Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/10276
DOI URL: http://dx.doi.org/10.21474/IJAR01/10276

RESEARCH ARTICLE

EFFECTIVENESS OF 1% ACETIC ACID SOAK ON HEALING PROCESS OF FOOT ULCER AMONG DIABETIC PATIENTS AT GOVERNMENT RAJAJI HOSPITAL MADURAI-20

Dr. S. Rajamani[1], Prof. S. Poonguzhali[2], Mrs. S. Muniammal[3], Dr. S.R. Dhamotharan[4] and Mr. Raj Kumar k[5]

1. Principal, College of Nursing, Madurai Medical College, Tamil Nadu, India.
2. Former principal, College of Nursing, Madurai medical college, Tamil Nadu, India.
3. Lecturer, College of Nursing, Madurai Medical College, Tamil Nadu, India.
4. Professor and HOD of General Surgery, Department Of General Surgery, Madurai Medical College, Tamil Nadu, India.
5. M.sc Nursing Student, college of Nursing, Madurai Medical College, Tamil Nadu, India.

Manuscript Info

Manuscript History
Received: 23 November 2019
Final Accepted: 25 December 2019
Published: January 2020

Key words:-
Food Ulcer, Diabetic Patients, 1% Acetic Acid Soak

Abstract

Title: Effectiveness of 1% acetic acid soak on healing process of foot ulcer among diabetic patients.

Objectives: To assess the level of foot ulcer among diabetic patients.To evaluate the effectiveness of 1% acetic acid soak on healing process of foot ulcer among diabetic patients.To associate healing process of foot ulcer among diabetic patients with their demographic variables.

Hypotheses: There is a significant difference between the pre and post test level of healing process and between the post test level of healing process and demographic variables,significant association between the healing process of foot ulcer among diabetic patients.

Methodology: Pretest- post test design was used. 60 sample were selected by probability (Simple Random) sampling technique. Interventional group received 1% acetic acid Soak twice a day for 5 days. Pretest- post test was done by using PEDIS Classification and Scoring System.

Findings: The findings revealed that there was a significant improvement of healing process after intervention confirmed by student's independent t-test value=8.35 and p=0.001level.

Conclusion: The statistical evidence proved that the 1% acetic acid soak was simple, safe and effective in improving the healing process of foot ulcer among diabetic patients.

Introduction:-

"The foot feels the foot when it feels the ground." -Buddha:

Foot ulcers are a major global healthcare problem. It is estimated that each year around 4 million people get a foot ulcer. Currently, there are an estimated 366 million people affected with diabetes mellitus globally. India is estimated to have 61.3 million diabetics, which is projected to cross 100 million by the year 2030. Along with the rising prevalence of diabetes, an increase in its complications is expected. Diabetes along with its complications is expected to result in increasing morbidity, mortality and health expenditure due to the requirement of specialized

Corresponding Author:- Dr. S. Rajamani
Address:- Principal, College of Nursing, Madurai Medical College, Tamil Nadu, India.

care. Furthermore, amputations due to diabetic foot ulcer are characterized by loss of productivity, which adds to the economic burden of diabetes. The prevalence of diabetic foot ulcer among outpatient and inpatient diabetics in a rural Indian study was found to be 10.4%.

Diabeti\c foot ulcer is a result of microvascular and neuropathic complications in diabetics. Studies such as the United Kingdom Prospective Diabetes Study have shown that proper control of blood glucose through diet, exercise and medications prevents the development of microvascular complications. Furthermore, the practice of diabetic foot care including daily foot examination and use of appropriate footwear is considered important in its early detection and prevention of complications. People with poor knowledge and practice regarding diabetic foot care are known to have a higher incidence of diabetic foot ulcers. On the other hand, simple health education measures can improve both the knowledge and practice regarding diabetic foot care. Adoption of foot care practice after education has also been shown to reduce foot problems such as corns and callosities and promote healing of foot ulcers. However, there is a dearth of studies in India, which assess the effect of health education on diabetic foot care practice of patients, especially in primary care setting. Thus, the objective of our study was to assess the risk factors for poor diabetic foot care and to determine the effectiveness of health education in improving diabetic foot care practice in a rural outpatient setting.

Diabetic foot is often quite a dreaded disability, with long stretches of hospitalization, and impossible, mounting expenses, with the ever dangling end result of an amputated limb. The phantom limb plays its own cruel joke on the already demoralized psyche. The diabetic foot, no wonder, is one of the most feared complications of diabetes. Diabetic foot is characterized by a classical triad of neuropathy, ischemia, and infection.Preventing the diabetic foot should be the first priority. This can be achieved by identifying the high-risk individuals, like those with periphe ral neuropathy, peripheral vascular disease, foot deformities, and presence of callus.

Diabetic foot ulcers are common and estimated to affect 15% of all diabetic individuals during their lifetime. It is now appreciated that 15 – 20% of patients with such foot ulcers go on to need an amputation. Almost 85% of the amputations are preceded by diabetic foot ulcers. Numerous risk factors for the development of foot ulcers have been suggested, the most important being peripheral sensory neuropathy followed by peripheral vascular disease. The proportion of neuropathic, neuroischemic, and purely ischemic lesions in diabetics is 54, 34, and 10%. In India, it is estimated that approximately 40,000 legs are being amputated every year, of which 75% are neuropathic with secondary infection, which is potentially preventable. Certain factors, such as, barefoot walking, illiteracy, low socioeconomic status, late presentation by patients, ignorance about diabetic foot care among primary care physicians, and belief in the alternative systems of medicine contribute to this high prevalence.

