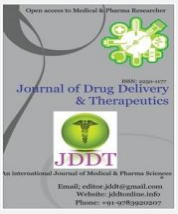
Available online on 25.12.2017 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research



Open Access Research Article

COMPARATIVE STUDY OF *CARICA PAPAYA* WITH MARKETED PRODUCT FOR THE TREATMENT OF WOUNDS IN DIABETIC RODENTS

Shaily Chaudhary[1], Akash Yadav[2]

[1]Smriti College of Pharmaceutical Education (SCOPE), 4/1 Pipliya Kumar Kakad, MR-11, Dewas Naka, Indore (Madhya Pradesh), India.

[2]IPS Academy College of Pharmacy, Knowledge Village, Rajendra Nagar, A.B. Road, Indore (Madhya Pradesh), India.

E-mail address: s.shailychaudhary@gmail.com

ABSTRACT

Diabetes is an unending situation associated with peculiarly elevated levels of sugar (glucose) in the blood. This chronic illness is also related with the degenerative extended pathological disorders like retinopathies, nephropathies, atherosclerosis, wound healing problems and cataract. Tissue renovates and wound curing are complicated processes that engross inflammation, granulation and tissue remodeling. Wound curing is characterized by two stages via inflammation and proliferation. The therapeutic utilization of *Carica papaya* relies because of the existence of papain an active constituent. This whole study emphasize on the effect of diabetes (high blood glucose sugar level) on the wound curing rate of rodents.

Cite this article as: Chaudhary S, Yadav A, Comparative study of carica papaya with marketed product for the treatment of wounds in diabetic rodents, Journal of Drug Delivery and Therapeutics. 2017; 7(7):211-213

INTRODUCTION:

The quote for diabetes is diabetes can hit anyone, from any walk of life and it does in numbers that are significantly increasing. It is a main cause of heart failure, blindness, amputations, amplified wound healing rate increased thirst, kidney failure, urination, increased hunger, fatigue, blurred vision, lack of sensation or prickling in the feet or hands sores that do not heal easily, inexplicable weight loss and stroke[1]. Wounds occur when the skin is broken down or scratched due to injury[2]. Streptozotocin (STZ) is a naturally occurring chemical, formerly known as an antibiotic, and later on studies found that it is mainly toxic to the insulin-producing beta cells of the pancreas[3].

MATERIAL AND METHODS:

Materials required

Streptozotocin, glucometer, accu chip, povidone iodine ointment, *Carica papaya* gel and wistar rats.

Induction of diabetes[4]

Diabetes (DM) was induced chemically as mentioned by Wu *et al.* [1]. Briefly after 12 hour fast, rats received one intra peritoneal (i.p.) injection of streptozotocin (65mg/kg) freshly prepared in sodium citrate buffer of 0.1 M (pH 4.5). At 8th day after streptozotocin injection blood glucose measurement was performed on tail vein blood by using a glucometer Accu-Check. Rats those fasting blood glucose level is more than 250 mg/dl were measured as diabetic. Water intake and weight was observed all the way throughout the study, and to confirm the diabetic status, fasting blood glucose measurement was repeated on the day of euthanasia.

After diabetes confirmed in animal

Wounding After diabetes was established in animals, with the help of punch biopsy machine (diameter of 6 mm; Accu-punch) make a full thickness around wound at the upper back of each rat in every group. Wound were traced on 1mm^2 graph paper on the same day of wounding and consequently at a gap of 3 days up to 12th day then on alternating days until healing was absolute. Changes in wound area were calculated on continuous mode and the speed of wound healing measured as given in the formula below.

Histopathology of wounds and measurements of percentage of wound healing by excision wound model was done in the following groups on 0, 8th and 12th day

Group 1: Control [vehicle]

Group 2: Positive control [standard povidone iodine]

Group 3: Treated with *Carica papaya*

Borders of the wounds were marked on a transparent paper by a fine tip permanent marker. The portion (in square millimetres) inside the borders of each tracing was determined plan metrically. The wound area of each animal was measured on 0 day, prearranged time period

initially at 3 h post wounding and successive measurement of wound area from both the three groups was taken on days 4, 8, and 12 post wounding. The grades of wound measurements on different days were articulated as percentage wound contraction. The values were articulated as per cent values of the 0 day capacity and were intended by Wilson's formula as follows:

% of Wound contraction

$$= \frac{\text{0 day wound area} - \text{unhealed wound}}{\text{0 day wound area}} x\ 100$$

Photographs of animals on 0, 8th and 12th days post wounding of every group were taken.

