*Modern American Journal of Medical and Health Sciences*
**ISSN (E):** 3067-803X
Volume 01, Issue 03, June, 2025
**Website:** usajournals.org


# INVESTIGATION OF AN ALTERNATIVE ANTI-INFLAMMATORY MODEL OF PRUNUS CERASUS L. OIL (SKIN WOUND MODEL)

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**Abstract**
This study explores the anti-inflammatory effect of Prunus cerasus L. (sour cherry) oil in a model of cutaneous injury in laboratory animals. The experimental design was based on the skin wound model, and the plant-derived oil was compared to the pharmaceutical standard, Levomekol ointment. As shown in Table 1, in the control group, the wound area increased 1.4 times one day after the injury, indicating inflammatory progression. In contrast, the group treated with Prunus cerasus oil demonstrated significant wound area reduction over time, indicating a potential therapeutic effect. These findings provide scientific evidence for the use of cherry oil as a natural topical anti-inflammatory agent.

**Keywords**: Prunus cerasus L., cherry oil, Levomekol ointment, inflammation, skin wound, herbal medicine.

## 1. Introduction

The search for alternative, natural, and cost-effective therapeutic agents has intensified over the past two decades, especially in the field of dermatological disorders and wound management. With the rise of antimicrobial resistance and increased awareness of the side effects associated with synthetic pharmaceuticals, there has been a global shift toward the use of medicinal plants as sources of novel bioactive compounds [1,2].

Among these botanicals, Prunus cerasus L.—commonly referred to as sour cherry—has garnered growing interest due to its rich phytochemical profile. Its oil, extracted from the kernels or flesh, contains a wide spectrum of bioactive

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constituents such as polyphenols, flavonoids (e.g., quercetin and kaempferol), anthocyanins, tocopherols, linoleic and oleic acids, all of which have demonstrated anti-inflammatory, antioxidant, and antibacterial activities in various in vitro and in vivo studies [3,4].

Several researchers have investigated the health benefits of cherry extracts, highlighting their antioxidant potential, ability to scavenge free radicals, and their capacity to modulate inflammatory mediators such as TNF-α, IL-6, and prostaglandins 555. However, limited scientific literature is available regarding the topical application of Prunus cerasus oil specifically for cutaneous wound healing models, particularly in comparison with established pharmacological treatments such as Levomekol ointment, which contains chloramphenicol and methyluracil and is widely used in post-surgical and infected wounds.

The biological healing of skin involves a complex, multi-phase process that includes hemostasis, inflammation, proliferation, and tissue remodeling. Disruption of any of these stages, especially due to oxidative stress or microbial contamination, can delay healing. Natural oils, when properly formulated, may support the wound environment by maintaining moisture, delivering bioactive compounds, and inhibiting microbial growth.

Therefore, this study was conducted to evaluate the topical efficacy of Prunus cerasus L. oil in a standardized skin wound model in laboratory mice, with the hypothesis that its anti-inflammatory and healing properties could be comparable or superior to conventional topical treatments. Through comparative analysis of wound contraction, tissue recovery, and inflammation reduction, this research aims to contribute to the growing body of knowledge surrounding plant-based alternatives in modern wound care.

## 2. Materials and Methods

2.1 Experimental Drugs and Dosage Forms. In this study, the following pharmaceutical formulations were used:

- Prunus cerasus L. oil at doses of 200 mg/kg and 150–100 mg/kg body weight, topically applied;

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- Levomekol ointment (standard pharmacological comparator) at a dose of 200 mg/kg body weight, applied topically;
- Distilled water (placebo control), applied in equal volume to untreated wounds.

2.2 Animal Model and Ethical Considerations. The experiment was conducted on clinically healthy male albino rats, with an average weight of 180–220 g. All procedures were carried out in accordance with the international ethical guidelines for animal research (OECD 420, ARRIVE 2.0), and approved by the institutional ethical committee of Fergana State Technical University.

