

# **RESEARCH ARTICLE**

# EFFECTIVENESS OF CITRIC ACID DRESSING ON HEALING PROCESS OF DIABETIC FOOT ULCER AMONG PATIENTS ADMITTED IN SURGICAL WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI

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#### Key words

Citric Acid Dressing, Diabetic Foot Ulcer

#### Abstract

**Title:** Effectiveness of Citric acid dressing on healing process of diabetic foot ulcer among patiets admitted in Surgical ward at Government Rajaji Hospital, Madurai.

**Objectives:** To assess the level of healing process of diabetic foot ulcer. To evaluate the effectiveness of citric acid dressing on healing process of diabetic foot ulcer. To associate the level of healing process of diabetic foot ulcer with their selected sociodemographic variables and clinical variables.

**Hypotheses:**  $H_1$ : There is a statistically significant difference between the pretest and posttest level of healing process of diabetic foot ulcer among patients.

 $H_2$ : There is a statistically significant association between the level of healing process of diabetic foot ulcer with their selected Sociodemographic variables and Clinical variables.

**Methodology:** Pre Experimental Research Design was used. 40 subjects selected by Non Probability Sampling Technique. 3% Citric acid dressing applied once a day for 5 consecutive days and posttest was conducted on  $6^{th}$  day. **Results:** The result revealed that, there was a significant improvement in the level of healing process of diabetic foot ulcer.

**Conclusion:** Citric acid dressing was more effective in improving the level of healing in patients with diabetic foot ulcer.

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# **Introduction:-**

Many people believe life is meaningless, but it is not! All people deserve to live since it is their right from birth. Life is precious because it is beautiful and it is a gift of God that he gave us. I believe all life is precious. We should value this gift with all that we have and love. Lifestyle often refers to the chosen aspect of a person's material life. According to WHO, 60% of related factors to individual health and quality of life are correlated to lifestyle. Factors that influence lifestyle include cultural setting and changing technology; personal attitudes and preferences; household characteristics such as number of people, income and location. Today wide changes have occurred in life of all people. Malnutrition, unhealthy diet, smoking, alcohol consuming, drug abuse, stress and so on are the

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presentations of unhealthy lifestyle that they are used as dominant form of lifestyle. Lifestyle has long been associated with the development of many chronic diseases and NCDs. WHO has identified four major NCDs, i.e., diabetes, CVDs, cancer and chronic lung disease/chronic obstructive pulmonary disease (COPD) which shares common lifestyle-related behavioral risk factors.

Diabetes mellitus (DM) is characterized by chronic hyperglycemia and impaired carbohydrates, lipids, and proteins metabolism caused by complete or partial insufficiency of insulin secretion and/or insulin action. WHO estimates that diabetes was the seventh leading cause of death in 2016.

Diabetes currently affects more than 62 million Indians, which is more than 7.1% of the adult population. The average age on onset is 42.5 years. Nearly 1 million Indians die due to diabetes every year. India ranks second in the world with 65.1 million diabetic patients. Prevalence rate of diabetes in India is 2.4% in rural and 12-17% in urban population.

The prevalence of diabetes is increasing worldwide resulting in foot complications, which lead to poor quality of life and increased cost of living. The various lower limb complications in diabetic patients are peripheral neuropathy, charcot atrophy, foot ulcers, infections and lower extremity amputations which may lead to hospitalization and disability among the diabetes. Research has shown, however, that development of a foot ulcer is preventable. In India prevalence of footulcers in diabetes patients is 3% which is lower compared with western population.

### Need for the study:-

Diabetic foot infections include Septic arthritis, Abscesses, Cellulitis, Tendonitis and Osteomyelitis. Severe infections in the foot may lead to leg amputations. It is estimated that Diabetes accounts for more than 50% of amputation, of which 85% of lower amputation in Diabetes patients are preceded by foot ulcers.

The risk of foot ulceration and limb amputation increases with age and the duration of diabetes. The prevention of diabetic foot is crucial, considering the negative impact on a patient's quality of life and the associated economic burden on the healthcare system. Treating a diabetic foot infection requires proper wound care and appropriate antibiotic therapy. The fundamentals of good clinical care includes adequate frequent debridement, offloading, moist wound care, treatment of infection, and revascularization of the ischemic limb. Wound care plays a pivotal role in the management of diabetic foot ulcer, which comprises cleaning the wound with normal saline following aseptic techniques and the use of modern wound care techniques that promote a moist wound healing environment.