Diabetes prevalence has been rising more rapidly in middle- and low-income countries. Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. In 2015, an estimated 1.6 million deaths were directly caused by diabetes. Another 2.2 million deaths were attributable to high blood glucose in 2012.Almost half of all deaths attributable to high blood glucose occur before the age of 70 years. WHO projects that diabetes will be the seventh leading cause of death in 2030. Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes. Diabetes can be treated and its consequences avoided or delayed with diet, physical activity, medication and regular screening and treatment for complications.

Need for the study:

Diabetes the global epidemic is rapidly increasing at an alarming rate. Developing countries like India harbor the majority of diabetic people and by the year 2030 AD India will have the largest number of diabetic patients. Diabetic foot is one of the common diabetic complications found in India. Both aerobic and anaerobic pathogens form the etiology for diabetic foot infection. Members of the Enterobacteriaceae family were the most prominent among the aerobes while members of the Genus Peptostreptococcus and Clostridium were most prominent among the anaerobes. Ulcers infected with anaerobic pathogens showed a longer healing time than ulcers infected with aerobic pathogens. Oxidative stress is one of the major markers of inflammatory response and oxidative stress markers such as lipid peroxidation, thiobarbituric acid reactive substance (TBARS), Superoxide Dismutase (SOD), Catalase, G Peroxidase, G-S Peroxidase and plasma total antioxidant play a major role in the nonhealing of diabetic foot ulcers. Growth factors such as platelet-derived growth factor (PDGF), transforming growth factor (VEGF), and epidermal growth factor (EGF) are needed for normal wound repair, while proteases such as matrix metalloproteinase (MMP) and serine proteases found in chronic wounds delay the healing process.

Worldwide India leads in diabetes mellitus and within India Kerala tops the list. Keeping in view increasing the burden of diabetes mellitus in Kerala, it highly important to know about the awareness of the disease among the general population to chalk out culturally appropriate and need oriented educational strategies.

As stated above, high blood sugar levels over time can cause nerve damage and circulation problems. These problems can cause or contribute to foot problems. Left unnoticed or untreated, sores, ingrown toe nails, and other problems can lead to infection. Poor circulation makes healing an infection.

Diabetes and daily routines go hand in hand--eating balanced meals, monitoring blood sugar, getting some physical activity each day, and relaxing. But there's another task doctors urge to add to busy schedule: examining feet. Reasons to Check Feet It's not the most glamorous chore, but medical professionals agree it's important. People with diabetes (PWDs) are at high risk for major foot complications, which are often unseen and under-discussed. Those complications can start as small blisters or cuts that are easy to overlook until it's too late.

Uncontrolled diabetes causes nerve damage in the extremities (a condition called peripheral neuropathy that limits pain sensation in up to 45 percent of all PWDs). Nerve damage also leads to poor circulation (which means wounds take longer to heal) and makes prone to infection (it's difficult for the body to fight off bacteria in wounds).

The best treatment is prevention, since medical treatment for diabetic wounds provides limited help. If a wound occurs, treatment can include:

1. Keeping all wounds clean and properly dressed
2. Antibiotics (for infected wounds or as a preventive measure for wounds at risk of getting infected)
3. Surgical debridement (the dead or infected tissue is removed to allow the healthy tissue to heal and regenerate)
4. Referral to a podiatrist or a wound care center (for patients with calluses, corns, hammertoes, bunions, toenail problems or chronic non-healing ulcers)
5. Limb amputation (to save as much of a limb as possible when there is a serious infection)

The studies show that an acidic environment created by use of acetic acid helps in wound healing by controlling wound infection, increasing antimicrobial activity, altering protease activity, releasing oxygen, reducing toxicity of bacterial end products, and enhancing epithelization and angiogenesis.

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.

Statement of the problem:

"A study to evaluate the effectiveness of 1% acetic acid soak on healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20"

Objectives:-

1. To assess the level of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20.
2. To evaluate the effectiveness of 1% acetic acid soak on healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20.
3. To associate the level of healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20 with their selected socio-demographic variables.

Hypothesis:

1. **H_1:**There is a significant difference between the pretest and post test level of healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20.
2. **H_2:**There is a significant difference between the post test level of healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20 with their selected socio-demographic variables.

3. **H_3:** There is a significant association between the level of healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20 with their selected socio-demographic variables.

Operational definition:

Effectiveness:

In this study effectiveness refers to the desired result produced by 1% acetic acid soak on wound healing process among patients with diabetic foot ulcer and it will be measured by using Modified Perfusion, Extent, Depth, Infection and Sensation Classification and Scoring System.

Acetic Acid Soak:

In this study acetic acid soak refers to the diabetic foot ulcer cleaned as routine care and then 1% acetic acid soaked gauze applied over the foot ulcer and wait for 10 - 15 minutes and then removed that 1% acetic acid soaked gauze and wash the wound with 0.9% normal saline and applied vasline gauze dressing twice a day for 5 consecutive days.