Prior to the procedure, animals were anesthetized using thiopental sodium (50 mg/kg, intraperitoneally). Under aseptic conditions, the dorsal skin of the rats was shaved (depilated), and a standard excisional skin wound was created with a diameter of 2.0 × 2.0 cm and a depth of approximately 0.5 mm. The wounds were left open to simulate a full-thickness superficial wound.

2.3 Treatment Protocol. Treatment was initiated immediately after wound induction, simulating acute-phase intervention. The respective substances were applied directly to the wound surface once daily for 14 consecutive days:

- Prunus cerasus oil in three different groups (doses: 200 mg/kg, 150 mg/kg, and 100 mg/kg);
- Levomekol ointment at 200 mg/kg;
- Control group received distilled water in equal volume.

Each group included 6 rats (n = 6). The entire experiment lasted 14 days, and wound healing dynamics were monitored throughout.

2.4 Evaluation Parameters. Wound healing was assessed on the basis of the following criteria:

1. Exudate presence and cellular composition, indicating the inflammatory phase;
2. Wound surface characteristics, scored semi-quantitatively according to Pokrovskaya's scale (used in Russian dermatological studies) 2,32,32,3;
3. Condition of surrounding tissues, including edema, erythema, and necrosis;

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4. Reduction in wound area ($cm^2$) — calculated using digital image analysis and measured at baseline, and on days 3, 7, and 14.

All observations were conducted under blinded conditions, and data were statistically processed using standard methods (ANOVA, $p < 0.05$ significance threshold).

## 3. Results and Discussion

The anti-alterative (wound healing and anti-inflammatory) activity of Prunus cerasus L. oil was evaluated using a cutaneous wound model in laboratory rats. Table 1 presents the dynamic changes in wound area and healing characteristics in control and treatment groups.

One day after injury, the wound area in control animals increased by approximately 1.4 times compared to the original excision area, indicating early-stage edema and inflammation. Cytological examination of smears taken on day 1 (per Pokrovskaya's method) showed degeneration-dominated reactions with reduced neutrophilic activity, presence of damaged cells, and visible microflora without phagocytic response. These findings reflect suppressed cellular immunity and insufficient wound protection at this stage.

On days 3–7, wound characteristics in the control group remained unchanged. A thin, dark brown to violet crust formed on the wound surface, particularly tightly attached to the lower part of the wound. Wound edges and surrounding tissues showed signs of swelling, with persistent exudate. Epithelialization progressed slowly. In these animals, full regeneration with hair follicle and dermal appendage formation was not observed until day 14.

By contrast, animals treated with Prunus cerasus L. oil (at both 200 mg/kg and 150–100 mg/kg) and those receiving Levomekol ointment (200 mg/kg) showed:

- No bleeding or pus during the first 3–6 days;
- Dry, clean wounds without signs of microbial infection;
- No edematous reaction;
- Early crust formation with stable adherence.

In the Prunus cerasus 200 mg/kg group, crust shedding was observed by days 9–12, and by days 13–14, complete epithelialization with dermal appendage

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regeneration (hair follicles, sebaceous and sweat gland structures) was noted. In contrast, Levomekol-treated wounds reached comparable regeneration by day 14, with less follicular recovery.

Cytological assessment on day 7 showed increased macrophages and polyblasts in both treatment groups, indicating active reparative processes. Neutrophil presence decreased, and phagocytosis signs were improved, especially in the cherry oil group. These results suggest that Prunus cerasus oil facilitates both anti-inflammatory and regenerative pathways.