The pH value within the wound milieu directly and indirectly influences all biochemical reactions taking place in the process of wound healing. It has been proven that the surface pH of a wound plays an important role in wound healing as it helps control infection and increase antimicrobial activity, oxygen release, angiogenesis, protease activity, and bacterial toxicity. Therefore, pH value affects the regular cellular events in wound healing. It has also been observed that wounds with a high alkaline pH have a lower healing rate in both acute and chronic wounds as compared to wounds with a pH closer to neutral. Wound healing progression decreases when pH is elevated to alkaline condition. The environment of acute as well as chronic wounds progresses from an alkaline state to a neutral state and then to an acidic state when healing begins.

# **Objectives:-**

- 1. To assess the level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20.
- 2. To evaluate the effectiveness of citric acid dressing on healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20.
- 3. To associate the level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20 with their selected socio demographic variables and clinical variables.

#### Hypotheses:

**H1:** There is a statistically significant difference between the pretest and post test level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20.

**H2:** There is a statistically significant association between the level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20 with their selected sociodemographic variables and clinical variables

### **Operational definition:-**

# Citric acid dressing

In this study it refers to cleaning the diabetic foot ulcer with 0.9% normal saline and application of 3% Citric acid soaked gauze dressing once a day for 5 consecutive days.

### Healing process

Healing process refers to the increase in perfusion of blood supply, reduction of wound infection, maintenance of sensation and approximation of wound as measured by Modified PEDIS (Perfusion, Extent, Depth, Infection and Sensation) Classification and Scoring system.

# **Review of literature:-**

Review of literature in the study is organized under the following headings.

- A) Literature related to prevalence of diabetic foot ulcer.
- B) Literature related to effectiveness of citric acid dressing.
- C) Literature review related to citric acid dressing on healing process of diabetic foot ulcer.

# Methodology:-

In this study, Quantitative evaluative approach was adopted by the researcher. Pre Experimental (one group pre test post test) Research Design was used. The study was conducted among patients with Diabetic foot ulcer who got admitted in Surgical Ward at Government Rajai Hospital, Madurai. 40 subjects selected by Non Probability (Purposive) Sampling technique. 3% Citric acid dressing applied once a day for 5 consecutive days and posttest was conducted on  $6^{th}$  day.

#### **Description of the tool:-**

The tool consists of two sections Section I: Socio Demographic variables and clinical variables Section II: Modified PEDIS (Perfusion, Extent, Depth, Infection and Sensation) classification and scoring system

#### **Interpretation of score**

1-3= GRADE I 4-6= GRADE II 7-9= GRADE III 10-12= GRADE IV

#### Ethical consideration

This study was conducted after getting approval from the Ethical Committee of Madurai Medical College, Madurai-20. All the respondents were informed carefully regarding the purpose of the study and their part during the study and how the privacy will be guarded. Informed Oral and Written consent was obtained from all the participants and confidentiality was ensured.

#### **Data collection procedure**

After obtaining permission from the Ethical Committee of Madurai Medical College, Madurai, Head of the Department, Department of Medicine and General surgery, Government Rajaji Hospital, Madurai. The data collection was done from 18.03.2019 to 12.04.2019. Samples were selected as per the inclusion criteria using non probability purposive sampling technique. Rapport was established with the patients with diabetic foot ulcer and the brief introduction about the study was explained. Informed Oral and Written consent was obtained from the patients after fully explaining the purpose of the study. Pretest was done on first day using Modified PEDIS (Perfusion, Extent, Depth, Infection and Sensation) Classification and Scoring system. 3% Citric acid dressing applied to the subjects once a day for 5 consecutive days and the post test was conducted on 6<sup>th</sup> day using PEDIS classification and scoring system. Sample procedure was followed for 6 weeks until the fulfillment of required samples.

#### Data analysis and interpretation:-

**Table 1:-** Comparison of pre test and post test level of healing process of diabetic foot ulcer among patients n=40.

Level of PEDIS	Pretest		Posttest		Extended Mc Nemar's test
	n	%	n	%	
Grade I	4	10.0%	25	62.5%	
Grade II	36	90.0%	15	37.5%	χ2=21.00
Grade III	0	0.0%	0	0.0%	p=0.001***(S)
Grade IV	0	0.0%	0	0.0%	
Total	40	100%	40	100.0%	

\*Significant at p<0.05 level, NS= Not Significant

Extended Mc Nemar's test revealed that ( $\chi 2=21.00$ ), (**p** = 0.001). There was a statistically significant difference between the pre test and post test level of healing process of diabetic foot ulcer among patients.