Healing process:

In this study wound healing process refers to the restoration of the structure of the damaged tissue intactness of skin, absence of infection, maintenance of perfusion and sensation at the site of diabetic foot ulcer, it is measured by using Modified Perfusion, Extent, Depth, Infection and Sensation Classification and Scoring System.

Diabetic patients with foot ulcer:

In this study patient with diabetic foot ulcer refers to the adult patients who are diagnosed as diabetic foot ulcer and admitted in surgical ward at Government Rajaji Hospital, Madurai-20

Assumption:

This study assumes that

Diabetic Patients prone to get foot ulcer due to improper foot care.

Delimitations:

The study is limited to

1. People those who have admitted with foot ulcer in surgical ward, at Government Rajaji Hospital, Madurai-20.
2. Sample size is limited to 60 patients
3. Study period 4 – 6 weeks.

Projected outcome:

1. The study will helps to identify the prevalence and level of foot ulcer among diabetic patients.
2. Acetic acid soak will decrease the level of foot ulcer among diabetic patients.
3. The findings will help health care professionals to practice acetic acid soak and use it in health care settings or in other areas.

Review Of Literature:

"Books are companions, teacher, magicians, bankers of the treasures of the mind. Books are humanity in print."-Barbara W Tuchman:

Literature reviews serves a number of important functions in research process. It helps the researcher to generate ideas or to focus on a research approach, methodology, meaning tools and even type of statistical analysis that might be productive in pursuing the research problem.

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

1. Literature related to prevalence of diabetic foot ulcer.
2. Literature related to effectiveness of acetic acid soak.
3. Literature related to acetic acid soak on healing process of diabetic foot ulcer.

Research Methodology:-

Ethical consideration:

This study was conducted after approval from the Ethical Committee Madurai Medical College, Madurai-20,all the respondents were carefully informed about the purpose of the study and their part during the study and how the privacy was guarded. Confidentiality was ensured. Written permission was obtained from all participants.

Data collection procedure:

After obtained permission from the Ethical Committee of Government Rajaji Hospital, Madurai-20 and The Head of the Department, Department of General Surgery, Government Rajaji Hospital, Madurai-20 the data collection was done from 04.06.2018 to 13.07.2018. Rapport established with the diabetic foot ulcer patients after the brief introduction about the study and its purpose. The written and oral consent was obtained from the patients after fully explaining the produre of the study. On the first day of data collection the researcher selected the sample as the inclusion criteria. Randomly assigning the samples for interventional group and control group. Pretest was done on the first day using PEDIS Classification and Scoring System and the diabetic foot ulcer was graded. Patients in the interventional group received Acetic acid soak twice a day for 5 consecutive days and the control group received the routine care for 5 consecutive days. Post test was conducted at 6th day using PEDIS Classification and Scoring System for both the groups. Sample procedure followed for 6 weeks until the fulfillment of required samples.

Data Analysis And Interpretation:-

The data collected were interpreted under the following sections:

Description of healing process of foot ulcer among diabetic patients both interventional and control group

Frequency and percentage description of pre test level of foot ulcer among diabetic patients both Interventional and control group n=60.

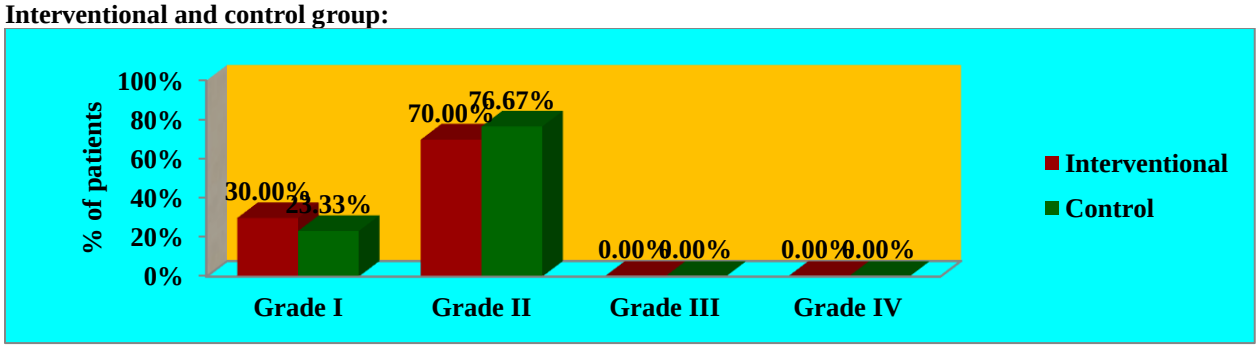
Level of foot ulcer	Group				χ^2
	Interventional		Control		
	F	%	f	%	
Grade I	9	30.00%	7	23.33%	χ^2=0.34 P=0.55(NS)
Grade II	21	70.00%	23	76.67%	
Grade III	0	0.00%	0	0.00%	
Grade IV	0	0.00%	0	0.00%	
Total	30	100.00%	30	100.00%	

p>0.05 not significant, NS=Not Significant

This table portrays distribution of pre test level of foot ulcer among diabetic patients in intervention and control group.

