EARLY EVENT IN EFFECT OF APPLE CIDER VINEGAR ON THE INDUCED BURN HEALING IN RABBITS

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ABSTRACT

This study evaluated early event effect of apple cider vinegar on burn wound healing in rabbits. Fifteen adult rabbits were brought from the Basra local market and raised under proper management conditions in Basra veterinary medicine college. The age of these rabbits ranges between 10-12 months and their body weight was 2-3 kg. The rabbits were divided into three groups, group A (control), group B (treated with lincomycine and group C (treated with apple cider vinegar. General anesthesia was provided by a mixture of xylazine and ketamine HCL at a ratio 10:25 mg/kg intramuscularly. Selected site were shaved, cleaned and disinfected. A burn of 3 cm in diameter was made in the glutted area of the electrically heated stump at temperature 80 C for 14 second.

Observation of burns of contract ability and study histopathological changes. The macroscopically results appear in all groups on 1^{st}, 3^{rd}, 7^{th}, is different observation but on 7^{th} days is complete healing, but the microscopically changes are also they seem results for good healing in group C.

The apple cider vinegar contains acidic acid and other acids is acceleration burn healing.

INTRODUCTION

Burns are destruction of epithelial tissue partial or full thickness of skin and underlying structures caused by heat, liquid, hot steam or strong acid, alkaline, frost bit, electric. Burns are classified according to the severity and type of lesion. The 1^{st} degree burn damages the epithelium, causing transient erythema and subsequent desquamation. 2^{nd} degree burns involved the entire epidermis and varying depths of the dermis, with some damage to accessory skin structures. In 3^{rd} degree burns, the full thickness of the skin is completely destroyed with variable damage to subcutaneous structures. The sequelae are ulceration and sloughing. Wound healing is a dynamic and complex programmed process involving complex

mechanisms that manifest themselves in various stages from blood clotting to inflammation, cellular proliferation, angiogenesis, and reconstruction of extracellular matrix [1, 2].

The word vinegar comes old French vin aigre meaning sour wine. Vinegar is produced by fermentation of ethanol by acetic acid bacteria, which yields acetic acid. Apple cider vinegar is made from cider or apple must (pressed juice that contains the skin, steams and seeds of the fruit) and it has a brownish-yellow color. It is usually sold unfiltered and unpasteurized with the bacterial culture (or mother of vinegar) still part of the mixture. This type of vinegar is very acidic because it contains about 5-6% acetic acid. Yeasts ferment the natural food sugars to alcohol, next, acetic acid bacteria (acetobacter) convent the alcohol to acetic acid. And showed the strongest bactericidal activity against all strains tested as *S aureus, E coli, S enteritidis*, which was attributed to their high acetic acid content. Acetic acid in apple cider vinegar accounts for its health benefits proponents of the apple cider vinegar diet claim that drinking a small amount of apple cider vinegar before meals or taking an apple cider vinegar supplement helps curb appetite and burn fat by improving the metabolism of micronutrients. When is used apple cider vinegar locally due to accelerate wound healing because apple cider vinegar contains pectin, succared, vitamins (B1, B2, B6) (A, E, C), salt, mineral as (sodium, calcium, magnesium, aluminum, phosphor, cobber, silicon, chlor). [3, 4, 5].

Because a little information about effective of apple cider vinegar on burn wound. Thus, the objective of the present study was to determine the effective of apple cider vinegar on burn wound in rabbits.

MATERIAL AND METHOD

1-experimental animals:

15 mature rabbits (local) were obtained from private farm in Basra, Iraq. Their average weights were 2-3 kg. they were acclimatized for one week in stainless steel cages and fed commercial diets, vegetables, crushed wheat and corn all over the whole experiment. They were divided into three groups (5 animal in each group), one control and two experimental groups. These are as follows:

A. Control groups: burn wound treated without any drug, but these wounds were washed with normal saline.

B. Treated group one: burn wound treated daily with antibiotic (lingomycine).

C. Treated group two: wound treated daily with apple cider vinegar (ACV).

Rabbits were anesthetized by intramuscular injection of 10 mg/kg xylazine and 25 mg/kg ketamine HCl [6].

The procedure used in this study the hairs on the skin of the animals back were shaved with a sterilized razor blade. Then, induce burn of identical size (3 cm in diameter) was created on the back of each animal, by the electrically heated stamp was maintained at a temperature of 80 C° and applied for 14 seconds for forming a superficial burn wound.

