



Ameliorative property of *Teucrium polium* on second degree burn

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ABSTRACT

Introduction: Traditionally, burn wound healing activities have been claimed for *Teucrium polium*. *Teucrium polium* possesses antioxidant and inflammatory activities and seems to ameliorate burn wound healing. This study was performed to evaluate the effects of *Teucrium polium* on burn healing in Balb/C mice.

Materials and Methods: In this preclinical experimental study 56 mice were randomly designated into 4 equal groups. Burn wounds were made using a hot plate with a surface area of 1.5 cm². Animals were treated with Teucrium 2%, Silver sulfadiazine or Vaseline 2 times per day for 21 days. The forth group received no treatment.

Results: The percentage of burn wounds healing and total time required for complete healing were evaluated and compared in different groups. Data were analyzed using ANOVA test.

Conclusion: Teucrium extract accelerated the burn wound healing more rapidly than control groups ($p < 0.01$). *Teucrium polium* is effective on burn wounds healing and might be beneficial in these groups of patients.

Implication for health policy/practice/research/medical education:

Teucrium polium is effective on burn wounds healing and seems be beneficial in these groups of patients.

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Introduction

A burn is a type of injury to skin caused by heat, chemicals, radiation, electricity or friction. Burns and their consequences are the major causes of mortality in the world. Every year, about 1200000 people in The United States are affected by burn which must be treated (1). Healing of Skin wound is a process which is performed by cooperation of tissues, cells and different factors (2). Among the most important reasons of delay in wound healing is remaining inflammation or insufficient blood vessel formation. *Teucrium polium* L is a plant in the family Labiatae with wooden, highly distributed parts in bottom, 40 cm in height and its leaves are long and narrow with fringed and dentate edges. This plant is distributed in different regions of Iran (north, south, west, center and semi-arid mountains) (3). This plant contains tannin, terpenoid, saponin, sterol, flavonoid, Leucoanthocyanin and also has antibacterial effects but has not any clear fungal effect.

By now, no study has been conducted on the effects of this

medicinal plant on burn wound healing. One of important things which should be considered regarding burn wounds is the delay in healing which may affect the conditions of the patients affected by burn. Finding natural substances accelerating healing process with few side effects could create important change in burn wounds healing. Traditional using of medicinal herb *Teucrium polium* L as wound healing is popular between people in Chaharmahal and Bakhtiari province and in recent years anti-inflammatory effects of this plant has been reported. But by now no study has been conducted on its burn wounds healing. So this study was conducted in order to consider remedial effects of *Teucrium polium* extract on burn wound healing process in Balb/c mice.

Materials and Methods

In this experimental study 56 Balb/C mice with approximate weight of 30±3 gram were selected. After anesthesia and creating burn wound, with an area of 1.5 cm² by hot metal plate

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on back of the mice and confirmation of second-degree burn, the mice were divided to 4 equal groups. They were treated with extract of the 2% *Teucrium polium*, Silver Sulfadiazine cream 1%, Vaseline or nothing. Animals were maintained in normal conditions 22–25°C, 50% humidity, 12 hours cycle of darkness-lightness and normal nutrition in individual cages. In order to provide wound, the back area was completely cleaned and disinfected by alcohol and cotton. After anesthesia by injection of the ketamine and xylazine mixture and removing hairs of animal back second degree burn was induced on the back of them. To do this, a hot circle metal plate with the area of 1.5 cm² was placed on the back of the fifth thoracic vertebrae for 10 seconds. In each group, two times each day 1mm of the provided pomade was used on wounds in such a way total area of wound and its surroundings were covered by pomade. No substance was used on wounds in control group. All wounds were left without dressing. Microbiology experiments on used pomade showed no microbial infection. After providing wound until complete healing, photographs were taken from the wounds on days 1, 7, 14, and 21 after making animal anesthetized. Same Photography condition during experiment period was considered. Area of wound using provided photos and video image analysis software was calculated carefully and then healing percentage was calculated in different days based on following formula (4,5):

Percentage of the wound = surface of the wound on day 1/surface of the wound in intended day × 100

Percentage of the recovery (healing) = Percentage of the wound - 100

For general comparison of groups, first the ANOVA test and then the Dunnett's test were used. P < 0.05 was considered statistically significant.