In intervention group, 21 (70%) were having Grade II level of foot ulcer and 9 (30%) were having Grade I level of foot ulcer , none of them were having grade III or grade IV . Where as in the control group 23 (76.67%) were having Grade II level of foot ulcer and 7 (23.33%) were having Grade I level of foot ulcer, none of them were having grade III or grade IV . In χ^2=0.34 showed a difference in the pre test level of foot ulcer among diabetic patients in intervention and control group.

Distribution of the subjects according to the pre test level of foot ulcer among diabetic patients both Interventional and control group:



Multiple bar diagram portrays that distribution of pre test level of foot ulcer among diabetic patients both interventional and control group

In intervention group, 21 (70%) were having Grade II level of foot ulcer and 9 (30%) were having Grade I level of foot ulcer , none of them were having grade III or grade IV . Where as in the control group 23 (76.67%) were having Grade II level of foot ulcer and 7 (23.33%) were having Grade I level of foot ulcer, none of them were having grade III or grade IV .In $\chi 2=0.34$ showed a difference in the pre test level of foot ulcer among diabetic patients in intervention and control group.

Frequency and percentage description of post test level of healing process of foot ulcer among diabetic patients both Interventional and control group n=60.

This table portrays distribution of post test level of healing process of foot ulcer among diabetic patients in intervention and control group.

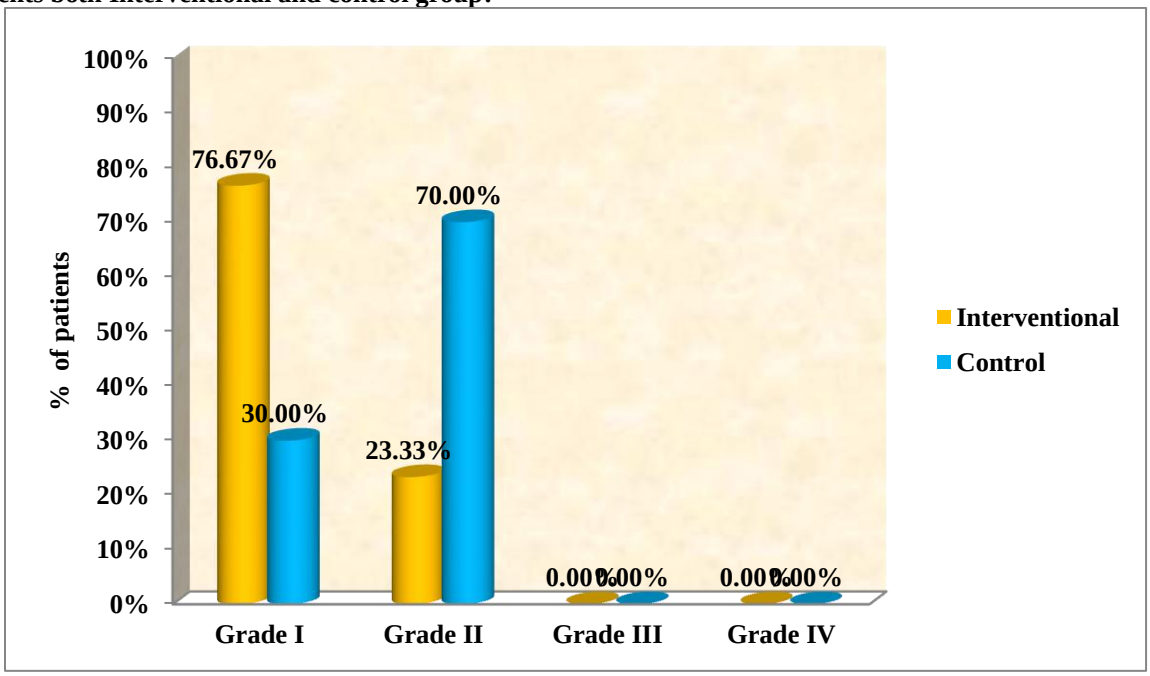
Level of healing process of foot ulcer	**Group**				$\chi 2$
	Interventional		**Control**		
	f	**%**	**f**	**%**	
Grade I	23	76.67%	9	30.00%	$\chi 2=13.12$ P=0.005***(S)
Grade II	7	23.33%	21	70.00%	
Grade III	0	0.00%	0	0.00%	
Grade IV	0	0.00%	0	0.00%	
Total	30	100.00%	30	100.00%	

P<0.05 significant , S= Significant

In intervention group, 23 (76.67%) were having Grade I level of foot ulcer and 7 (23.33%%) were having Grade II level of foot ulcer none of them were having grade III or grade IV wound healing process. Where as in the control group, 21 (70%) were having Grade II level of foot ulcer and 9 (30%) were having Grade I level of foot ulcer none of them were having grade III or grade IV wound healing process.

In $\chi 2=13.12$ showed a difference in the Post test level of healing process of foot ulcer among diabetic patients intervention and control group.

Distribution of the subjects according to the post test level of healing process of foot ulcer among diabetic patients both Interventional and control group:



Multiple bar diagram portrays that distribution of post test level of healing process of foot ulcer among diabetic patients both interventional and control group.