Prepared from Zer company (5% concentration) , turkey and find local markets.

The two experimental groups were treated daily by the treatment materials. One of these groups treated by antibiotic known as lingomycine, while the other by apple cider vinegar.

The contracting ability can be defined as ability of the wound to become narrower than the beginning volum. The area of the burns were recorded in 1, 3, 7 days to show the contracting ability of wounds.

The anterior wounds were considered for histopathological studies. The regenerated tissues were cut in 3, 5, 7 days in each groups the form of square pieces along with normal skin on either side of the wound and preserved in 10% buffered formalin. The biopsies of skin samples were fixed in a 10% buffered formalin solution then embedded in paraffin block and sectioned in 4-µm increments. The sections were positioned on a slide and stained with hematoxylin-eosin [7].

RESULTS

1-Macroscopic evaluation

	1st day	**3rd day**	**7th day**
Control group A	after induce burn and treated with normal saline. Figure (1)	after induce burn and treated with normal saline. Long of burn 3cm. Figure (4)	after induce burn and treated with normal saline. Long of burn 3cm, and begun contraction with scar tissue. Figure (7)
Treated B	after induce burn and treated with lincomycine. Figure (2)	show treated groups one, after induce burn and treated with lincomycine. Long of burn 3cm. Figure (5)	after induce burn and treated with lincomycine . Long of burn 3cm, and high contraction, with scar tissue. Figure (8)
Treated C	after induce burn and treated with apple cider vinegar. Figure (3)	show treated groups two, after induce burn and treated with apple cider vinegar. Long of burn 3cm, and begun contraction. Figure (6)	after induce burn and treated with apple cider vinegar. High contraction and healing with less scar tissue. Figure (9)

	3rd day	7th day
Control group A	After induce burn and treated with normal saline. High fibrous tissues and inflammatory cells. Figure (10)	After induce burn and treated with normal saline. Begun hair follicle , high scar tissues Figure (13)
Treated B	After induce burn and treated with lingomaycine. High fibrous tissues with abnormal skin layers. Figure (11)	After induce burn and treated with lingomycine. Begun hair follicle, and less scar tissues Figure (14)
Treated C	After induce burn and treated with apple cider vinegar. High fibrous tissues and high blood vessels Figure (12)	After induce burn and treated with apple cider vinegar. Complete healing without scar tissue, normal hair follicles Figure (15)

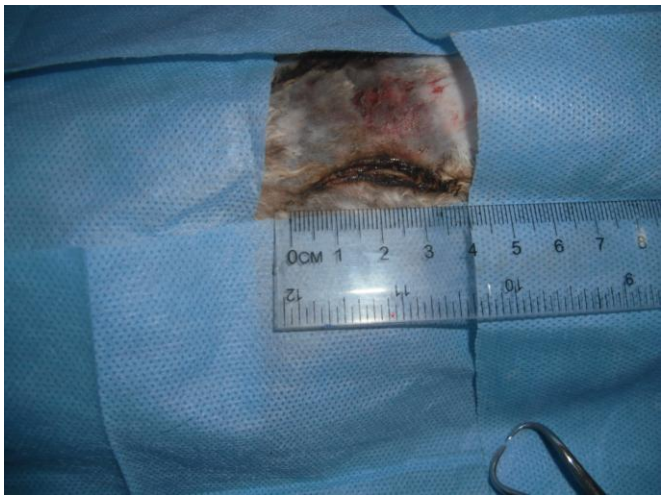

Figure 1: in 1st day show control groups, after induce burn and treated with normal saline.

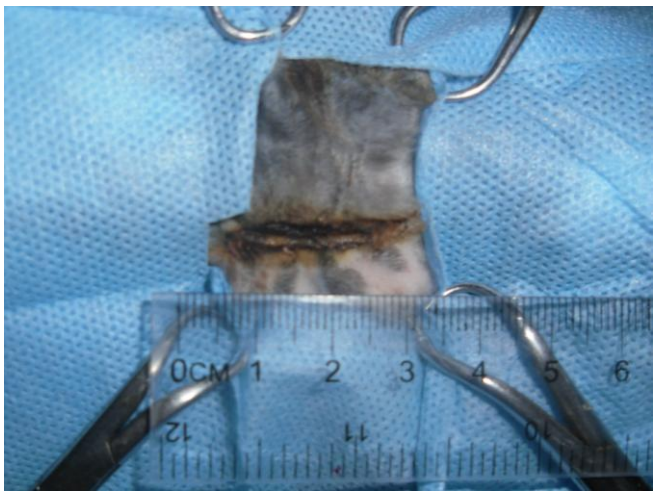

Figure 2: in 1st day show treated groups one, after induce burn and treated with lincomycine.

