Comparison of the ficus for the wound healing activity in various species

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ABSTRACT

Injuries and wounds are any sorts of damage to the skin or subcutaneous tissue. Usually, any wounds of such sorts are self-healed. Sometimes, there may be a delay in healing, and that delay is caused due to the functional delays in various processes of wound healing. All the Ficus plants show similar activities like the antioxidant, anti-inflammatory and wound healing properties including skin conditions like ulcers and rheumatism. The anthelmintic property and immunomodulatory are also seen. The herbal extracts of the same family of Ficus in different plants were investigated for the wound healing activity in the excision wound method, and the extracts showed significant activity compared to the drug. All the extracts showed a better healing ability, but the extract of FBO-100 showed the highest activity followed by FMO followed by FHO and finally the FRO. Overall, the activity of the extract ointment was comparable and was significant compared to the standard drug ointment. The wound closure of the extract ointment treated groups were better and were completed in 12 days, and the activity was more than 96%. The herbal extracts of the same family of Ficus in different plants were investigated for the wound healing activity in the excision wound method, and the extracts showed significant activity compared to the drug. The plants of microcarpa, benghalensis, religiosa and hispida are compared for the activity, and the order showed for the activity was FBO>FMO>FHO>FRO.

INTRODUCTION

Injuries and wounds are any sorts of damage to the skin or subcutaneous tissue. Usually, any wounds of such sorts are self-healed. Sometimes, there may be a delay in healing, and that delay is caused due to the functional delays in various processes of wound healing. There are three stages of wound healing. They are as follows.

a. The inflammatory stage is the response of the body to the wound. When the wound occurs in the body, the immediate reaction to the wound is sent to the immune system, and the inflammatory mediators like the prostaglandins and interleukins are released into the bloodstream where they travel to the site of injury and start the healing process.

b. In the proliferative stage, the inflammatory mediators will start to show their activity in the site of action. They initiate the collagen synthesis, and the deposition of the collagen fibre in the wound will make the granular tissue function to heal the wound. The epithelialization starts with this stage, and the base is of the wound is filled with the tissue of collagen.

c. In the remodelling stage, the epithelialization
reached to the maximum extent and is then starts to form an eschar over the wound surface area. This would be eventually leading to the loosening and breakage of the eschar so that wound is healed completely.

There are no available synthetic drugs that act best to treat the wounds by acting on the wounds and also reducing the pain and inflammation at the same time. This the reason the focus has been shifted towards the herbal origin drugs for the treatment of the wounds. The herbs have been used to heal the wounds to cover them and slowly heal them from the evolution of humanity. The herbs have been delivering numerous lead molecules that contain many medicinal properties, and the wound healing ability is one among them [1, 2].

All the Ficus plants show similar activities like the antioxidant, anti-inflammatory and wound healing properties, including skin conditions like ulcers and rheumatism [3–5]. The anthelmintic property and immunomodulatory are also seen [6, 7]. They are also proven to contain the antidiabetic properties, too [8, 9]. So in this current work, the investigation is to be performed by comparing the four species of Ficus (Benghalensis, Religiosa, Microcarpa and hispida) for the wound healing activity simultaneously and to report the same.

**Extraction and preparation**

The leaves of the four species of the plants were collected and then dried to prepare herbarium. The voucher was stored in the laboratory. 1kg of leaves was collected and dried under the batch drum dryer. The leaves were spread over a tray and then inserted into the dryer. The temperature was set to 40°C for about three days. They were occasionally spread out to ensure the even drying of the leaves. The dried parts were then collected and pounded to get a fine powder which was passes on a sieve and even sized. The powder was then used for extraction by ultrasound-assisted extracted with the temperature of the bath was maintained at 45°C, and the power was set to 75%. The frequency was set at 3500KHz, so these parameters were set as constant, and the powders were soaked in the distilled water for extraction. The extraction was carried out to about 2days, and the macerate was then filtered off. The filtrate was collected and dried out using a rotary evaporator. This crude extract was then weighed, and the percentage yields were calculated as below; Benghalensis-18.4%; Microcarpa-17.4%; hispida-19.3% and religiosa-17.9%w/w. the extracts were then suspended in the ointment base of paraffin for the investigation of the activity after naming the extracts as FBO-100, FMO-100, FHO-100 and FRO-100 which had a final concentration of the drug at 100mg/g of the ointment

