Effect of Topical Application of Sesame Oil on Oral Wound Healing in Rabbits

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Abstract

Background: Wound healing is a very complex process, varied and influenced by numerous feature such as the size ,severity nature of the injury and the site of the wound and is consists of four steps: hemostasis, inflammatory reaction, proliferation and remodeling, all of which are regulated by cytokine and growth factors released by cells in the wound area

Medicinal plants have been used for many years for different treatment, sesame oil is one of these medications.The functional activity of lignanspresent in sesame seeds has become of the major interest.

Oil- soluble lignan compound includessesamine free radicals are generated at the site of injury, which are known to impair the healing process by causing damage to cellular membrane ,nucleotides,protein and lipid and sesame oil has a poten antioxidant activity which helps to prevent oxidative damage and promote the healing process.

The aim of this study was to evaluate the effect of local application of sesame oil on acceleration of healing oral mucosa wounds.

Material and Methods: Six New Zealand rabbits were used in this study with age between (10-12) months and weight range between(1.5-2) Kg,incisional wounds was done on the internal aspect of check (lining mucosa) for right and left side for each animal,left side was left to heal normally while the right side was treated with seasame oil.

Result: Topical application of sesame oil showed marked anti-inflammatory activity on incisional oral wounds and revealed enhancement of wound healing process.

Conclusion: Sesame oil has a beneficial role in wound healing, its wound healing properties

Key words: Sesame oil, wound healing.

Introduction:

The oral mucosa is the mucous membrane that lines the inside of the mouth,itcomprises of stratified squamous epithelium termed oral epithelium and an underlying connective tissue termed lamina propria, at the lip the oral mucosa is continuous with

the skin ,thus the oral mucous membrane is located anatomically between the skin and the gastrointestinal mucosa and show some properties of each**(1).**

There are three types of oral mucosa can be recognized according to their primary function and histology:1- the lining mucosa ,non-keratinized stratified squamous epithelium which represent the largest part of the oral mucosa,it form about 60% of the oral mucosa and cover the floor of mouth, lines the checks, lips and soft palate and its loosely attached to underlying tissue.2-the masticatory mucosa,keratinized stratified squamous epithelium found on the dorsum of the tongue, hard palate and attached gingiva,it form only 25% of oral mucous membrane and its firmly attached to the underlying tissue.3-the specialized mucosa which occupying smaller area about 15% of oral mucous membrane which cover the dorsum of the tongue and it contain taste buds**(2).**

Non keratinized mucosa is significantly thicker than keratinized mucosa and successfully withstands the hearty shearing forces of a prosthesis following oral mucosa transplantation in the oral cavity, furmother non-keratinized mucosa contain more elastic fibers than keratinized mucosa**(3)**

The wound is generally damage to tissue resulting in the interruption of the original tissue architecture ,culture and homeostasis,wound can be caused by almost any injurious agent and can include almost any tissue or structure**(4)**

Wound healing is a complex process, which is generally divided into three phases including the invasion of inflammatory cells, proliferation of tissue-repairing cells, and remodeling of the tissue. The level of wound healing depends upon many factors including wound size, blood supply to the area, foreign bodies presence, microorganisms, age, the health of the patient, nutritional status of the patient, drug usage, and a variation of systemic diseases **(5).**

Wound healing has a complex event formed by cells migration and proliferation such as fibroblasts, endothelium and epithelium cells as well as migration of cells originating from blood such as thrombocytes, macrophages and neutrophils, successful wound healing involves fibroplasia, angiogenesis and re-epithelisation**(6)**, Fibroplasia is the stage at which proliferation of fibroblast required for contraction of wound occurs as well as synthesis and storing of the matrix necessary for the formation of new vein and epithelium. Wound contraction, carried out by myofibroblasts, which are specific fibroblasts, is an essential stage of healing ,delay in this process results in wound healing failure or prolongation**(7).**

Local and systemic factors affecting on the process of wound healing ,local factors including : oxygen and infection ,while systemic factors including :age, sex hormone,stress,drugs,smoking and carbohydrate,protein and amino acid .**(8)**
There is a relationship between wound healing in human and certain animal species therefore, the present study employed a model of rabbit wound healing for the assessment of the influence of seasame oil in wound healing.**(9)**

Materials and Methods:

Six New Zealand white rabbits were used in this study, age (10-12)months and their weight range between (1.5-12) kg.