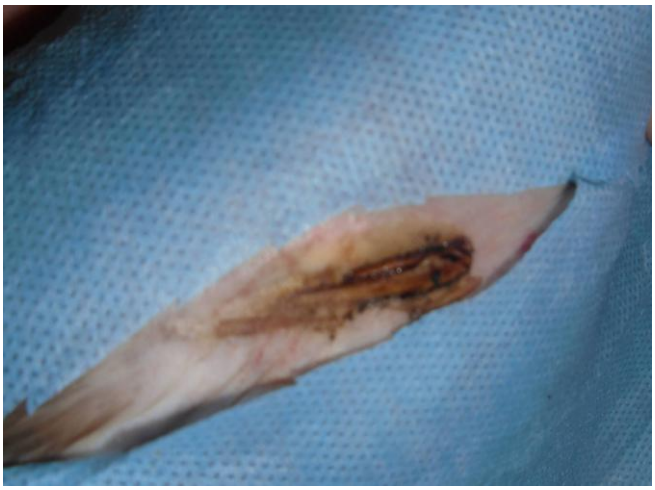

Figure 3: in 1st day show treated groups two, after induce burn and treated with apple cider vinegar.

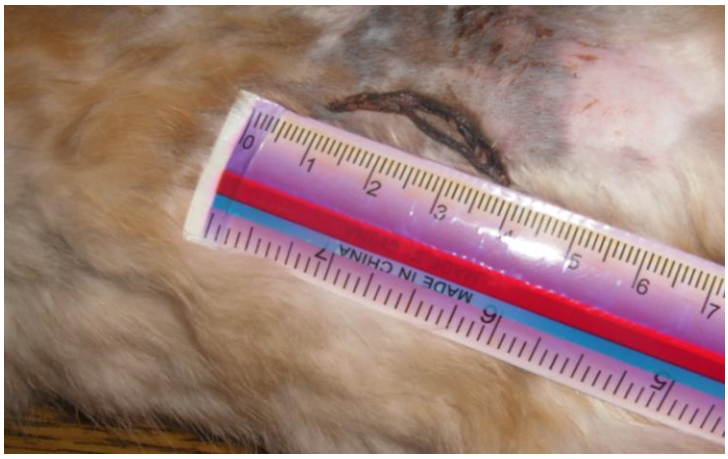

Figure 4: after 3 days, show control groups, after induce burn and treated with normal saline. Long of burn 3cm.

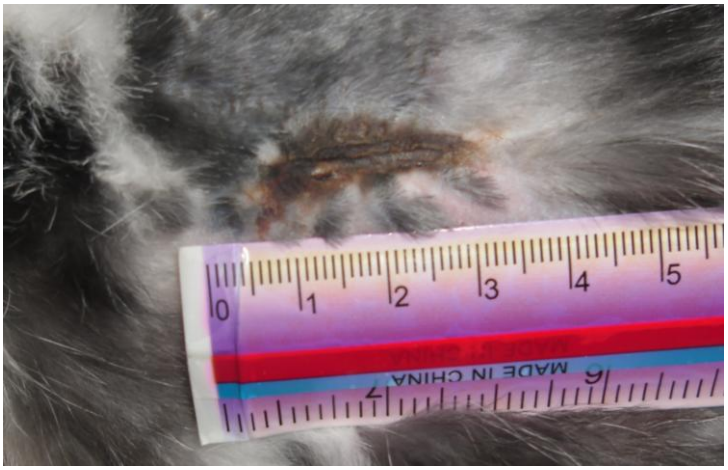

Figure 5: after 3 days, show treated groups one, after induce burn and treated with lingomycine. Long of burn 3cm.

Figure 6: after 3 days, show treated groups two, after induce burn and treated with apple cider vinegar. Long of burn 3cm, and begun contraction.

