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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A dissertation submitted to

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OCTOBER 2019

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CERTIFICATE

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ABSTRACT

Title: Effectiveness of citric acid dressing on healing process of diabetic foot ulcer among patients 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 socio demographic variables and clinical variables. **Hypotheses:** $\mathbf{H_1}$: There is a statistically significant difference between the pretest and posttest level of healing process of diabetic foot ulcer among patients. $\mathbf{H_2}$**:** There is a statistically significant association between the level of healing process of diabetic foot ulcer with their selected Socio demographic 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.

Keywords: Citric acid dressing, Diabetic foot ulcer

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INTRODUCTION

CHAPTER - I

INTRODUCTION

"The human foot is a masterpiece of engineering and a work of art."

- ***Leonardo da Vinci***

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. It leads to friendship, love, and even more. Life is all around us that people take it lightly. Life is a precious gift that makes sure the world goes on. With life, all people have free minds. People are able to do the great achievements in knowledge that they do. We are able to express our elations to the people around us; we speak of our love and show the world our right to live. I believe all life is precious. It is a gift from God to the universe. 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. In the recent years lifestyle as an important factor of health is more interested by researchers. **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 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. These risk factors are tobacco use (smoking/chewing), physical inactivity, unhealthy diet, and alcohol use leads to key metabolic and or physiological changes like raised blood pressure (BP), overweight/obesity, raised blood glucose, and raised cholesterol levels.

A disease is a particular abnormal condition that negatively affects the structure or function of part or all of an organism, and that is not due to any external injury. The disease experience significantly affects not only the person, but also exerts close influence on the family network. A collective suffering process emerges in which the family and the person suffering constitute a core to cope with the problem, in which the fear, uncertainty and concern with the problem are shared bilaterally. In general, a family member, usually the closest relative (partner, mother) assumes most of the care burden. In some cases, patients consider they put a strain on their family, creating a perceived dependence in the subjects that contributes to enhance their discomfort and changes family relations.

Diabetes is a condition where people don't produce enough insulin to meet their body's needs and/or their cells don't respond properly to insulin. Insulin is important because it moves glucose, a simple sugar, into the body's cells from the blood. It also has a number of other effects on metabolism. There are two main kinds of diabetes: Type 1 diabetes and Type 2 diabetes. Type 1 diabetes occurs when the pancreas cannot make insulin. Type 2 diabetes occurs when the pancreas does not make enough insulin or the body does not use insulin properly. It usually occurs in adults, although in some cases children may be affected. People with Type 2 diabetes

usually have a family history of this condition and 90% are overweight or obese. Another less common form is gestational diabetes, a temporary condition that occurs during pregnancy.

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. There are two primary forms of diabetes, insulin-dependent Diabetes Mellitus (Type 1 Diabetes mellitus, T1DM) and non-insulin-dependent Diabetes mellitus (Type 2 Diabetes mellitus, T2DM). T2DM is the most common form of DM, which accounts for 90% to 95% of all diabetic patients.

Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputation. In 2016, 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 estimates that diabetes was the seventh leading cause of death in 2016. 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. In 2016, diabetes was the direct cause of 1.6 million deaths and in 2012 high blood glucose was the cause of another 2.2 million deaths.

Asian Indian phenotype with high insulin resistance and increased abdominal fat deposition is more prone to diabetes and hence, the situation is alarming. In urban population, the diabetes prevalence is 5- 25% and in rural areas, it is 2-5%. In Asia,

prevalence of diabetes is high and it has been estimated that 20% of the current global diabetic population resides in South- East Asia. Indeed, the number of cases in India is likely to double in two decades that is from 39.9 million (in 2007) to 69.9 million by 2025. However, half of those cases remain undiagnosed, underscoring the need for rapid, low-cost solutions to reach the region's underserved areas.

Until recently, India had more diabetics than any other country in the world, according to the **International Diabetes Foundation**, although the country has now been surpassed in the top spot by China. Diabetes currently affects more than 62 million Indians, which is more than 7.1% of the adult population. The average age onset is 42.5 years. Nearly 1 million Indians die due to diabetes every year.

The prevalence of diabetes is increasing worldwide resulting in foot complications, which lead to poor quality of life and increased cost of living. 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 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.

