



## DE-SLOUGHING ACTION OF PAPAYA DRESSING VS NORMAL SALINE IN CHRONIC NON HEALING ULCERS.

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### ABSTRACT

Lots of developments and researches are being done in the quest for an ideal wound dressings. Carica papaya dressings are one of these new developments. Papaya is known for its unique de-sloughing and wound healing property due to the presence of protease enzymes. There are not so many studies to quantify the de-sloughing action with any agents applied to the chronic non healing ulcers. This study is done to evaluate the effects of healing in chronic non healing ulcers as evidenced by amount of de-sloughing done by carica papaya dressings and normal saline dressings for a period of fourteen days in 30 patients, 15 patients with papaya and 15 patients with normal saline. Raw carica papaya plucked from the tree is grated and applied over the ulcers. Patients are evaluated daily from day zero to day 14. On fourteenth day it is observed by visual analog scale that, there is significant decrease in the amount of slough and formation of granulation tissue in patients who were dressed with carica papaya (P-value<0.0001) when compared to patients dressed with normal saline (P-value=0.0001). There is no significant difference in decrease in size of the ulcer between papaya dressing and normal saline dressing. The cost effectiveness, availability and ease of application makes carica papaya a better choice for de-sloughing the chronic non healing ulcers.

**KEYWORDS** : Raw Carica papaya, Normal saline, Chronic Non Healing Ulcer, De-slough, Protease Enzymes, Wound Healing, Granulation Tissue.

### INTRODUCTION:

*"Every 30 seconds a lower limb is lost some where in the world as a consequence of metabolic disorders".*

Healing of an ulcer is a complex biological process, which needs interactions among different cell types along with de-sloughing property and neovascularisation to promote delivery of adequate amount of nutrients and regulatory factors required for tissue remodeling and regeneration. In chronic wounds, there is disruption of normal healing process due to either poor general health or local factors like sensory neuropathy resulting in painless trauma causing ulceration and infections or inadequate blood supply to the wound resulting in decreased nutrients supply to the wound which promote growth process. Wound healing is a complex process in which the skin, and the tissues under it, repair themselves after injury.[1] This process is divided into predictable phases: blood clotting (hemostasis), inflammation, tissue growth (proliferation), and tissue remodeling (maturation). Blood clotting may be considered to be part of the inflammation stage instead of a separate stage.[2] The wound healing process is not only complex but also fragile, and it is susceptible to interruption or failure leading to the formation of non-healing chronic wounds. Factors that contribute to non-healing chronic wounds are diabetes, venous or arterial disease, infection, and metabolic deficiencies of old age.[3] Many studies have been conducted with various materials to improve wound healing. This study is done to document the effectiveness of papaya dressing as de-sloughing agents in chronic non healing ulcers.

### AIMS AND OBJECTIVES:

To compare and quantify the de-sloughing action and wound healing properties of papaya dressing vs normal saline dressings on wound bed preparation of chronic non healing ulcers using visual analog scale

### MATERIALS AND METHOD:

This is a randomized, prospective and comparative study done in the Department of General Surgery, SVS Medical College and Hospital, Mahabubnagar; on 30 patients with chronic non-healing ulcers. These 30 patients were divided into two groups A and B each

containing fifteen patients. Group A were dressed with papaya and group B were dressed with normal saline.

### INCLUSION CRITERIA:

1. Patients between 20 to 50 years of age of both sexes.
2. Admitted patients of chronic non healing ulcers of diabetic, varicose veins and any of non malignant aetiology.
3. Size 4x4 cm and above with no tendency of healing in past 2 months despite conventional treatment.