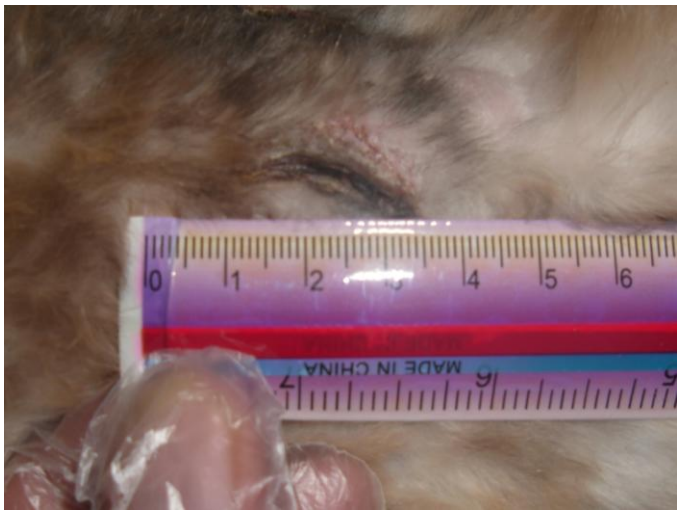

Figure 7: after 7 days, show control groups, after induce burn and treated with normal saline. Long of burn 3cm, and begun contraction with scar tissue

Figure 8: after 7 days, show treated groups one, after induce burn and treated with lingomycine . Long by burn 3cm, and high contraction, with scar tissue.

Figure 9: after 7 days, show treated groups tow, after induce burn and treated with apple cider vinegar. High contraction and healing with less scar tissue

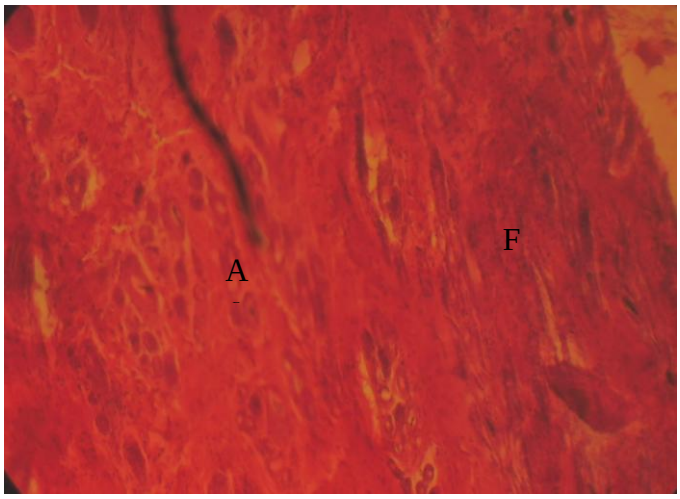

Figure 10: after 3 days, show control groups, after induce burn and treated with normal saline. High fibrose tissues (F) and inflammatory cells A. H&E stain 20X

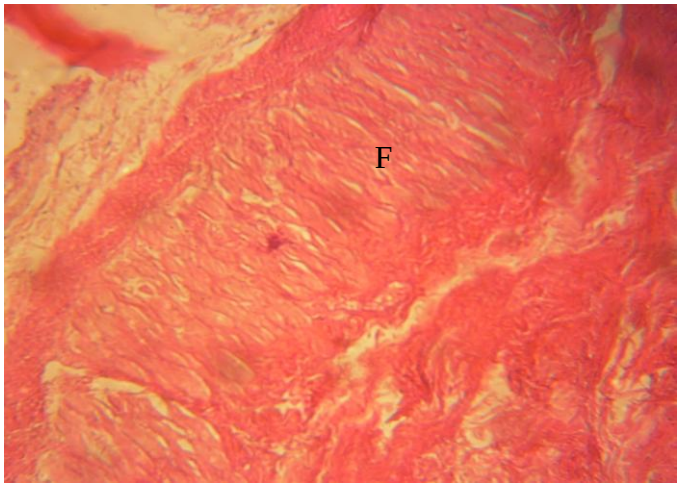

Figure 11: after 3 days, show treated groups one, after induce burn and treated with lingomaycine. High fibrose tissues (F) with abnormal skin layers. H&E 40X.