According to the Indian Heart Association, India is projected to be home to 109 million individuals with diabetes by 2035. A study by the **American Diabetes Association** reports that India will see the greatest increase in people diagnosed with diabetes by 2030. The high incidence is attributed to a combination of genetic susceptibility plus adoption of a high-calorie, low-activity lifestyle by India's growing middle class. A study conducted in South India found that major risk factors for diabetes were age of 40 years, male gender, body mass index of more than 23 kg/m^2,

waist hip ratio of men >1 and women >0.8, alcohol intake and systolic blood pressure of more than 140 mm of Hg

In Tamil Nadu, 18.6 per cent of population are known to have diabetes and statistics are not encouraging for places like Madurai". The prevalence of diabetes, a non-communicable disease (NCD), has been steadily increasing in the past few decades, especially in Tamil Nadu (10.4 per cent prevalence), as seen in INDIAB study of **Indian Council of Medical Research (ICMR).**

Research has shown, however, that development of a foot ulcer is preventable. Foot ulcers are much feared complications of diabetes and recent studies have suggested that the risk of developing foot ulcer is as high as 25%. In India prevalence of footulcers in diabetes patients is 3% which is lower compared with western population. The regional prevalence of diabetes varies from as low as 5.3% in Jharkhand to 10.4% in Tamil Nadu and 13.6% in Chandigarh.

1.1 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.

Simple lifestyle measures have been shown to be effective in preventing or delaying the onset of type 2 diabetes. To help prevent type 2 diabetes and its complications, people should

- Achieve and maintain healthy body weight
- Be physically active – at least 30 minutes of regular, moderate-intensity activity on most days. more activity is required for weight control

- Eat a healthy diet, avoiding sugar and saturated fats intake
- Avoid tobacco use – smoking increases the risk of diabetes and cardiovascular diseases.

Being overweight and using alcohol and tobacco also plays a role in the development of foot ulcers and also anyone who has diabetes can develop foot ulcer. People who use insulin are at higher risk of developing a foot ulcer, as are patients with diabetes- related kidney, eye and heart disease.

Diabetic foot ulcer is a major complication of diabetes mellitus and probably the major component of the diabetic foot. Wound healing is an innate mechanism of action that works reliably most of the time. A key feature of wound healing is a stepwise repair of lost extracellular matrix (ECM) that forms the largest component of the dermal skin layer. But in some cases, certain disorders or physiological insult disturbs the wound healing process. Diabetes mellitus is such metabolic disorder that impedes the normal steps of the wound healing process, which causes a delay in the formation of mature granulation tissue and parallel reduction in wound tensile strength.

The yearly incidence of diabetic foot ulcers ranges from 2% to 32% depending upon ADA risk classification, Boulton. More than half of the ulcers will become infected, requiring hospitalization and 20% of infections results in amputation. Amputation in people with diabetes is 10 to 20 times more common than in people without diabetes and it is estimated that every 30 seconds a lower limb or part of a lower limb is lost somewhere in the world as a consequence of diabetes. In India, the age adjusted annual incidence of non traumatic lower limb amputations in persons with diabetes ranges from 2.1 to 13.7 per 1,000 persons. A study says that 40- 70 %

of amputation in Tamil Nadu occurs due to diabetes. A prospective observational study was carried out in 120 patients who were admitted with diabetic foot infections in Government Rajaji Hospital, Madurai for a period of 18-month showed patients with age <50 -40%, went for amputation, 51 to 60- 34.3% went for amputation, 61to 70- 20% went for amputation and > 70- 5.7% went for amputation.

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.

Wound healing is a complex process involving highly regulated responses of specified cell types, which harbor locally secreted growth factors that play a key role in wound healing. 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.

1.2 Statement of the Problem

A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai.

1.3 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.

1.4 Hypotheses

H_1: There is a statistically significant difference between the pretest and posttest level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20.

H_2: 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 socio demographic variables and clinical variables.

1.5 Operational Definition

Effectiveness

In this study effectiveness refers to the desired result produced by the citric acid dressing on diabetic foot ulcer on wound healing process among patients and it will be measured by using Modified PEDIS (Perfusion, Extent, Depth, Infection and Sensation) Classification and Scoring system.

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.

Patients with diabetic foot ulcer

Patients with diabetic foot ulcer refers to those who is diagnosed as Grade I and Grade II Diabetic foot ulcer and admitted in Surgical ward at Government Rajaji Hospital, Madurai.

1.6 Assumption

This study assumes that

Patients have different levels of healing process of Diabetic foot ulcer.