RESULTS AND DISCUSSION:

Measurements of proportion of wound contraction on 0 day:

For Control Group 1, the % of wound reduction was found to be = 2%

For Group 2 Positive control, the % of wound reduction was found to be = 6%

For Group 3: Treated with Carica Papaya gel the % of wound reduction was found to be = 6%

Measurements of percentage of wound contraction on 4th day:

For Control Group I, the % of wound contraction was found to be = 6%

For Group 2 Positive control, the % of wound contraction was found to be = 23%

For Group 3: Treated with Carica Papaya gel the % of wound contraction was found to be = 32%

Measurements of percentage of wound contraction on 8th day

For Control Group 1, the % of wound narrowing was found to be = 13%

For Group 2 Positive control, the % of wound narrowing was found to be = 42%

For Group 3: Treated with Carica Papaya gel the % of wound narrowing was found to be = 57%

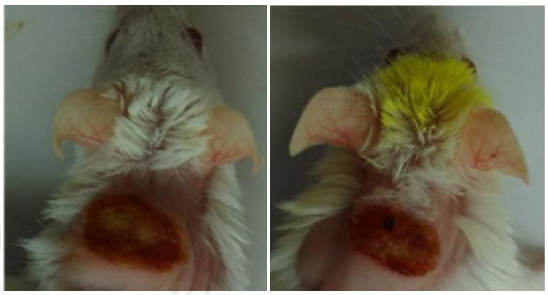
Measurements of percentage of wound contraction on 12th day

For Control Group 1, the % of wound reduction was found to be = 22%

For Group 2 Positive control, the % of wound reduction was found to be = 63%

For Group 3: Treated with Carica Papaya gel the % of wound reduction was found to be = 67%

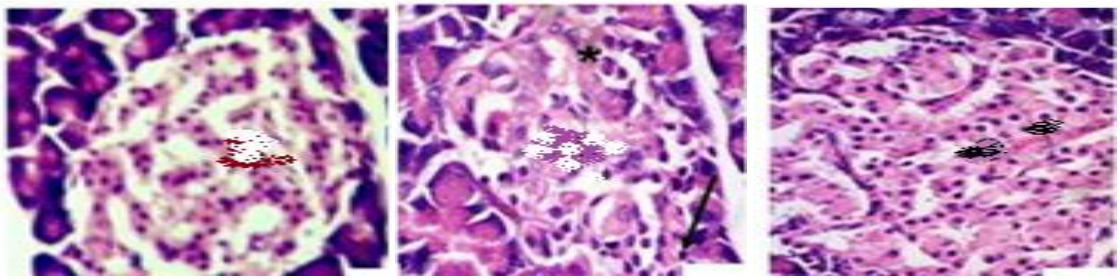
On understanding the data obtained by the analysis of % of wound narrowing on these 4 constitutive days, it was observe that the wound healing property of povidone iodine and Carica Papaya gel were very close and *Carica papaya* increase the wound healing improvement in diabetic rats.



Group1 Group 2

Group 3

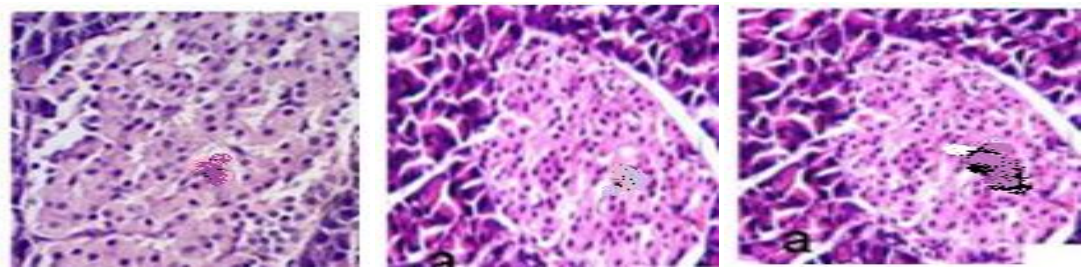
Figure 1: Wound healing photographs of wounds in rat on 8th day after wound formation in group. Group1 (control wounded non-treated); group 2 (Positive control); and group 3 (treated with *Carica papaya*)



Group 1 Group 2 Group 3

Figure 2: *Histological changes during the wound-healing process on the 0 day. Group 1(control wounded non-treated), group 2 (Positive control) and group 3 (treated with Carica papaya)*

The histopathology of the wound curing slide represent that on day zero the scars and injury of tissue for all the three groups are approximately same.