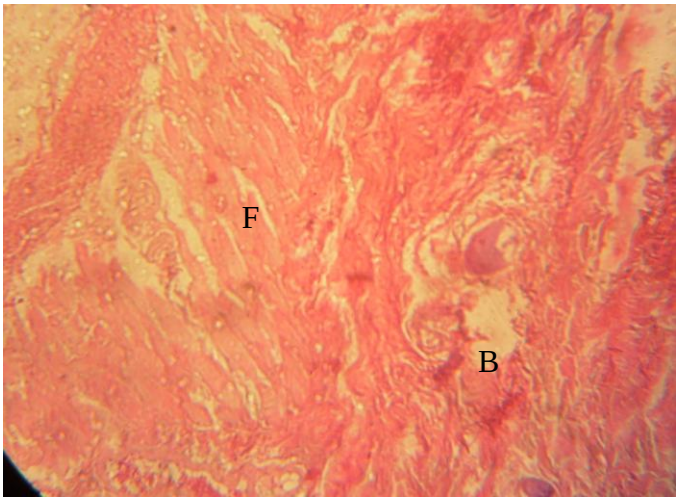

Figure 12: after 3 days, show treated groups two, after induce burn and treated with apple cider vinegar. High fibrose tissues (F) and blood vessels (B).(H&E 40X).

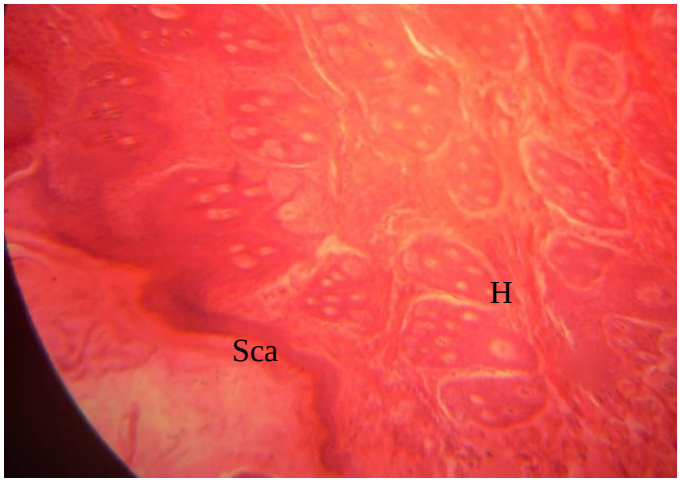

Figure 13: after 7 days, show control groups , after induce burn and treated with normal saline. Begun hair follicle , scar tissues .(H&E 40X).

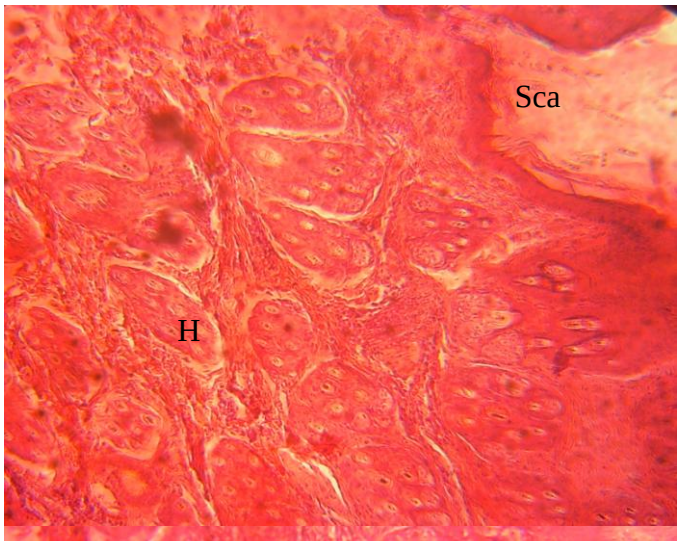

Figure 14: after 7 days, show treated groups one, after induce burn and treated with lingomycine. Begun hair follicle, and scar tissues .(H&E 40X).