1.7 Delimitations

The study is limited to

1) Patients who are admitted with diabetic foot ulcer in Surgical ward at Government Rajaji Hospital, Madurai-20.
2) Sample size is limited to 40 patients
3) Study period 4-6 weeks.

1.8 Projected Outcome

1) This study will help to identify the prevalence of diabetes mellitus and diabetic foot ulcer.
2) Citric acid dressing will heal the diabetic foot ulcer among patients.
3) The findings will help the health care professionals to practice citric acid dressing and to use it in health care setting and in other areas.

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

"Literature is as old as speech. It grew out of human need for it, and it has not changed except to become more needed."

-John steinbeck

This chapter explains in detail about the review of literature and conceptual framework used for the study. A literature review surveys books, scholarly articles, and any other sources relevant to a particular issue, area of research, or theory, and by doing so, provides a description, summary and critical evaluation of these works in relation to the research problem being investigated. Literature reviews are designed to provide an overview of sources the researcher have explored while researching a particular topic and to demonstrate to the readers how the research fits within a larger field of study.

Generally, review of literature provides in-depth understanding and explanation on how the findings are similar to or novel from previous research work. The aim of literature review is to highlight what has been done so far in the field of interest and how your findings relate to earlier research. The review of literature also indicates the approaches, methods, variables used and statistical procedure. Review of literature also reveals techniques and statistical procedures that have not been attempted by others.

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.**

2.1 Literature related to prevalence of diabetic foot ulcer.

Leila Yazdanpanah, et.al, (2018), conducted a prospective cohort study on Incidence and Risk Factors of Diabetic Foot Ulcer at Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. Among all 712 patients with diabetes. 605 patients met the inclusion criteria. Thirty-nine cases (6.4%) had DFU, so we followed up 566 patients without any present or history of DFU for 24 months, of whom 32 were lost to follow-up. Independent risk factors of DFU development were previous history of DFU or amputation, insulin consumption, gender, distal neuropathy and foot deformity. In this study, p value ≤ 0.05 was considered as significant.

S. P. Vibha, et.al, (2018), conducted a study on Community based study to assess the prevalence of diabetic foot syndrome at Udupi district. A community based cross-sectional study, 620 subjects participated in the study, The overall prevalence of DFS was 51.8%. Among them 31.3, 11.9 and 8.5% belonged to category 1, 2 and 3 respectively. Multivariate logistic regression analysis showed advancing age, low socio-economic status, sedentary physical activity and longer duration of DM were significantly correlates with of DFS.

Chandrashekar S., Suraj Muralidhar, (2017), conducted a study on A study on the prevalence of risk factors and presence of diabetic foot ulcers at Mysore Medical College and Research Institute, Mysuru, Karnataka, India. An epidemiological study, 249 T2DM participants were enrolled. The prevalence of DFU risk factors was 55.4% (95% CI: 53.7% - 57.0%), and prevalence of DFU was 12% (95% CI: 10.3% - 13.6%).

Pengzi Zhang, et.al, (2016), conducted a study on Global epidemiology of diabetic foot ulceration, through searching PubMed, EMBASE, ISI Web of science, and Cochrane database. A systematic review and meta-analysis was done. It was found that that global diabetic foot ulcer prevalence was 6.3% (95%CI: 5.4–7.3%), which was higher in males (4.5%, 95%CI: 3.7–5.2%) than in females (3.5%, 95%CI: 2.8–4.2%), and higher in type 2 diabetic patients (6.4%, 95%CI: 4.6–8.1%) than in type 1 diabetics (5.5%, 95%CI: 3.2–7.7%). North America had the highest prevalence (13.0%, 95%CI: 10.0–15.9%), Oceania had the lowest (3.0%, 95% CI: 0.9–5.0%), and the prevalence in Asia, Europe, and Africa were 5.5% (95%CI: 4.6–6.4%), 5.1% (95%CI: 4.1–6.0%), and 7.2% (95%CI: 5.1–9.3%), respectively. Australia has the lowest (1.5%, 95%CI: 0.7–2.4%) and Belgium has the highest prevalence (16.6%, 95%CI: 10.7–22.4%), followed by Canada (14.8%, 95%CI: 9.4–20.1%) and USA (13.0%, 95%CI: 8.3–17.7%). The patients with diabetic foot ulcer were older, had a lower body mass index, longer diabetic duration, and had more hypertension, diabetic retinopathy, and smoking history than patients without diabetic foot ulceration.