**Animal treatment**

Albino Wistar healthy rats were bough from the supplier which were of both the male and female rats, which weighed about 185-200g and were looking healthy. The rats were given with good standard pellet diet and the water freely to will in the cages isolated them batch-wise. The air controlled and normal humid environment was maintained to adapt the animals in the laboratory appropriately. After that, the rats were used for the study.

**Creation of the excision wound**

Thirty animals were taken are given the ether anaesthesia in the intraperitoneal route for about 2mins. When the rats fell unconscious, then the back of the rats was shaved using a clipper [10], and the rats were let to rest and get entirely unconscious. Now with a sterile surgical blade, the excision of the skin was done by marking an area of 500mm using a stencil marker. The excision wound was about 400mm in the area [11]. The rats were grouped into six groups of 5 animals in each group with having all the male and female rats arranged randomly. The groups are named as 1-6, and the drug administration is as follows.

Group I-these rats were given the normal saline on the wound, which was 1% in concentration with a sterilizing agent incorporated into it.

Group II-these rats were given the standard drug ointment, Betadine, which is 5% concentration on the wound topically [12].

Group III-these rats were given the Extract ointment FBO-100 topically, which is 100mg/g concentration.

Group IV-these rats were given the Extract ointment FMO-100 topically, which is 100mg/g concentration.

Group V-these rats were given the Extract ointment FRO-100 topically, which is 100mg/g concentration.

Group VI-these rats were given the Extract ointment FHO-100 topically, which is 100mg/g concentration.

The experiments were continued till 15 days, wherein the measurement of the wound surface was the criteria for analysis of the activity. The wound healing of the extracts was also measured using the graphs and extrapolated and compared. The excellent surface area was measured for every 1,3,6,9,12 and 15th day for all the rats. The percentage of protection was calculated.
Table 1: Comparison of the wound healing of the Ficus species

<table>
<thead>
<tr>
<th>Groups</th>
<th>Wound area (mm²)</th>
<th>% protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st Day</td>
<td>3rd Day</td>
</tr>
<tr>
<td>Normal group</td>
<td>403±0.72</td>
<td>384.4±1.01</td>
</tr>
<tr>
<td>Standard Betadine</td>
<td>404±0.823</td>
<td>371.0±0.82</td>
</tr>
<tr>
<td>FMO-100</td>
<td>405±0.647</td>
<td>355.2±0.11a</td>
</tr>
<tr>
<td>FHO-100</td>
<td>404±0.911</td>
<td>354.8±0.7a</td>
</tr>
<tr>
<td>FBO-100</td>
<td>405±0.989</td>
<td>355.13±0.8a</td>
</tr>
<tr>
<td>FRO-100</td>
<td>401±0.719</td>
<td>353.9±0.6a</td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION

Wounds that are created by the excision model took a long while to heal and the wound entirely in the regular groups, which was given only saline solution. All the wounds looked clean and not infected. The wounds were healed in this group in 20 days. The wound took all the three stages of the healing process to heal, and the differences were due to the mechanism of the body, responding to the process [13].

All the extracts showed a better healing ability, but the extract of FBO-100 showed the highest activity followed by FMO followed by FHO and finally the FRO. Overall, the activity of the extract ointment was comparable and was significant compared to the standard drug ointment. The wound closure of the extract ointment treated groups were better and were completed in 12 days, and the activity was more than 96% [Table 1][Figure 1].

CONCLUSION

The herbal extracts of the same family of Ficus in different plants were investigated for the wound healing activity in the excision wound method, and the extracts showed significant activity compared to the drug. The plants of microcarpa, benghalensis, religiosa and hispida are compared for the activity, and the order showed for the activity was FBO>FMO>FHO>FRO.

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Conflict of Interest

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