Animals were divided into three groups according to healing interval peirod (3,5,7) days, two animals for each peiord and were housed in individual cages with freely have access to water and food .

Animals were subjected to anesthesia by intramuscular injection of ketamine 10% (1 mg/kg) of body weight and Xylazine 2%(0.2 ml /kg) of body weight, incisional wound was induced on lining mucosa for right and left side of check that include all layers of mucosa (Epithelium, lamina properia and connective tissue) and right side left to heal normally while left side was treated with sesame oil ,the treatment were applied topically at once time and at the same day of doing wound, the wound left undressed and evaluated daily.

Result:

Histological finding:

Three days duration:

A-Control group

Histological view at wound site of three days healing period of lining mucosa ,shows the defect area, no epithelium is formed and necrotic tissue is seen with numbers of inflammatory cells

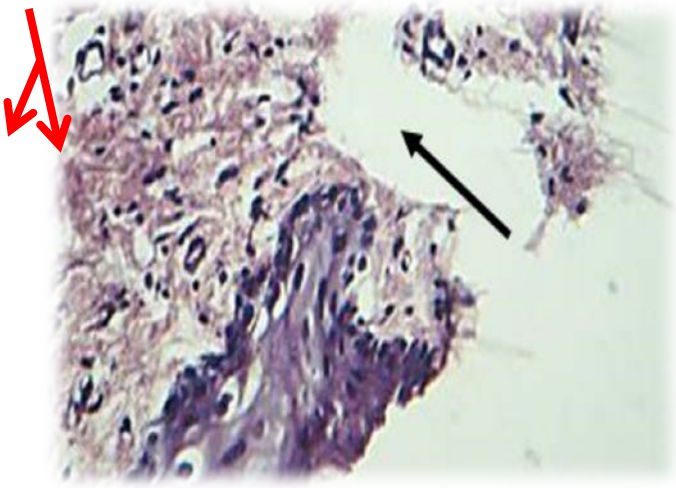

Figure1: View of 3days duration in control group shows cut edge of wound (arrow),inflammatory cells (IC).H&Ex20

B-Experimental group:

Microphotograph view at wound site of three days duration shows granulation tissue with congested blood capillaries and large numbers of inflammatory cells and fibroblast.

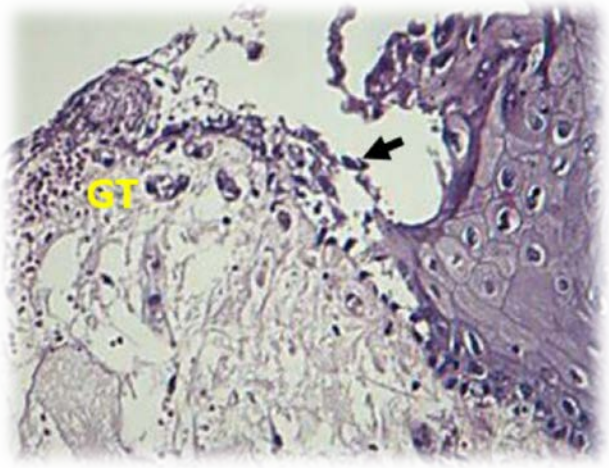

Figure 3: Microphotograph of wound site shows granulation tissue at cut edge of wound, migrating epithelial cells (arrow) .H&EX10.

Five days duration:

A-Control group:

Microphtograph view at wound site of five days duration shows new epithelium is formed and fibroblast

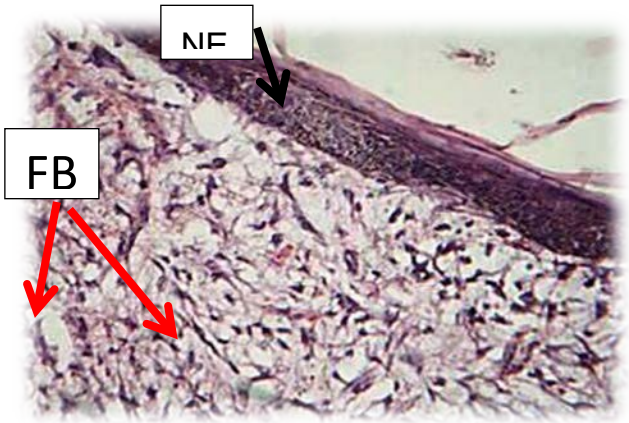

Figure (3):View of of control group after5 days show new epithelium(NE) and fibroblasts(FB)).H&Ex20

