterococcus faetalis* | 13.25 | 25.5 |
| 6. | *Bacillus subtilis* | 12.75 | 14.75 |

**Anti fungal activity**

Anti fungal activity of formulated paste was studied by standard agar diffusion method. The sterilized Sabourand's dextrose agar medium was poured into the sterile petridish and allow for solidification. The inoculation of selected fungal suspension was done by spreading with sterile cotton swabs. After 10 minutes holes of about 4-5mm in diameter were bored in the medium with sterile borer. The formulation and the standard paste was placed and kept for 4 hours at room temperature for diffusion and then kept in incubator at $37^0$ C. After 18-24 hours of incubation, the diameter of zone of inhibition around each hole was observed. The results were represented in the table-7.

**Table 7: Anti fungal activity of paste**

| S. no | Name of strains used | Diameter of zone of inhibition (in mm) | |
|---|---|---|---|
| | | Paste | Standard |
| 1. | *Candida albicans* | 12.5 | 10.5 |
| 2. | *Saccharomyces cerevisiae* | 11.5 | 10.75 |

**RESULTS AND DISCUSSION**

The pH of formulated paste was found to be 6.5, which lies in normal pH range of the skin. Spredability is the parameter which helps in the uniform application of paste to the skin. A good paste takes less time to spread and will have high credibility. Spredability of ideal formulation was found to be 9.8.Stability studies found that formulation shown stable until 120 days.

Skin irritancy studies revealed that the formulated paste was shown negative results. Penetration test resulted that the formulated paste shown good penetration power. Anti microbial activity resulted that formulated paste shown good activity when compared with standard paste and shown higher sensitivity towards gram negative bacteria pseudomonas aeruginosa. The order of sensitivity is as follows: Pseudomonas aeruginosa > Escherechia coli > Staphylococcus aureus >Enterococcus faetalis > Bacillus subtilis = Proteus vulgaris.

**CONCLUSION**

The topical formulation with honey mixtures was shown good physiochemical properties and also shown good anti microbial activity when compared with standard paste. These results suggest that the feasibility of topical paste with honey mixture. However the

preclinical studies of this formulation need to be done. Further investigation can be carried out to establish in vivo and in vitro release pattern in animal models and human volunteers can be patented.

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