### EXCLUSION CRITERIA:

1. Age <20 yrs and >50 yrs
2. Patients with deep vein thrombosis
3. Significant arterial insufficiency
4. Severe neuropathy
5. Renal insufficiency
6. Malignant ulcers
7. Parasitic ulcer

### METHOD:

- Informed consent is taken from the patients.
- Detailed history of the patient with chronic non healing ulcer of the leg is taken.
- The initial ulcer size is measured at its maximum diameters by using flexible measuring tape up to one decimal in centimetres.
- Wound cultures are taken. Debridement is done.
- GROUP-A: Freshly plucked raw papaya is thoroughly washed and grated with the help of a sieve. The pulp is placed over the cleaned ulcer and covered with two layers of gauze piece. Above the gauze two to three layers of sterile gamjee pads are placed and kerlix dressing is done to hold in place with bandages. This is repeated everyday and compared.
- GROUP-B: Gauze pieces soaked in normal saline are placed over the cleaned ulcer in two layers and covered two layers of dry gauze pieces. Above the gauze two to three layers of sterile gamjee pads are placed and kerlix dressing is done to hold in place with bandages. This is repeated everyday and compared.
- Wound is inspected daily and the healing is measured by taking digital photography using 4X magnification from 20cm

distance.

- The same process is continued up to 2 weeks and the results are compared for papaya dressings and normal saline dressings using visual analogue score.
- The results are plotted in the proforma.

**RESULTS:**

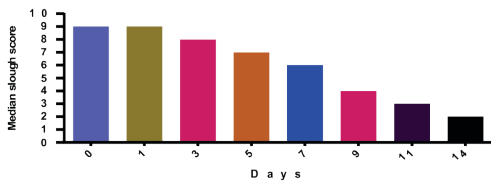
**STATISTICAL ANALYSIS:**

Data will be analyzed by using graph pad prism software of 6.01 version. . Data was summarized by Mean ± SD for continuous data. The comparison amount of slough between papaya dressing and normal saline dressings on chronic non healing ulcers for different time points was done by analysis of two way repeated measures test and followed by post-hoc multiple comparison tests. The comparison between different time points for the parameter amount of slough in the groups papaya dressing and normal saline dressing was done by analysis of one way repeated measures and The comparison between two groups for ordinal data is done by using WILCOXON RANK-SUM TEST or MANN WHITNEY U TEST. All P-values < 0.0001 will be considered significant.

**Table-1: the effectiveness of papaya dressing over chronic non healing ulcer in reducing the slough when dressed for a period of two weeks.**

Days	N	Range	Median	IQR	P-value
0	15	6 to 10	9	10 to 7	<b>&lt;0.0001</b>
1	15	6 to 10	9	10 to 7	
3	15	5 to 9	8	9 to 6	
5	15	4 to 9	7	8 to 5	
7	15	3 to 8	6	7 to 4	
9	15	3 to 6	4	5 to 4	
11	15	2 to 5	3	3 to 2	
14	15	1 to 3	2	2 to 1	

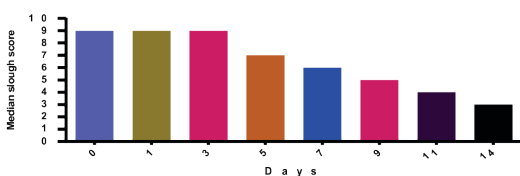
**Figure-1: the simple median bar diagram the effectiveness of papaya dressing over chronic non healing ulcer in reducing the slough when dressed for a period of two weeks**



**Table-2: the effectiveness of normal saline dressing over chronic non healing ulcer in reducing the slough when dressed for a period of two weeks.**

Days	N	Range	Median	IQR	P-value
0	15	6 to 9	9	10 to 7	<b>0.0001</b>
1	15	6 to 9	9	10 to 7	
3	15	6 to 9	9	10 to 7	
5	15	5 to 7	7	9 to 6	
7	15	3 to 6	6	8 to 5	
9	15	2 to 5	5	6 to 4	
11	15	2 to 4	4	5 to 3	
14	15	1 to 3	3	4 to 3	

**Figure-2: the simple median bar diagram for effectiveness of normal saline dressing over chronic non healing ulcer in reducing the slough when dressed for a period of two weeks.**



**Table-3: Comparison of reduction in amount of slough between papaya and normal saline in the table below**

Days	PAPAYA (Median value)	NORMAL SALINE (Median value)
0	9	9
1	9	9
3	8	9
5	7	7
7	6	6
9	4	5
11	3	4
14	2	3



**Photo-1: Day-0 Photo-2: Day-7 Photo-3: Day-14**



**Photo-4: Day-0 Photo-5: Day-7 Photo-6: Day-14**

Note: Photos 1,2 and 3 showing progressive decrease in amount of slough from day-0 to day-14 with papaya dressing.