In intervention group, 23 (76.67%) were having Grade I level of foot ulcer and 7 (23.33%%) were having Grade II level of foot ulcer none of them were having grade III or grade IV wound healing process. Where as in the control group, 21 (70%) were having Grade II level of foot ulcer and 9 (30%) were having Grade I level of foot ulcer none of them were having grade III or grade IV wound healing process.

In $\chi 2=13.12$ showed a difference in the Post test level of healing process of foot ulcer among diabetic patients intervention and control group.

Comparison of pretest and post test level of healing process of foot ulcer among diabetic patients both Interventional group and control group.

Pretest and post test level of healing process of foot ulcer among diabetic patients in interventional group

n = 60

Level of healing process of foot ulcer	**Pretest**		**Posttest**		**Generalized McNemar's test**
	f	**%**	**f**	**%**	
Grade I	9	30.00%	23	76.67%	**$\chi 2=32.56$ P=0.001***(S)**
Grade II	21	70.00%	7	23.33%	
Grade III	0	0.00%	0	0.00%	
Grade IV	0	0.00%	0	0.00%	
Total	30	100.0%	30	100.0%	

*significant at $p<0.05$ level, S= significant ** $P \leq 0.01$ highly significant

The above table shows that the pretest and post-test level of healing process of foot ulcer among diabetic patients. In pre test, 21 (70.00%) were having Grade II level of foot ulcer and 9 (30.00%) were having Grade I level of foot ulcer. In post test, 23 (76.67%) were having Grade I level of foot ulcer and 7 (23.33%) were having Grade II level of foot ulcer.

Generalised McNemar' test was done to find out the difference between the pre test and post test$\chi 2=32.56$was greater than the value which was significant at 0.001 level.

Pretest and post test level of healing process of foot ulcer among diabetic patients in control group

n=60

Level of healing process of foot ulcer	**Pretest**		**Posttest**		**Generalized McNemar's test**
	f	**%**	**f**	**%**	
Grade I	7	23.33%	9	30.00%	**$\chi 2=0.35$ P=0.056(NS)**
Grade II	23	76.67%	21	70.00%	
Grade III	0	0.00%	0	0.00%	
Grade IV	0	0.00%	0	0.00%	
Total	30	100.0%	30	100.0%	

$p>0.05$ not significant NS=Not Significant

The above table shows the pre test and post test level of healing process of foot ulcer among diabetic patients in control group. In pre test, 23 (76.67%) were having Grade II level of foot ulcer and 7 (23.33%) were having Grade I level of foot ulcer. In post test, 21 (70.00%) were having Grade II level of foot ulcer and 9 (30.00%) were having Grade I level of foot ulcer,.

Generalized Mc Nemar's chi square test **$\chi 2=0.35$** shows that there is no significant difference between the pre and post test level of healing process of foot ulcer among diabetic patients in control group.

Comparison of Mean, Standard deviation and Mean difference of pretest and post test level of healing process of foot ulcer among diabetic patients

n=60

Group	No. of *patients*	Pretest Mean ± SD	Posttest Mean ± SD	Mean difference	Student's paired t-test
Interventional	30	4.13 ± 0.97	2.27 ± 1.87	1.86	t=8.35 P=0.001*** DF = 29, significant
Control	30	4.33 ± 0.86	4.07 ± 0.78	0.26	t=1.86P=0.07 DF = 29, not significant
Independent t-test		t=0.87 P=0.38 DF = 59, not significant	t=4.93 P=0.001*** DF = 59, significant		