**Table 1. Comparative Evaluation of the Anti-Inflammatory Effect of Prunus cerasus L. Oil and Levomekol Ointment**

| Day | Control | Levomekol | 200 mg/kg | 150 mg/kg | 100 mg/kg |
|---|---|---|---|---|---|
| Primary | 3,1 ± 0,012 | 3,2 ± 0,087 | 3,2 ± 0,087 | 3,3 ± 0,085 | 3,2 ± 0,031 |
| Day 1 | 3,0 ± 0,051 | 2,6 ± 0,056 | 2,7 ± 0,083 | 3,1 ± 0,066 | 3,1 ± 0,027 |
| Day 2 | 2,9 ± 0,063 | 2,4 ± 0,053 | 2,5 ± 0,083 | 3,0 ± 0,065 | 3,0 ± 0,027 |
| Day 3 | 2,8 ± 0,063 | 2,4 ± 0,053 | 2,3 ± 0,073 | 2,9 ± 0,083 | 2,9 ± 0,03 |
| Day 4 | 2,7 ± 0,032 | 1,9 ± 0,068 | 1,4 ± 0,024 | 2,6 ± 0,095 | 2,6 ± 0,029 |
| Day 5 | 2,6 ± 0,01 | 1,2 ± 0,022 | 1,1 ± 0,033 | 2,4 ± 0,061 | 2,4 ± 0,022 |
| Day 6 | 2,4 ± 0,035 | 1,0 ± 0,029 | 0,8 ± 0,025 | 2,3 ± 0,036 | 2,3 ± 0,021 |
| Day 7 | 2,2 ± 0,036 | 0,7 ± 0,015 | 0,6 ± 0,025 | 2,1 ± 0,035 | 2,2 ± 0,014 |
| Day 8 | 2,1 ± 0,049 | 0,5 ± 0,015 | 0,5 ± 0,023 | 2,0 ± 0,024 | 2,1 ± 0,012 |
| Day 9 | 2,0 ± 0,075 | 0,5 ± 0,015 | 0,4 ± 0,023 | 1,9 ± 0,006 | 2,0 ± 0,012 |
| Day 10 | 1,9 ± 0,057 | 0,4 ± 0,013 | 0,3 ± 0,022 | 1,5 ± 0,006 | 1,8 ± 0,011 |
| Day 11 | 1,7 ± 0,039 | 0,3 ± 0,007 | 0,2 ± 0,012 | 1,1 ± 0,012 | 1,4 ± 0,01 |
| Day 12 | 1,5 ± 0,025 | 0,2 ± 0,012 | 0,0 ± 0,0 | 0,8 ± 0,014 | 1,2± 0,006 |
| Day 13 | 1,2 ± 0,022 | 0,0 ± 0,0 | 0,0 ± 0,0 | 0,5± 0,005 | 0,9 ± 0,005 |
| 14th day | 1,0 ± 0,017 | 0,0 ± 0,0 | 0,0 ± 0,0 | 0,2 ± 0,005 | 0,6 ± 0,01 |

Changes in wound surface area (M□m; n=5;) in rats treated with 200 and 150-100 mg/kg of Prunus cerasus L. plant oil applied to the wound surface daily (14 days) and Levomekol ointment 200 mg/kg (* $p<0.05$, ** - $p<0.01$ compared to control)