Photos 4,5 and 6 showing progressive decrease in amount of slough from day-0 to day-14 with normal saline dressing.

**DISCUSSION:**

Cutaneous wound healing is an essential physiological process consisting of the collaboration of many cell strains and their products.<sup>[4]</sup> Attempts to restore the lesion induced by a local aggression begin very early on in the inflammatory stage. In the end, they result in repair, which consists of the substitution of specialized structures brought about by the deposition of collagen, and regeneration, which corresponds to the process of cell proliferation and posterior differentiation through preexisting cells in the tissue and/or stem cells.<sup>[5]</sup> Tissue repair is a simple linear process in which the growth factors cause cell proliferation, thus leading to an integration of dynamic changes that involve soluble mediators, blood cells, the production of the extracellular matrix, and the proliferation of parenchymal cells. The skin healing process, according to Mitchel *et al.*, illustrates the principles of repair for the majority of tissues.<sup>[6]</sup> Cell and biochemical events in wound repair can be divided into the following stages: inflammatory reaction, cell proliferation and synthesis of the elements which make up the extracellular matrix, and the posterior period, called remodeling.<sup>[7]</sup>

Many modalities of wound care have come up to assist a surgeon, to treat chronic wounds like conventional dressing with honey, phenytoin, foams and sprays, films, vacuum assisted dressing One such development is topical application of papaya. Almost all the studies take reduction in slough area as the end point by applying papaya dressing and normal saline. Till date there is no study available in literature to quantify the de-sloughing property, hence this study is done comparing papaya dressing vs normal saline dressings in de-sloughing the chronic non healing ulcers.

**STUDIES RELATED TO PAPAYA:**

Ihtasham Muhammad Ch\*, Shaukat Ali Shaikh \*, Haroonur Rashid\*\* *etal* (2014) Conducted to assess the role of papaya dressings in the management of diabetic foot in terms of healing of ulcers and

concluded, Topical papaya dressing provides cost effective and favorable outcome in clients with diabetic foot ulcer by decreasing the healing duration, reducing surgical interventions.<sup>[8]</sup>

Pradeepa R et al. (2015) conducted a cohort study to determine the prevalence of, and risk factors, diabetic neuropathy (DN) in south Indian type 2 diabetic subjects and concluded the prevalence of neuropathy was significantly higher in KD subjects compared with NDD subjects ( $P < 0.0001$ ) were higher in those with neuropathy compared with those without. Duration of diabetics ( $P = 0.045$ ) to be significantly.<sup>[9]</sup>

Garung S, Et Al. (2013) conducted a group study to investigate the healing efficiency of papaya latex formulated as 1.0 and 2.5% hydrogels and concluded that papaya latex formulated in the carbopol gel is effective in the treatment of burns and thus supports its traditional use.<sup>[10]</sup>

Murthy, Man gala .R et al (2012) et all done a interventional study related to comparison of safety and efficacy of papaya dressing with hydrogen peroxide solution on wound bed preparation in clients with wound gape, the abstract was published a Indian journal of pharmacology. The results Revealed that papaya dressing is more efficacious and equally safe as compared to hydrogen peroxide dressing when used for wound bed preparation in clients with postoperative wound gape.<sup>[11]</sup>

Jeffcott, William J; Chip chase, Susan Y., et al (2006) conducted consecutive cohort study multidisciplinary foot care clinic university of Texas ,USA related to assessing the outcome of the management of diabetic foot ulcers using ulcer-related and person-related measures.

