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# PHARMACEUTICAL DEVELOPMENT OF *MARHAM ZANGAR* AS A NEW UNANI SURGICAL DRESSING MATERIAL FOR NON HEALING WOUNDS

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## ABSTRACT

Chronic wounds represent an increasing burden to healthcare systems as the age of the population increases. Current guidelines for antibiotic prescribing for such wounds are often based on the expert opinion rather than scientific fact, and may present difficulties in interpretation and implementation to the clinician. The increasing prevalence of antibiotic resistance is widely recognized, and even emergence of multi-drug resistant bacteria (MDRB) has been observed that a wide variety of antibiotics are no longer effective in lower limb infection.[3] In Unani system of medicine, non healing wounds/ulcers are known as *Quruh-e-usr indamal* or *Quruh-e-khabeesa* and its treatment is mentioned by the Unani physicians. *Marham Zangar* is a famous Unani compound formulation mentioned in the National Formulary of Unani medicine (NFUM), Part-I. This formulation is used for the treatment for infected and septic wounds and specifically for non healing wounds/ulcers. Thus, it is the need of the hour to search an effective and safe medicament from the vast Unani classical literature. In the present study a serious effort has been made to design and develop *Marham Zangar* into the *tulle gras* form.

**KEYWORDS:** *Quruh-e-usr indamal*/Non healing wound/ulcer, *Marham Zangar*, *tulle gras*.

## INTRODUCTION

The origin of Unani system of medicine dates back to the ancient Greece. The great Unani physician Buqrat / Hippocrates (460-377 BC) was the Greek philosopher-physician who

freed medicine from the clutches of magic and superstition, and laid foundation of scientific medicine.[1] Wound is defined as disruption of structural and physiological continuity of a living tissue. It may be produced by physical, chemical, thermal, microbial, or immunological damage to the tissues. Chronic wounds are those which do not follow normal wound healing trajectory or in other words "wounds/ulcers older than 3 months of age".[2] The treatment of wounds is the oldest surgical problem. Mankind has always been prone to accidental cuts and bruises, and mortal strife has led to the infliction of innumerable wounds in all ages of which we have record. Chronic wounds represent an increasing burden to healthcare systems as the age of the population increases. Current guidelines for antibiotic prescribing for such wounds are often based on the expert opinion rather than scientific fact, and may present difficulties in interpretation and implementation to the clinician. The increasing prevalence of antibiotic resistance is widely recognized, and even emergence of multi-drug resistant bacteria (MDRB) has been observed that a wide variety of antibiotics are no longer effective in lower limb infection.[3]

In Unani system of medicine, non healing wounds/ulcers are known as *Quruh-e-usr indamal* or *Quruh-e-khabeesa* and its treatment is mentioned by the Unani physicians. This formulation is used for the treatment for infected and septic wounds and specifically for non healing wounds/ulcers.[4, 5, 6, 7, 8, 9, 10] *Marham Zangar* is a famous Unani compound formulation mentioned in the National Formulary of Unani medicine (NFUM), Part-I.

Present study was carried out to pharmaceutically develop *tulle gras* dressing as a modified form of *Marham Zangar* and to set standard operating procedures (SOPs) for *tulle gras* dressing as a modified form of *Marham Zangar*.

## MATERIALS AND METHODS

The ingredients of *Marham Zangar* i.e. *Behrozah*, *Roghan-e-Gul*, *Zangar* were procured from Khari Baoli, old Delhi. These were authenticated by NISCAIR and Shree Krishna Laboratories, New Delhi. The sterile paraffin gauze dressing (Cuticell classic B.P.) was purchased from surgical goods market, Delhi.

### Preparation of *Marham Zangar*

**1. Separation of foreign matter of crude drugs**

All the foreign matter were inspected on a thin layer of crude drugs on a white paper with unaided eye and removed, separately. All drugs were separately weighed.

**2. Powdering of drugs**

The ingredients were taken in the ratios as mentioned in the National Formulary of Unani Medicine (NFUM), Part-I. The following steps were taken before powdering the drugs:

i. Earthy and other waste materials were separated and dried under shade to remove the moisture
ii. Before powdering, each drug was pounded by the mortar and pestle.
iii. *Zangar* and *Behrozah* were made powder separately through 120 no sieve.

**3. Preparation of different gelling agents for the compatibility with *Marham Zangar***

Different gelling agents (Sodium alginate, Chitosan, Hydroxy propyl methyl cellulose, Carbopol 940) were prepared in 1%, 2%, 3%, 4% concentration, respectively and Sodium alginate gel base in a concentration of 2% was found suitable for making gel of *Marham Zangar*.

**3. Mixing of ingredients**

*i.* *Roghan e Gul* was taken in a pre dried glass beaker.
*ii.* *Zangar* was mixed gradually in it on a magnetic stirrer for about 10 minutes.
*iii.* *Behrozah* was mixed gradually in this solution on magnetic stirrer, this process was continued till both drugs mixed well in the *Roghan e Gul*.
*iv.* *Marham Zangar was prepared.*
*v.* *Marham Zangar* was mixed gradually in sodium alginate gel base (2%) on magnetic stirrer for 1 hour.
*vi.* *Marham Zangar* modified as gel was prepared.