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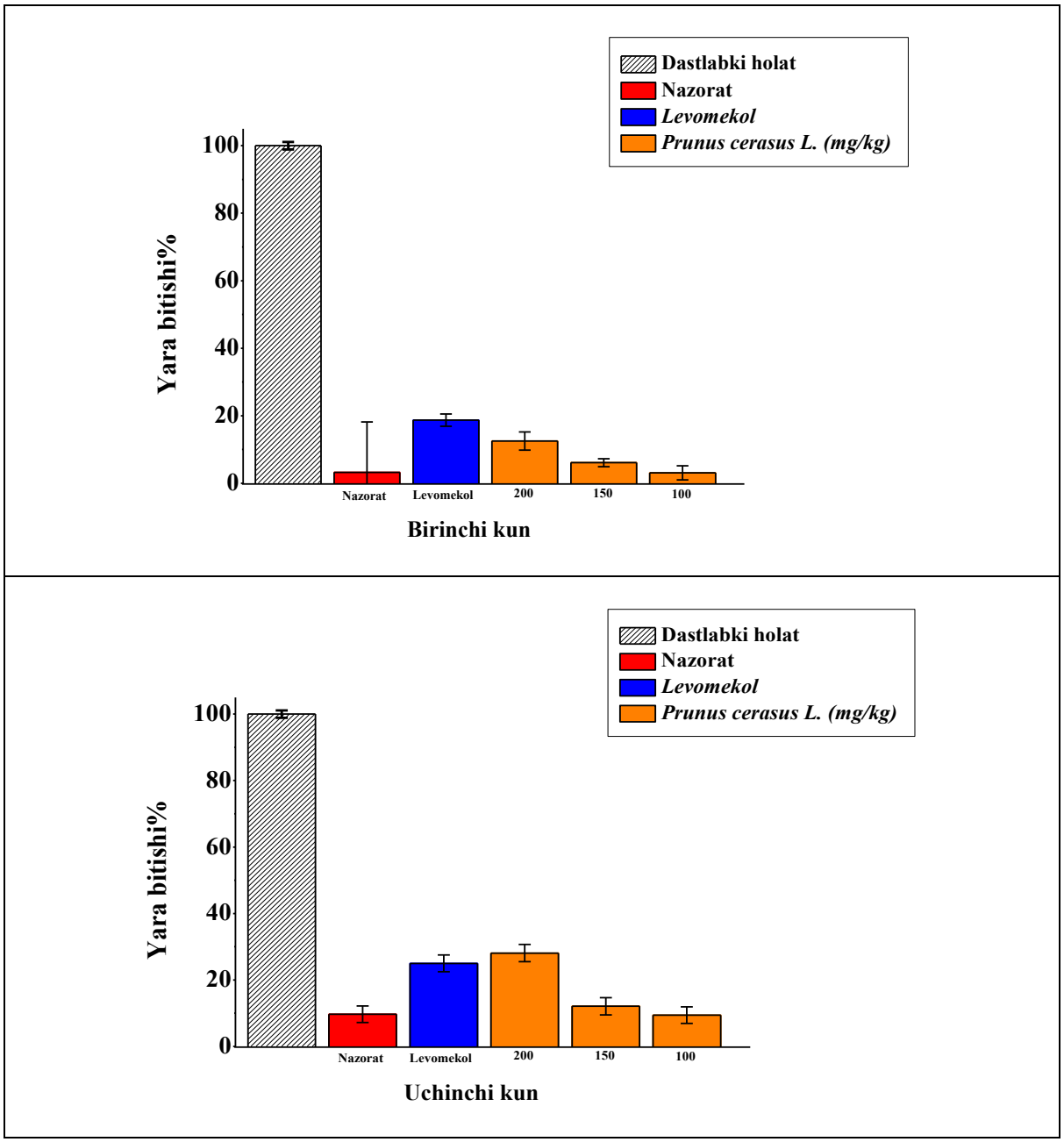
Table 2. Percentage (%) changes in wound surface area (M□m; n=5;) in rats treated with 200 and 150-100 mg/kg of Prunus cerasus L. plant oil applied to the wound surface daily (14 days) and Levomekol ointment 200 mg/kg (* p<0.05, ** - p<0.01 compared to control)