* * highly significant at P≤0.01 *** very high significant at P≤0.001

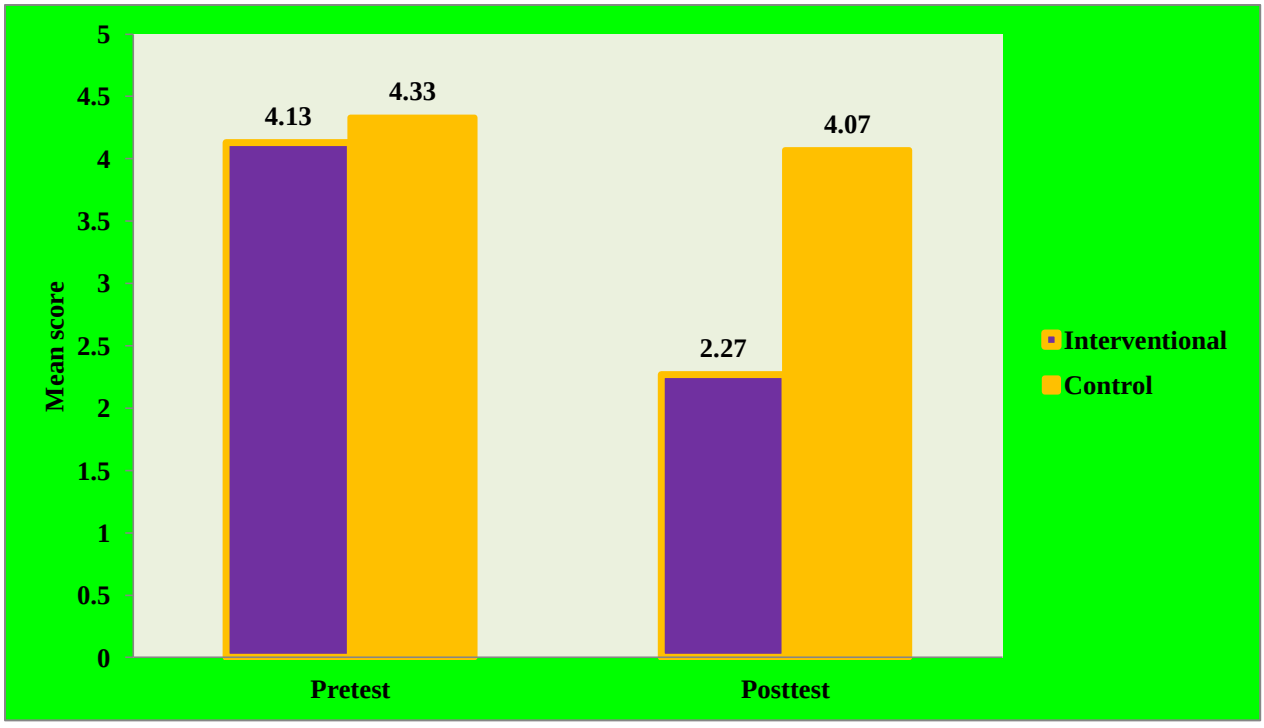
Above table depicts the comparison of mean healing process of foot ulcer among diabetic patients between interventional group and control group.

In intervention group, pretest mean score was 4.13 with standard deviation 0.97. Where as post test, mean score was 2.27 with standard deviation 1.87, the mean difference was 1.86. Student's paired 't' test was done to find out difference between pre test and post test level in intervention group. The calculated 't' value 8.35 was greater than the table value which was significant at 0.001 level.

In control group, pretest mean score was 4.33 with standard deviation 0.86. Where as post test, mean score was 4.07 with standard deviation 0.78, the mean difference was 0.26. Student's paired 't' test was done to find out the difference between pre test and post test level in control group. The calculated 't' value 1.86 was lesser than the table value which was not significant .

In intervention group, post test mean 2.27 with standard deviation 1.87. Where as in control group 4.07 with standard deviation 0.78. The independent't' test was done to find out the difference between post test level in both intervention and control group. The calculated 't' value 4.93 was greater than the table value which was not significant at 0.001 level.

Comparison of mean, standard deviation and mean difference of pretest and post test level of healing process of foot ulcer among diabetic patients



Comparison of mean, standard deviation and mean difference of pretest and post test level of healing process of foot ulcer among diabetic patients

The above multiple bar diagram portrays the comparison of mean healing process of foot ulcer among diabetic patients between interventional group and control group.

In intervention group, pretest mean score was 4.13 with standard deviation 0.97. Where as post test, mean score was 2.27 with standard deviation 1.87, the mean difference was 1.86. Student's paired 't' test was done to find out difference between pre test and post test level in intervention group. The calculated 't' value 8.35 was greater than the table value which was significant at 0.001 level.

In control group, pretest mean score was 4.33 with standard deviation 0.86. Where as post test, mean score was 4.07 with standard deviation 0.78, the mean difference was 0.26. Student's paired 't' test was done to find out the difference between pre test and post test level in control group. The calculated 't' value 1.86 was lesser than the table value which was not significant .

In intervention group, post test mean 2.27 with standard deviation 1.87. where as in control group 4.07 with standard deviation 0.78. The independent 't' test was done to find out the difference between post test level in both intervention and control group. The calculated 't' value 4.93 was greater than the table value which was not significant at 0.001 level.

Discussion, Summary, Conclusion, Implication And Recommendations:-

This chapter narrates the summary of the study and the conclusion drawn. It also describes the implications for different areas like nursing education, nursing administration, nursing practice and nursing research. It provides the recommendation based on the study.

Summary of the statement of the study:

The present study was conducted to evaluate the effectiveness of 1% acetic acid soak on healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20

The objective of the study were

1. To assess the level of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20.
2. To evaluate the effectiveness of 1% acetic acid soak on healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20.
3. To associate the level of healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20 with their selected socio-demographic variables.

The following hypothesis were tested at 0.001 level:

H_1: There is a significant difference between the pretest and post test level of healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20.

H_2: There is a significant difference between the post test level of healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20 with their selected socio-demographic variables.

H_3: There is a significant association between the level of healing process of foot ulcer among diabetic patients at Government Rajaji Hospital, Madurai-20 with their selected socio-demographic variables.

The assumption of the study:-

1. Diabetic Patients prone to get foot ulcer due to improper foot care. Study finding were followed

The study was conducted at surgical wards at Government Rajaji Hospital, Madurai-20. The conceptual frame work adopted was modified Peplau's Interpersonal Relations Theory. Quantitative evaluative approach – True experimental design was adopted. The independent variables are 1% acetic acid soak and the dependent variable was healing process of foot ulcer among diabetic patients. Probability (simple random) sampling technique was adopted to select 60 samples, 30 samples in interventional group, receiving 1% acetic acid soak and 30 samples in control group patients receiving routine care, selection of samples is based upon who fulfill the inclusion criteria during the

period of data collection. Intervention carried out to the interventional group was acetic acid soak among patients with diabetic foot ulcer and data collection period from 04.06.2018 to 13.07.2018.