**4. Preparation of *tulle gras* surgical bandage the modified form of *Marham Zangar***

A sterile paraffin gauze B.P. (Cuticell Classic) 10×10 cm was taken and dipped in a beaker containing *Marham Zangar* modified as gel and it was left to be dried.

**Physico-Chemical Evaluation of *tulle gras* surgical bandage the modified form of *Marham Zangar***

**1. Organoleptic properties:**

**a. Physical Appearance:** Appearance was recorded according to the consistency whether semisolid, semi-liquid etc.

**b. Determination of shape:** The shape of the tulle dressing was noted.

**c. Determination of size:** The size of the tulle dressing was noted.

**d. Determination of Colour:** The color of the tulle dressing was noted.

**e. Determination of Taste:** This was done by asking the volunteer to taste the formulation.

**f. Determination of Odor:** Tulle dressing was examined for odor by slow and repeated inhalation of air over the material.

**g. Determination of homogeneity:** Homogeneity of formulation on tulle dressing was noted.

**h. Determination of smoothness:** Smoothness of the tulle gras dressing was noted.

**i. Determination of stickiness:** stickiness of the tulle gras dressing was noted.

**2. Determination of pH**

**(i) pH of 1% solution:** 1 gm of drug was weighed and dissolved in accurately measured 100 ml of ethyl alcohol, then filtered and pH was checked with a standardized glass electrode.

**(ii) pH of 10% solution:** 10 gm of drug was weighed and dissolved in accurately measured 100 ml of ethyl alcohol, then filtered and pH was checked with a standardized glass electrode.[11]

**3. Determination of moisture absorption rate**

The rate of total amount of moisture absorbed by a dressing was determined by the following method, the paraffin based *Marham Zangar* dressing (10x10 cm) was dipped in water (25ºC) in a square plate for 5 minutes, then took the dressings out of the water for 1 minute, and weighed them in a balance . The procedure was repeated this 10 times and calculated the average values. The calculation was done with the following formula:

Absorption rate (C%) = (Wb-Wa)/Wa × 100%, where Wa and Wb were the weight of the dressings before and after immersion in water.[12]

**4. Drug Uniformity**

The Drug content of gel of *Marham Zangar* was found to be uniformly distributed over the paraffin gauze. Uniformity of drug content throughout the formulation is important parameter shows the homogeneity of drug content.

**5. Determination of Microbial load:**

Ten gm/ml of the drug was diluted to 100 ml with sodium chloride peptone solution (pH 7.0).

**(i) Total bacterial count:** 1 ml of pre-treated sample of drug in each of 2 petri dishes (90 mm dia.) + 15 ml of casein – soyabean digest agar medium at 40° to 45°C, Incubated at 30°C to35°C for 3 to 5 days. This sample was examined with the help of microscope.

**(ii) Total Fungal count:** 1 ml of pre-treated sample in each of 2 petri dishes (90 mm dia.) + 15 ml of casein – soyabean digest agar medium at 40° to 45°C, Incubated at 30°C to35°C for 3 to 5 days. This sample was examined with the help of microscope.[13]

**7. Determination of adhesiveness**

The bioadhesive strength of the *tulle gras* dressing was evaluated by the modified method of Wong et al. The measurement was conducted with a texture analyzer equipped with a 5-kg load cell and bioadhesion test rig. Chicken back skin was used as a model tissue. As follows, the skin taken from a freshly slaughtered animal was used after the removal of all the fats and debris. The dermal tissue was fitted on the bioadhesion test rig, and then 100 µL of distilled water was applied on the surface of the tissue before the study. The tests were done at 37-C. The *tulle gras* dressing was cut into a circular shape and attached to the P/10 cylindrical Perspex probe with double-sided adhesive tape. The probe was lowered onto the surface of the tissue with a constant speed of 1 mm/s−1 and contact force of 1 N applied.

After keeping in contact for 30 seconds, the probe was then moved vertically upwards at a constant speed of 1 mm/s−1. Work of adhesion (mJ/cm2) and peak detachment force (N/cm2) were calculated. Each experiment was performed 3 times.[14]

**8. Anti microbial activity**

**(i) Anti microbial activity against E. coli**

10 ml of pre-treated sample to 50 ml of Casein soyabean digest broth, incubate at 30 to 35°C for 18 to 24 hours, 1 ml of above + 100 ml of McConkey broth, incubate at 42° to 44°C for 24 to 48 hours. Subculture on plates of Mckonkey agar & incubate at 30 to 35˚C for 18 to 72 hours.