B-Experimental group:

Histological finding of five days' duration shows reduction in number of inflammatory cells and replacement of granulation tissue by fibrous connective tissue with scattered fibroblast and complete epithelization is seen too

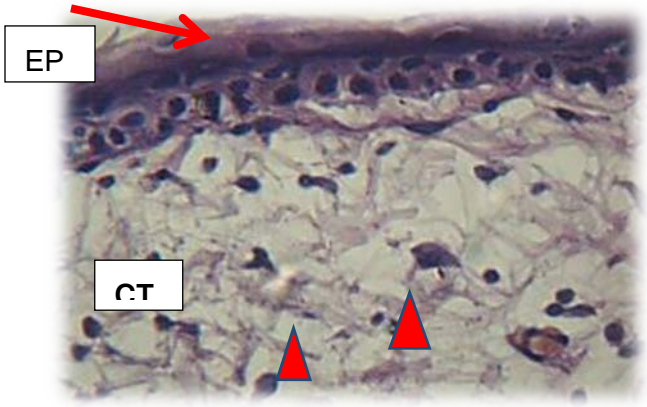

Figure4: View of wound site of experimental group after 5days, shows fibrous connective tissue (CT) ,scarce number of inflammatory cells (IC) (head arrow)and epithelium(EP).H&Ex20

Seven days duration:

Control group:

Histological section at control wound site of 7 days shows epithelium, collagen fibers and fibroblast.

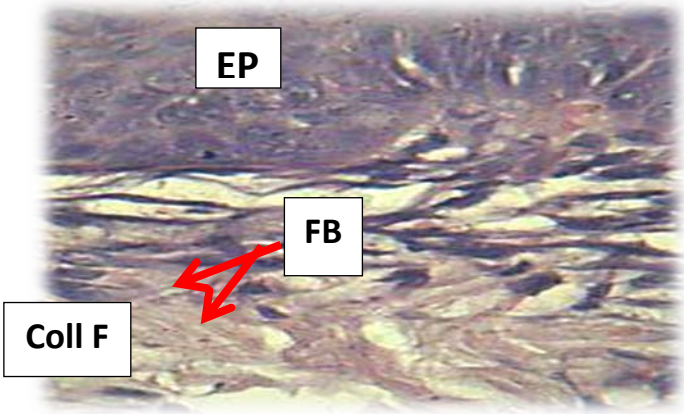

Figure5:view of 7days duration of control group, shows epithelium (EP),collagen fibers(Coll F) and fibroblasts(FB)).H&Ex20

Experimental group:

Histological finding of 7 days post operatively revealed complete healing of wound area and shows cell layers of new epithelium , , fibroblast and collagen fibers.

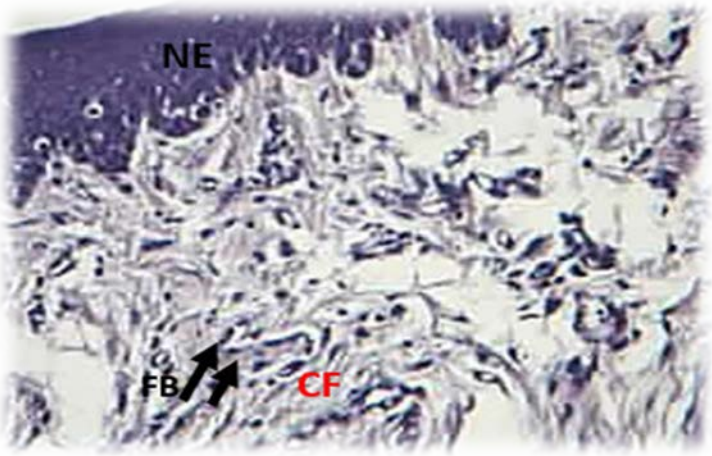

Figure6: Microphotograph of 7daysduration of control group shows new epithelium, organizing collagen fibers(CF) and fibroblasts (FB). H&EX20.