#### Chemical properties of papaya:

The latex was chemically investigated and found that it was rich in chymopapain and papain and the later is also known as vegetable pepsin.<sup>[31]</sup> It was reported that when myrosin is combined with caricin, a mustard-like odor is produced.<sup>[32]</sup> The seeds and the pulp of Carica papaya contain benzyl glucosinolate which can be hydrolyzed by myrosinase to produce benzyl isothiocyanate.<sup>[12]</sup> Carica papaya have antibacterial activity against various microorganisms including Staphylococcus aureus, Bacillus cereus, Bacillus subtilis, E coli, Enterobacter cloacae, Proteus vulgaris, Klebsiella pneumonia, Salmonella typhi, Pseudomonas aeruginosa and Shigella flexner.<sup>[13]</sup> Papaya contains an Anti-glycemic property which is able to control the glucose concentration in the exposed and damaged tissue.<sup>[14]</sup>

The present study is a comparative study done in SVS Medical College and Hospital, Mahabubnagar on 30 patients with chronic ulcers from November 2016 to November 2018. The patients are selected randomly following the inclusion and exclusion criteria. The various ulcers in this study are of diabetic, post traumatic with infection, venous, traumatic, post burn etiologies. This chapter concentrates on the findings of this study derived from the statistical analysis and its pertinence to the objectives set for the study. The purpose of the study was " A study to assess the effectiveness of papaya dressing on chronic non healing ulcers among clients Admitted in surgery ward at SVS medical college, mahabubnagar

The effectiveness of papaya dressing as a de-sloughing agent is measured by assessing the amount of slough present over the ulcer bed periodically from day-0 to day-14. On day zero the range of slough is 6 to 10 with median and IQR as 9 and 10 to 7 respectively. The ulcer is dressed with grated raw papaya for the next two weeks. There is no change in amount of slough for the first two days. From day-3 onwards there is progressive decrease in amount of slough present over the ulcer bed upto day-14. On the day 14 the range of slough is 1 to 3 with median and IQR as 2 and 2 to 1 respectively. There is significant decrease in amount of slough with  $P$  value  $< 0.0001$  at the end of second week. With this data it is evident that

there is no much change in amount of slough when dressed with papaya upto day-2. Decrease in slough starts from day-3 and shows a progressive reduction in slough by the end of 2<sup>nd</sup> week.

The effectiveness of normal saline in reducing the amount of slough on ulcer bed is measured by assessing the slough periodically from day-0 to day-14. On day-0 the range of slough present is 6 to 9 with median and IQR as 9 and 10 to 7 respectively. The ulcer is dressed with normal saline for the next two weeks. There is no change in the amount of slough on the ulcer bed for 3 to 4 days. From day-5 onwards there is progressive decrease in amount of slough upto day-14. On the day-14 the range of slough is 1 to 3 with median and IQR as 3 and 4 to 3 respectively. There is significant decrease in ulcer size with  $P$  value = 0.0001 at the end of second week. With this data it is evident that there is no much change in amount of slough when dressed with normal saline upto day-4. Decrease in slough starts from day-5 and shows a progressive reduction in slough by the end of 2<sup>nd</sup> week.

From the median values that are plotted in table no-3 it is evident that the papaya dressing showed better results than the normal saline.

#### CONCLUSION

Both raw Papaya and normal saline application enhanced wound healing by decreasing the ulcer size and decreasing the amount of slough present over ulcer bed. There is no much improvement in ulcer for first five to seven days of application of papaya and normal saline. After one week there is Rapid decrease in amount of slough and ulcer size in both the groups. In comparison with normal saline, papaya dressing showed better and fast results as a de-sloughing agent when applied over chronic non healing ulcers. In terms of de-sloughing property papaya dressing is superior to normal saline dressing. Regarding ulcer size there is no much difference between papaya and normal saline dressing. Papaya dressing is cost effective and easily available, can also be introduced as a policy for non pharmaco therapy management. Hence Raw papaya dressing is ideal choice in treating chronic non healing ulcers as a DE-SLOUGHING agent.

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