**Table 2:-** Comparison of Mean, Standard deviation and Mean difference of pre test and post test level of healingprocess of diabetic foot ulcer among patientsn=40

Pretes	st	Posttest		Mean	Student's paired
Mean score	SD	Mean score SD		Difference	t-test
5.05	0.93	3.13	0.72	1.93	t=14.69 p=0.001 *** Significant

\*\*\*Very highly significant at p<0.05 level, NS= Not Significant

The student's paired 't' test was done to find out the difference between the pre test and post test. It revealed that (t=14.69), (p=0.001). There was a statistically significant difference between the pre test and post test level of healing process of diabetic foot ulcer among patients.





Error bars: +/- 2 SE

In the pre test, mean score was 5.05 with standard deviation of 0.93 whereas post test, mean score was 3.13 with the standard deviation of 0.72 and the mean difference was 1.93.

The student's paired't' test was done to find out the difference between the pre test and post test. It revealed that (t=14.69), (p=0.001). There was a statistically significant difference between the pre test and post test level of healing process of diabetic foot ulcer among patients.

	Max score	Mean score	Mean Difference of PEDIS reduction score with 95% Confidence interval	Percentage of PEDIS reduction score with 95% Confidence interval
Pretest	12	5.05	1.92	16.00%
Posttest	12	3.13	(1.66 – 2.19)	(10.38% -18.25%)

**Table 3:-** Effectiveness of citric acid on healing process of diabetic foot ulcer among patients n=40.

On an average, healing process of diabetic foot ulcer among patients in post test PEDIS reduction score was increased by 18.25% than the pre test PEDIS reduction score by 10.38%.

The difference between the pretest and post test PEDIS reduction score was analyzed using proportion with 95% confidence interval. Percentage of PEDIS reduction score with 95% confidence interval is 16.00 and the mean difference of PEDIS reduction score with 95% confidence interval is 1.92.

This reduction shows the effectiveness of 3% Citric acid dressing on healing process of diabetic foot ulcer.

# Summary, Conclusion, Implications And Recommendations:-

The present study was done to evaluate the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in surgical ward at Government Rajaji Hospital, Madurai.

# Major findings of the study were,

The distribution of socio demographic and clinical variables of the study subjects showed that, 18 (45%) were Aged between 51- 60 years, 32 (80%) were Males, 35 (87.5%) were Hindus, 19 (47.5%) were hailed from Rural area, 36 (90%) were Non vegetarian, 21 (52.5%) were studied upto Primary education, 24 (60%) were Clerical/ Shop keeper/ Farmer, 24 (60%) were earned between Rs.5001 – 10,000, 40 (100%) had type II Diabetes mellitus, 17 (42.5%) had duration of Diabetes mellitus more then 5 years, 20 (50%) had less than one month of Diabetic foot ulcer, 19 (47.5%) had Diabetic foot ulcer in foot, 23 (57.5%) had Insulin, 28 (70%) had no Co morbidities, 25 (62.5%) had Body mass index between 18.5 – 24.9, 21 (52.5%) had Ramdom blood sugar of 161-200 mg/dl and 26 (65%) had Regular treatment.

In the pre test 36 (90%) had Grade II Diabetic foot ulcer, in the post test, 25 (62.5%) had Grade I Diabetic foot ulcer. There was a statistically significant association between the level of healing process of diabetic foot ulcer and Age, Male gender, Duration of diabetic foot ulcer and Random blood sugar level.

# The study findings brought out the following conclusion.

The study findings provide evidence that citric acid dressing was effective in improving the healing process of diabetic foot ulcer among patients. Hence the researcher concluded that 3% citric acid dressing is effective than routine care in healing process of diabetic foot ulcer among patients.

# Implications of study

The findings of the study have several implications on nursing practice, nursing administration, nursing education and nursing research that can be used in the following areas of profession.

### Implication for nursing practice

- 1. The study findings will help the nursing personnel to include Citric acid dressing as a nursing intervention in the management of diabetic foot ulcer.
- 2. Nurses must be trained in the aspect of citric acid dressing and they should know its scientific principles involved in it to improve the level of healing process of diabetic foot ulcer among patients.

#### Implication for nursing education

1. Nursing education motivate the nursing student to use Modified PEDIS classification and scoring system among patients with diabetic foot ulcer in surgical ward.

### Implication for nursing administration

- 1. Administrator can encourage the nurses to assess the level of diabetic foot ulcer and make it as one of the assessment procedure.
- 2. Administrator should guide the nurses to use standardized classification, grading and scoring system for diabetic foot ulcer.
- 3. Nursing administrator can formulate protocols to incorporate the citric acid dressing as diabetic foot ulcer in surgical ward.

### Implication for nursing research

- 1. The study would help to expand the scientific body of professional knowledge from which further research can be conducted.
- 2. Nurse researcher comparing citric acid dressing with other types of dressing such as betadine dressing, palcenterex dressing, honey dressing, acetic acid dressing for identifying the difference planning approach to minimize those difference.