The tool used in the study consist of two section

Section-A

1. Socio demographic variables
2. Clinical variables

Section-B

Modified Perfusion, Extent, Depth, Infection, Sensation (PEDIS) classification and scoring system.

Interpretation of score

Grade –I 1 - 3
Grade –II 4 - 6
Grade – III 7 - 9
Grade – IV 10 - 12

Content validity was obtained from five experts in the field of Medicine and Medical surgical nursing, Pilot study was conducted to find out the feasibility of the study and it did not show any major flaw in the design of the study. On the 1st day, after data collection with Modified Perfusion, Extent, Depth, Infection, Sensation (PEDIS) classification and scoring system, the level of foot ulcer among diabetic patients was assessed followed by application of 1% acetic acid soak twice a day (8.00 am and 2.00 pm) for 5 consecutive days amoninterventional group patients with diabetic foot ulcer and application of routine care among control group everyday in the morning for 5 consecutive days. Post test was done on 6th day using the same Modified Perfusion, Extent, Depth, Infection, Sensation (PEDIS) classification and scoring system. Data was collected for six weeks from 04.06.2018 to 13.07.2018 and based on the objectives and hypothesis, data were analyzed using descriptive and inferential statistics.

Major findings of the study:

Description of Socio demographic and clinical variables among diabetic patients with foot ulcer:

1. With respect to the age in interventional group majority of the subjects, 9 (30.00%) belongs to more than 60 years where as in control group 10 (33.33%) belongs to the age group between of 51-60 years
2. When dealing with gender in interventional group majority of the subjects, 20 (66.67%) were males, where as in control group 24 (80.0%) were males.
3. With regards to religion in interventional group majority of the subjects, 23 (76.67%) were hindu where as in control group 25 (83.33%) were hindu.
4. When comparing marital status in interventional group majority of the subjects, 27 (90.00%) were married, where as in control group 28 (93.33%) were married.
5. When determining the educational Status in interventional group majority of the subjects, 15 (50.00%) studied up to high where as in control group 10 (33.33%) studied up to primary education .
6. Regarding dietary pattern in interventional group majority of the subjects, 21 (70.00%) were non-vegetarian, where as in control group 22 (73.33%) were non-vegetarian.
7. When comparing the personal habit in interventional group majority of the subjects, 17 (56.67%) had no bad habits where as in control group 14 (46.66%) had no bad.
8. While mentioning the occupation in interventional group majority of the subjects, 21 (70.00%) were employed where as in control group 20 (66.67%) were employed.
9. While dealing with area of residence in interventional group majority of the subjects, 14 (46.67%) were hailed from rural where as in control group 13 (43.33%) were hailed from urban area.
10. As far as monthly income in interventional group majority of the subjects, 11 (36.67%) were earned between Rs.4001-6000 where as in control group 10 (33.33%) were earned between Rs.4001-6000 .
11. With regards to type of diabetes in interventional group majority of the subjects, 19 (63.3%) were type I diabetes, where as in control group 19 (63.3%) were type I diabetes.
12. While discussing about the duration of diabetes mellitus in interventional group majority of the subjects and 5 (16.7%) had more than 5 years. In control group majority of the subjects, 12 (40.0%) had more than 6 months and 4 (13.3%) had more than 5 years.

13. While comparing the duration of diabetic foot ulcer in interventional group majority of the subjects, 20 (66.7%) had less than 1 month where as in control group 20 (66.7%) had less than 1 month.
14. Regarding site of diabetic foot ulcer in interventional group majority of the subjects, 21 (70.0%) had planter surface of the foot ulcer where as in control group, 20 (66.7%) had planter surface of the foot ulcer.
15. While discussing about the adherence to treatment in interventional group majority of the subjects, 20 (66.7%) were strictly adherent where as in control group 20 (66.7%) were strictly adherent to treatment.
16. While dealing with type of anti diabetic drug in interventional group majority of the subjects, 19 (63.3%) were on insulin where as in control group 23 (76.7%) were on insulin.
17. When describing with co-morbid condition in interventional group majority of the subjects, 13 (43.3%) had coronary artery disease, where as in control group 15 (50.0%) had coronary artery.
18. Comparing with body mass index in interventional group majority of the subjects, 17 (56.7%) were had 18.5 to 24.9, where as in control group 17 (56.7%) were had 25 to 29.9.
19. While discussing about the random blood sugar level in interventional group majority of the subjects, 10 (33.3%) were had 121 to 160 mg/ where as in control group 13 (43.3%) were had 161 to 200 mg/dl.
20. In intervention group, majority 21 (70%) were having Grade II level of foot ulcer. Where as in the control group 23 (76.67%) were having Grade II level of foot ulcer in pre test.
21. The post test of wound healing in intervention group, 23 (76.67%) were having Grade I level of foot ulcer. Where as in the control group, 21 (70%) were having Grade II level of foot ulcer
22. In $\chi 2=13.12$ showed a difference in the Post test level of healing process of foot ulcer among diabetic patients intervention and control group.
23. The calculated chi square test value was $\chi 2=13.12$ which were greater than the table value which was statistically highly significant at p=0.005 level which clearly shows that there was a significant increasing the healing process of foot ulcer