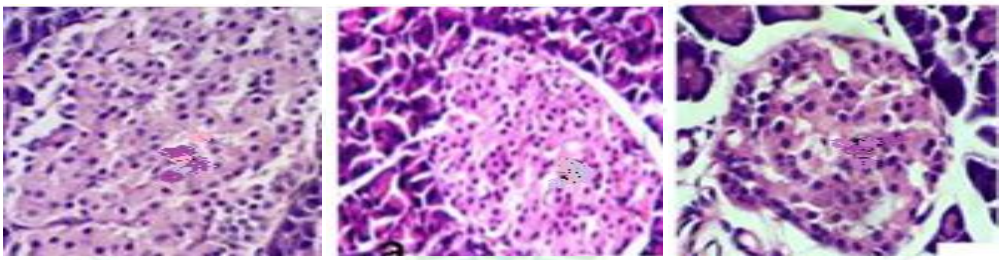
Group 1 Group 2 Group 3

Figure 3: Histological changes during the wound-healing process on the 8th day

Group 1 (control wounded non-treated), group 2 (Positive control) and group 3 (treated with *Carica papaya*)

The histopathology of the wound curing slide represent that on the eight day angiogenesis, collagen deposition, granulation, tissue formation, and wound narrowing take place more rapidly in group 2 and group three as compare to group 1. Even it was observed that collagen deposition and tissue development is greater in group 3 in the comparison of group 2.

Histopathological images of groups on 12th day:



Group 1 Group 2 Group 3

Figure 4: Histological changes during the wound-healing process on the 12th day

Group 1 (control wounded non-treated); group 2 (Positive control) and group 3 (treated with *Carica papaya*)

The histopathology of the wound curing slide represent that on day twelve the scars and injury of tissue for all the three groups are totally different. As group 2 and group 3, *Carica papaya* debrided wounds speedily, replacing sloughs with granulation tissue.

CONCLUSION:

The following research was emphasized on the development of a newest topical therapeutic agent *Carica Papaya*; increase the wound curing process in diabetic rats. With this expectation we examine the healing proficiency of papaya latex formulated as 1.0 and 2.5% hydrogels. We created a full width around wound at the upper back of every rat in every group in wistar rats separated into three groups as following; Group-I (negative control) received no treatment. Group-II was treated with standard drug povidone iodine hydrogel (positive control). Group-III received the *Carica Papaya* hydrogel. The efficacy of treatment was estimated on the base of wound narrowing rate, wound healing photographs in rats and histopathological report of animals of group 1, group 2 and group 3. It was bring into being that *Carica Papaya* was a superb therapeutic agent, which used to improve the wound curing rate extensively in diabetic rodents.

REFERENCES:

1. Wu KK, Huan Y, Streptozotocin-induced diabetic models in mice and rats, CPPH, 2008, 420, 1-14.
2. Agarwal PK, Singh A, Gaurav K, Goel S, Khanna HD, Goel RK, Evaluation of wound healing activity of extracts of plantain banana (Musa sapientum var. Paradisiaca) in rats, IJEB, 2009, 47, 32-40.
3. Murthy S, Gautam MK, Goel S, Purohit V, Sharma H, Goel RK, Evaluation of in Vivo Wound Healing Activity of Bacopa monniera on Different Wound Models in Rats, Biomed Res Int, 2013, 1-9.
4. Imran, M., Khan, M., Akhtar, R., Ahmed, S., & Rageeb, M. Antidiabetic and hypolipidemic effect of methanol extract of stereospermum colais fruit in streptozotocin induced diabetic rats. Journal of Drug Delivery and Therapeutics, 2016; 6(4): 41-47. doi:10.22270/jddt.v6i4.1272