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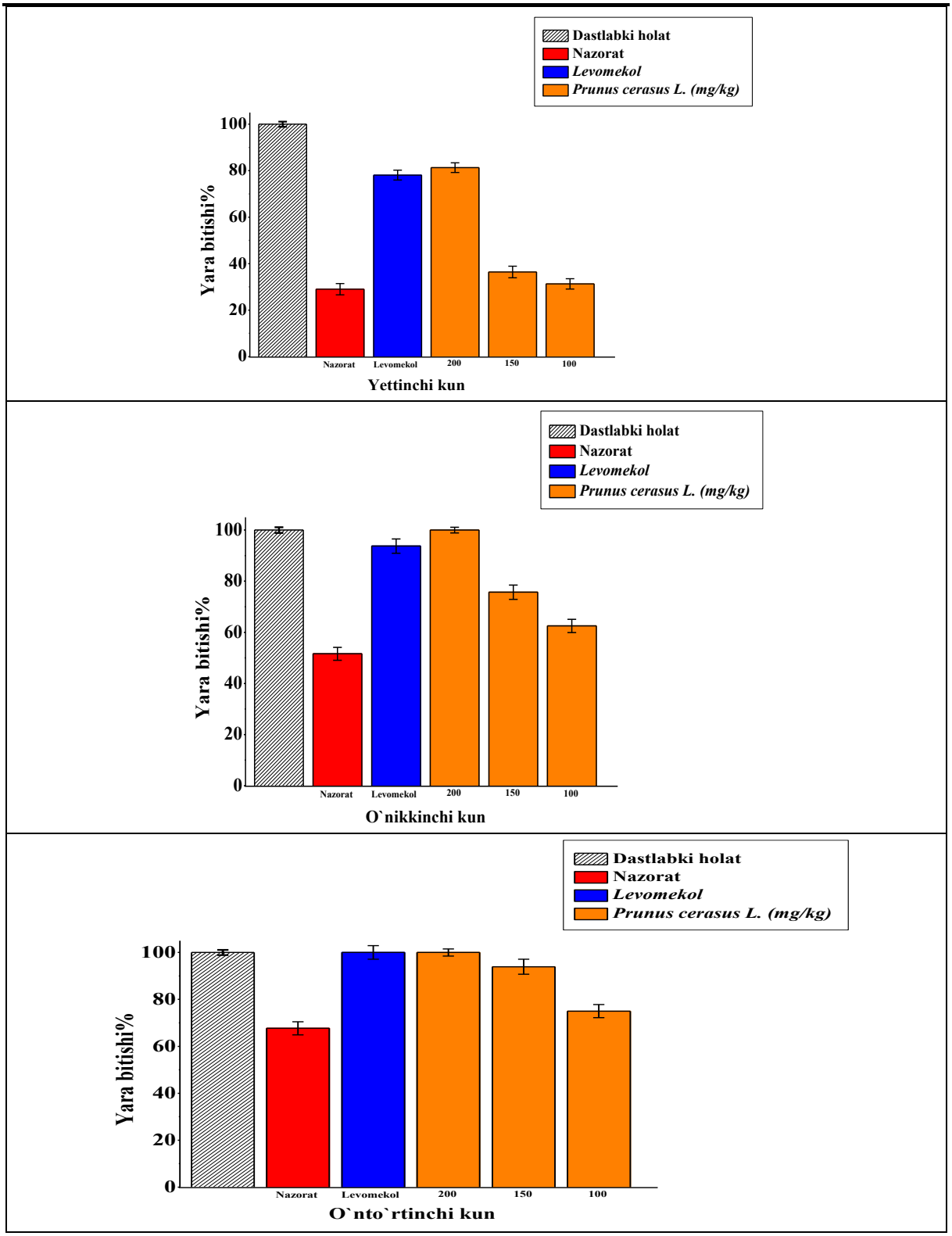

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**Conclusion**

1. On days 3-6 of observation, the healing of skin wounds in animals treated with Prunus cerasus L. vegetable oil at a dose of 200 mg / kg was 1.2 times faster than in control animals within 3 days. By day 6, it was 3.0 times faster.
2. On days 9-12 of observation, the healing of skin wounds in animals treated with Prunus cerasus L. vegetable oil at a dose of 200 mg / kg was 1.25 times faster than in animals treated with Levomekol at a dose of 200 mg / kg. By day 12, the healing of skin wounds in animals treated with 200 mg / kg of vegetable oil was 1.25 times faster than in animals treated with Levomekol at a dose of 200 mg / kg. By day 12, the healing of skin wounds in animals treated with 200 mg / kg of vegetable oil was complete, while the remaining doses of 150-100 mg / kg lagged behind by day 12.
3. During the 14-day observation period, the comparative levomecol 200 mg/kg showed better activity than the remaining doses of Prunus cerasus L. vegetable oil 200 mg/kg.

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