Results

Apparent healing results of the second-degree burn wound in groups using *Teucrium polium* 2%, Silver Sulfadiazine cream 1%, Vaseline and control group, in seventh, fourteenth and twenty one days of study, the ANOVA test and the Dunnett post-hoc test showed that there is significant difference between first group and control groups (p < 0.05). Results of healing in groups 2 and 3 were different from control group (p < 0.05; Table 1).

Results of the histopathologic comparison of samples showed that in comparison with control group, the group which received *Teucrium polium* had better reconstruction of the epithelial cells; fibrotic reaction was more extended and less bleeding was seen in the area of burn on days 7 and 14. Fibroplasia process in place of burn in these groups was more progressed and less edema

Table 1. Percentage of the wound recovery in different groups and comparison of the healing process in considered groups.

Study time	Groups			
	<i>T. polium</i> 2%	Silver	Vaseline	Control
Day 7	19.7	24.8	10.0	23.3
Day 14	65.9	70.8	61.1	66.3
Day 21	91.5	76.2	80.8	75.3
P Value	0.0	0.9	0.3	1

Based on Dunnett post-hoc test in comparison to day 21 with control
Percentage of the wound = surface of the wound on day 1/surface of the wound in intended day × 100

Percentage of the recovery (healing) = Percentage of the wound - 100

and inflammation were seen. But no significant pathologic difference was seen between groups receiving *Teucrium polium* and control group on day 21. Also none of the groups had significant difference with each other.

Discussion

Results of the healing in this study indicated preference of the group treated with *Teucrium polium* in comparison to control group. Scientific research showed that *Teucrium chamaedrys* has anti-inflammatory (6), antioxidant (7), antipyretic, antimicrobial (8) and antinociceptive (9) effects. This plant contains some amount of tannin, terpenoids, saponin, sterol, flavonoid, leucoanthocyanin and also antibacterial effects (10). Obtained results of this study suggested that on day 21 there was a significant difference between groups of 2% *Teucrium polium*, with control group regarding apparent healing of the wound. However, pathologic study on samples showed that in group receiving *Teucrium polium* reconstruction of the epithelial cells was better; fibrotic reaction was more extended and less bleeding in place of the burn was seen in comparison to control group in days 7 and 14. Fibroplasia process had more progress in place of the burn in this group and edema and inflammation was less. But, no significant difference was seen between groups receiving *Teucrium polium* and control group in day 21. Regarding chemical structure of substances available in *Teucrium chamaedrys*, observed useful effects of this plant on day 21 could be referenced to substances available in this plant. Such effects were not seen in groups treated with silver and Vaseline and healing results in these groups were not different from control group in day 21. Although there was significant difference between groups receiving *Teucrium polium* in days 7 and 14 and other groups regarding pathologic healing but, this effect was same for all groups in day 21 and it must be noted that main effect of the *Teucrium polium* is in apparent healing of the burn wound in such a way that average percentage of the apparent healing of the burn wound which was not different in none of groups from the control group until days 7 and 14 finally it obtained significant difference in group receiving *Teucrium polium* with other groups in day 21. Since in our study useful effects of the *Teucrium polium* in apparent healing of the wound were not appeared before the day 21 it seems that these this plant could be more effective when it is used for a long period and conducting long term studies in order to more consideration of their medicinal effects is recommended.

Conclusion

Results of this study showed that *Teucrium polium* extract is effective in wound healing and could accelerate burn wound healing process in Balb/C mice.

Authors' contributions

All helped in doing the study, RA, NSh and AN prepared the draft, MR, HSh and MRK edited the manuscript.

Conflict of interests

The author declared no competing interests.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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