Discussion:

Wounds are denoted to asainterruption of normal anatomic structure and function.
Wound healing is a very complex, multifactorsequence of events comprising several cellular andbiochemical processes which include a natural body reaction to injury, initiatenearly after wounding and occurs in four stages, the first phase is coagulation which controls excessive blood loss from the damage vessels,
the next stage of the healing process is inflammation and debridement of wound followed by re-epithelization which includes proliferation,migration and differentiation of the epithelial cells, in the final stage of healing process collagen deposition and remodeling will occurs **(11)**
In present study ,we have examined the characteristics of sesame oil in oral wounds healing,

The result of present study showed the defect area.no epithelium is formed at 3 days of incision in control group and this histological observation in agreement with (Niksaet al,2010) who carried the study on rabbits skin and found the wound in control group at 2 days is still open and consists of large defect area, While in experimental group at 3 days duration shows granulation tissue is formed and there is number of inflammatory cells at wound site and this in agreement with (Abdalbari,2009)who his histopathological finding at 3 days period showed granulation tissue with inflammatory cell infiltration .

The result of present study showed new epithelium is formed and threr is high number of inflammatory cells and fibroblast at 5 days of control group and this result in agreement with (Zainab Abdul karem,2009) who improved that threr was highly evidence of inflammatory cells in first week on wound done in rabbit skin.

At 5 days histological finding showed reduction in number of inflammatory cells with fibrous connective tissue formation and this in agreement with (Abdalbari,2009).

In control group at 7 days of incisional wound histological evaluation revealed complete epithelization and this result agree with (Warqaa Mahmood,2010) who improved that new epithelium formation was complete at 7 days of incisional wound in control group at skin of mice,while in experimental group at 7 days ,the histological results showed complete healing area and fibrous connective tissue and this agree with (Warqaa Mahmood,2010).

References:

1-Nanci, Elsevier, 2013, page 278 Ten Cate's Oral Mucosa

2-R.Michael,M.Joseph,G.Barbagli and F.Scannapieco"Oral Mucosa Harvest: An Overview of Anatomic and Biologic Considerations"Eau-Ebu update series ,5,2007,179-187

3-Z.Mohammed and B.Abdulghani," In Vivo Histological Evaluation of the Effect of Pomegranate and Aloe Vera and a Combination of Both on Wound Healing of Buccal Mucosa",Journal of Natural Sciences Research,6(14)2016,41-55.

4-A.Alfars," Histopathological evaluation of skin wound in rabbits treated by systemic dexamethasone."Basra Journal Veterinary Research,8(1)2009,130-137.

5- A.Moghbel,A.Asghar and H.Agheli"The effect of tragacanth mucilage on the full-thickness wound in rabbits",Archives of Iranian Medicine, 8(4) 2005, 257 – 262.

6-A.Sagliyan,F.Benzer,F.Kandemir,C.Gunay,M.Han and M.Ozkaraca," Beneficial effects of oral administrations of grape seed extract on healing of surgically induced skin wounds in rabbits",RevueMéd. Vét., 2012, 163, 1, 11-17

7- A.Sagilyan, C.Gunay,M.Cengiz and I.Yaman"Usage of fibrin adhesives in liver surgery in rabbits: an experimental study", *F.U.Vet. J. Healt. Sci.*,24(2010) 63-69.

8-M.kashmoola," Histopathological evaluation of skin wound in rabbits treated by systemic dexamethasone.",Baghdad Journal College Dentistry,19(1)2007,58-61.

9-A.Hemmati,A.Arzi and M.Amin"Effect of *Achilleamillefolium*extract in wound healing of rabbit",Journal of natural remedies,2(2)2002,164-167.

10-M.Sharif ,J.Alizargar and A.sharif"Evaluation of the Wound Healing Activity of Sesame Oil Extract in Rats",World Journal of Medical Science,9(2)2013,74-78

11-N.Lemo,G.Marginac,E.Reyes-Gomez,T.Lilin,O.Crosaz and D.Dohan"Cutaneous reepithelization and wound contraction after skin biopsies in rabbits:a mathematical model for healing and remodeling index",Veterinarski Arhiv,80(5)2010,637-652.

12-Z.Abdul-Karem"Clinical and Histopathological study of the effect of magnetic field on the healing of open wounds in rabbits"Mcsthesis,Basrah university2009,ch:4P:27

13-W.Mahmood"Immunohistochemical Evaluation of the effect of 790-805nm diode laser on interlukin-1B,Epidermal,Fibroblast,Vascular Endothelial and platelate derived growth factors in wound healing"Phdthesis,Baghdad university2013, ch4,P:128.