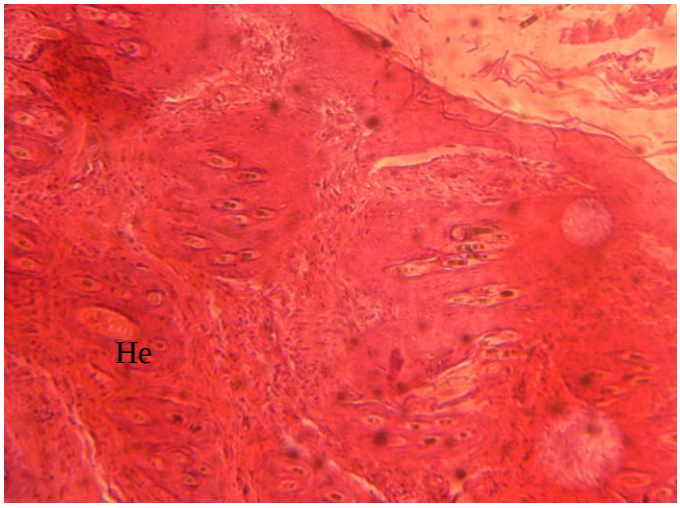

Figure 15: after 7 days, show treated groups two, after inducing burn and treated with apple cider vinegar. Complete healing without scar tissue, normal hair follicles.(H&E 40X).

DISCUSSION

The present study was evaluation of the effect apple cider vinegar, on the burn healing in rabbits.

Macroscopic evaluation in control group in 1st and 3rd days are not changes in healing or contraction, but in 7th day beginning healing and contraction with very high scar tissues. In treating group one treated with lincomycin in 3rd day beginning healing and contraction, in 7th day burn healing with scar tissue. In treating group two in 3rd day starting healing and contraction, in 7th day burn healing with less scar tissue.

Microscopic evaluation in 3rd day in control group shows very high fibrous tissue with inflammatory cells. In treating group one show fibrous tissue, and in treating group two show high fibrous tissues with blood vessel. On 7th day show in control group begun hair follicle with high thickness of scar tissues. In treating group one begun hair follicle and thickness of scar tissue. In treating group two normal hair follicles, with very less scar tissues.

From this results show in treating group one and two best from the control group because in treating group one by using antibiotic locally (lincomycin) prevent growth bacteria due to accelerate healing. In treating group two by use apple cider vinegar can help burn healing due to the high percentage of pectin, scared, vitamin B1, B2, and B6, vitamin C, E, and A as well as minerals and salt such as Na, Ca, Mg, AL, P, Ca, Silicon, CI. All these components play a role enhancing of healing and return the tissue to normal state these results may be agree with [1, 8, 9, 10, 11, 12, 13].

Vet E speeds wound healing and improves the cosmetic outcome of burns and other wounds agree with [14, 15].

Apple cider vinegar contains acidic acid, proponic acid, lactic acid this acids kill bacteria cells because low PH and increase burn healing [5].

الاحداث المبكرة لتاثير خل التفاح على شفاء الحروق المحدثه في الارانب

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الخلاصة

تم في هذه الدراسة دراسة التغيرات المبكرة لتأثير عصير خل التفاح على شفاء الحروق في الأرانب. استخدم في هذه الدراسة خمسة عشر أرنب تم جلبها من الأسواق المحلية في البصرة وتم عنايتها تحت ظروف أدارية في كلية الطب البيطري/جامعة البصرة ، وكان عمر هذه الأرانب يتراوح بين 10–12 شهر ووزن الجسم 2–3 كغم. وقسمت الحيوانات الى ثلاث مجموعات، مجموعة سيطرة (تم علاجه بالنورمل سلاين) ومجموعة ب (تم علاجها باللنكومايسين)، ومجموعة ج (تم علاجها بعصير خل التفاح). خدرت الأرانب عضليا بالمخدر العام وذلك بخلط الزايلازين والكيتامين بنسبة 25:10 ملغم/كغم. وتم اختيار الموقع المحدد وهي منطقة الظهر حيث تم حلقها وتنظيفها وتعقيمها ثم عمل الحرق بطول 3 سم بالكاوية الكهربائية بدرجة حرارة 80 C° لمدة 14 ثانية، بعد ذلك تم متابعة الحروق عيانيا (قدرة التقلص) ومجهريا، أوضحت النتائج العيانية في كل المجاميع لليوم الاول والثالث والسابع اختلافات لكن في اليوم السابع كان هناك شفاء تام في مجموعة المعالجة بعصير خل التفاح. اما التغيرات المجهري هـ في كل المجاميع كانت متشابه لكن كانت أفضل في مجموعة ج. عصير خل التفاح يحتوي على حامض ألخليك وحوامض أخرى سرعت من شفاء الحروق.

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