Association between post test level of healing process of foot ulcer and their selected socio demographic variables. Chi-square test reveals that, there was a significant association between the age ($\chi 2=10.12$), (P=0.01), gender ($\chi 2=6.89$), (P=0.01), adherence to treatment ($\chi 2=7.36$), (P=0.02), type of anti-diabetic drug ($\chi 2=7.85$), (P=0.01) and random blood sugar level ($\chi 2=8.88$), (P=0.03) and the level of healing process of foot ulcer, for (i.e) age group between 30-40 years and 41-50 years, female, strictly adherent to treatment and had oral form anti diabetic drug , random with blood sugar range between 121-161 mg/dl.

Conclusion:-

The statistical evidence proved that the 1% acetic acid soak and routine care was effective in improving the healing process of foot ulcer among diabetic patients in interventional group and control group. When comparing the level of healing process of foot ulcer among diabetic patients between interventional group and control group it was proved that 1% acetic acid soak was more effective than routine care. Hence the researcher concluded that 1% acetic acid soak is effective than routine care in healing process of foot ulcer among diabetic patients.

Implications:

The investigator had drawn several implication from this study for various areas such as nursing practice, nursing education, nursing administration and nursing research.

Implication for nursing practice:

1. Nurses working in surgical wards should take responsibility for the assessment diabetic foot ulcers by using Perfusion, Extent, Depth, Infection, Sensation (PEDIS) Classification and Scoring System in routine.
2. Standardized classification, grading and scoring system for diabetic foot ulcer have to be followed as a part of admission/initial assessment by Nursing personal to is working surgical ward.
3. Diabetic foot ulcer dressing incorporating with 1% acetic acid soak can be followed as it is effective in improving the level of healing process of foot ulcer among diabetic patients in surgical wards.
4. Effective wound healing can be achieved only with controlled glycaemic level, so the Nurses should motivate the diabetic patients on diet, drug, exercise.

Implication for nursing education:

1. Nursing educators should plan for workshops and conferences on management of foot ulcer with various Nursing intervention especially on 1% acetic acid soak in their day to day nursing practice.

2. Nursing educators should also plan for continuous nursing education programmes for nurses to enhance their knowledge and skills about early identification of diabetic foot ulcer and the possible ways of healing the foot ulcer by using 1% acetic acid soak like honey dressing, topical application of insulin, turmeric foot wash etc.
3. Nurse educators motivate the nursing students to observe and use Perfusion, Extent, Depth, Infection, Sensation (PEDIS) Classification and Scoring System to observe the level of foot ulcer.

Implication for nursing administration:

1. Administrator should pay special attention to new nurses as well as student nurses to educate and evaluate diabetic foot ulcer in clinical settings by using Perfusion, Extent, Depth, Infection, Sensation (PEDIS) Classification and Scoring System.
2. Administrator can encourage the nurses to assess the level of diabetic foot ulcer and make it as one of the assessment procedure.
3. Administrator should guide the nurses to use standardized classification, grading and scoring system for diabetic foot ulcer.
4. Articles and materials needed for providing diabetic foot ulcer dressing must be made available by the administrative department.
5. Nursing Administrator can formulate protocols to incorporate the acetic acid soak in diabetic foot ulcer dressing in surgical ward.
6. Nursing administrators should take interest in motivating the nursing personnel's especially nurses to improve the knowledge and skills by attending the health conferences, seminars and training programmes on early identification of foot ulcer and update their knowledge about the various types of management of for managing diabetic foot ulcer.
7. Nursing administrator should arrange regular in-service education programme for the various methods of management for diabetic foot ulcer to improve the healing process.

Implication for nursing research:

1. This study can be a baseline for future studies to build upon and motivate.
2. Nursing research has to be done to find out the effectiveness of various types of dressings solution to reduce the foot ulcer among diabetic patients.
3. Nursing researcher can conduct studies to find out the effectiveness of 1% acetic acid soak on other wound healing process.
4. The findings of the study would help to expand and enrich the scientific body of professional knowledge upon which further study can be conducted with large samples and long duration.
5. The study will motivate the new researchers to conduct similar type of study using various independent variables and their comparison with 1% acetic acid soak in the reduction of diabetic foot ulcer.
6. Large scale studies can be conducted on 1% of acetic acid soak on healing process of foot ulcer among diabetic patients in various settings and disseminate the finding of research through paper presentations, conferences and publishing in nursing journals.

Recommendations:-

1. A similar study can be replicated with larger sample for better generalization.
2. A comparative study can be done between 1% acetic acid soak and any other wound dressing solutions to evaluate the best.
3. A study can be conducted to assess the knowledge, attitude and practice of nursing staff regarding diabetic foot ulcer wound care.
4. The effectiveness of 1% acetic acid soak in combination with metronidazole wash can also be done
5. A similar study can be conducted in other settings like outpatient department and medical wards.