**(ii) Anti microbial activity against Pseudomonas aeruginosa**

10 ml of pre-treated sample to 100 ml of Casein soyabean digest broth, incubate at 30° to 35°C for 18 to 24 hours, subculture on Cetrimide agar, incubate at 30 to 35°C for 18 to 72 hours. If growth occurs streak the colonies on Pseudomonas agar for detection of fluroscein & Pseudomonas agar for detection of pyocyanin at 33 to 37 ˚C for 3 to 4 days. Examine under U.V light.

**(iii) Anti microbial activity against Staphylococcus aureus**

10 ml of pre-treated sample to 50 ml Casein soyabean digest broth, incubate at 30° to 35°C for 18 to 24 hours, streak on Mannitol salt agar at 30 to 35 ˚C for 18 to 72 hours.[13]

## RESULTS AND DISCUSSION

Present study was carried out to pharmaceutically develop *tulle gras* dressing as a modified form of *Marham Zangar* and to set standard operating procedures (SOPs) for *tulle gras* dressing as a modified form of *Marham Zangar*. Formulation was made in three batches and their mean value was calculated, and their organoleptic, physico-chemical and other tests were carried out.

- **Organoleptic properties**

**Table 1: Organoleptic description of *tulle gras* dressing of *Marham Zangar***

| | |
|---|---|
| **Appearance** | Gelly |
| **Shape** | Square shaped bandage. |
| **Size** | 10×10 cm. |
| **Color** | Light Green. |
| **Odor** | Agreeable odor. |
| **Taste** | Bitter. |

**Table 2: Moisture content and microbial load**

| | |
|---|---|
| **Moisture Content** | 15.0% |
| **Total Bacterial Count** | 1450 micro-organism/gm |
| **Total Fungal Count** | Absent/gm |
| **Homogeneity** | Homogenous. |
| **Smoothness** | Smooth. |
| **Stickiness** | Moderately sticky |

**1. pH of the *Marham Zangar* gel**

The pH of gel of *Marham Zangar* was found to be 6.03±0.01 and 5.85±0.02 in 1% and 10% solution respectively. An acidic or alkaline formulation is bound to cause irritation on skin, subcutaneous tissues and mucosal membrane and hence this parameter assumes significance while developing a muco-adhesive formulation.

**Table 3: pH of *Marham Zangar* modified as gel**

| S. No. | pH 1% | pH 10% |
|---|---|---|
| 1. | 6.01 | 5.91 |
| 2. | 6.07 | 5.81 |
| 3. | 6.02 | 5.84 |
| **Mean ± SD** | 6.03±0.01 | 5.85±0.02 |

**2. Drug content uniformity**

The drug content of gel of *Marham Zangar* was found to be uniformly distributed over the Cuticell classic paraffin gauze. Uniformity of drug content throughout the formulation is important parameter shows the homogeneity of drug content.

**3. Determination of Moisture absorption**

The total amount of moisture absorbed by the paraffin based *Marham Zangar* dressing was calculated and it was found to be 15%. Since moisture is also an important factor for wound healing, the presence of moisture avoids the delays in healing response, which occur when wounds are allowed to dry out.

**4. Determination of Microbial load**

(i) Total bacterial count was 1450 micro-organism/gm and that was within permissible limit.

(ii) Fungus was absent in the *tulle gras* bandage the modified form of *Marham Zangar.*

**5. Anti-microbial activity**

Anti-microbial activity of *tulle gras* bandage of the modified form of *Marham Zangar* was seen on P. aeruginosa, S. aureus and E. coli bacteria.

**6. Determination of adhesiveness:** The bioadhesiveness of the dressing was evaluated by using Texture analyser, and it was found to be 1.871 ± 0.050.

**CONCLUSION**

There is no effective treatment available for the non healing ulcer in the conventional system of medicine. Antibiotic prescribing for non healing wounds is often based on expert opinion rather than scientific fact and may present difficulties in interpretation and implementation to

the clinicians. Further, the increasing prevalence of antibiotic resistance is widely recognized. But Unani pharmacopoeias mention a number of formulations to treat non healing wounds/ulcers. Of these, *Marham Zangar* has been recommended for this clinical indication. So, in the present study *Marham Zangar* was designed and developed into *tulle gras* due to the fact that *marham* has many shortfalls, such as it sticks to the wound, a thick layer of *marham* can cause infection, its repeated application, it is not user friendly etc.

In the modified *tulle gras* bandage form, the significant parameters, such as organoleptic properties, pH, moisture absorption, drug uniformity, microbial load and anti microbial activity were carried out. These parameters defined the significance modified form i.e, *tulle gras* bandage.

So this *tulle gras* dressing can be a taken as a better alternative in place of classical dosage form of *Marham Zangar* with regard to the shortcomings found in the pharmacopoeial formulation. This study will be helpful in preparing the classical form of *Marham Zangar* and newly designed and developed dosage form i.e, *tulle gras* dressing along with its standard procedure by adopting Standard Operating Procedures (SOPs).

Further, a clinical study is warranted to evaluate therapeutic efficacy and safety of the newly designed and developed dosage form vis-à-vis *Marham Zangar*. This would fill the gap of evidence-based Unani therapeutics as well as pharmaceutics.

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