Tesfamichael G. Mariam, et.al, (2016), conducted a study on Prevalence of Diabetic Foot Ulcer and Associated Factors among Adult Diabetic Patients at the University of Gondar Referral Hospital, North West Ethiopia. An institutional-based cross-sectional study, Systematic random sampling was used to select 279 study participants. From the total number of participants involved in the study, 154 (55.2%) were males and 125 (44.8%) were females. The mean age of participants was 49.8 with SD ± 15.6 years. One hundred ninety (68.1%) were married. Regarding their educational status, 46 (16.5%) had secondary education and above. Ninety-nine (35.5%) participants came from rural area. Two hundred forty-six, (88.2%) participants were Orthodox Christians on religious status

2.2 Literature related to effectiveness of citric acid dressing

Supaksh Mahindru, et.al, (2017), conducted a study on Evaluation of effect of topical application of 3% citric acid on wound healing at Government Medical College, Amritsar. An unicentric, prospective, randomised study with a parallel design was used on 100 patients divided into two groups of 50 each. Patients treated with citric acid (72.06%) showed more reduction in wound size than those who were treated by conventional method (67.40%). The increase in granulation area was more when citric acid (65.36%) was used than that in control group (60.60%). Wounds treated with citric acid showed early reduction in amount of discharge as compared to control group.

Zhaoxin Zhang, et.al, (2015), conducted a study on Wound bed preparation for ischemic diabetic foot ulcer with citric acid at People's Hospital of Xinjiang Uygur Autonomous Region, China. A total of 60 cases of patients with diabetic foot ulcer were randomly divided into the experimental group ($n = 30$) and the control group ($n = 30$). The wound bed preparation time of the experimental group was 14.37 ± 1.06 days ($t = 14.78$, $p < 0.0001$). The mean cure time of the experimental group was 32 ± 1.93 ($t = 12.521$, $p < 0.01$). There was statistically significant difference in the growth of granulation tissue between the experimental group and the control group ($p < 0.05$).

Vinod prabhu, et.al, (2014), conducted a study on Does wound pH modulation with 3% citric acid solution dressing help in wound healing at Bharati Vidyapeeth University, Sangli, Maharashtra, India. An unicentric randomized double blinded study with a parallel design was used. Twenty patients were known diabetic out of which 11 were in the CA group, and the rest were in the Eusol group. The ulcer

granulation interval showed that the mean stay in CA group was 10.56 days while it was 20.04 days in the Eusol group. The cost of stay was less in CA group. It is concluded that 3% CA solution forms a good alternative for wound dressings that acts by modulating the wound pH to acidic levels

V. U.Thool, et.al, (2014), conducted a prospective study on Permeabilizer citric acid treatment for VISA infections at RTM Nagpur University, Nagpur, India. 16 MRSA isolates tested for potentiating activity of citric acid, 14 isolates showed an increase in zone diameter size. The wide range of study on citric acid suggests that it would be a valuable option in the therapy of MRSA/VISA infections and in topical application in wound care. Citric acid inhibited all isolates in the range of 0.05-0.2 gm% and all the Vancomycin Intermediate Staphylococcus aureus (VISA) isolates (n=9) were susceptible to citric acid except one.

Rajendra G Malu, et.al, (2014), conducted a study on topical use of citric acid for wound bed preparation at MIMSR Medical College, Latur, India. Using purposive sampling technique five samples were selected with wounds with large raw areas. Application of 3% citric acid ointment resulted in the formation of healthy granulation tissue in four cases. There was statistically significant difference in the growth of granulation tissue ($p<0.05$).

2.3 Literature review related to citric acid dressing on healing process of diabetic foot ulcer.

Kumari, M.j, Jeyagowri, Jagdish, S. (2017), conducted a quasi experimental study on compare the effect of wound healing and cost of dressing solution between citric acid and conventional method of dressing among the patients with diabetic foot ulcer in tertiary hospital, puducherry. Using convenient sampling technique 120

patients with diabetic foot ulcer were recruited for the study. the researcher had chosen the first sixty patients for conventional method of dressing after that next sixty patients allotted for 3% citric acid dressing. The significant 'p' value inferred that the difference in improvement in wound healing status among the patients in the citric acid dressing and conventional dressing groups after the intervention was statistically significant ($p<0.0001$).

Dr. Kumari, et.al, (2016), conducted a study on Effect of citric acid dressing on wound healing of diabetic foot ulcer at JIPMER, Pudhucherry. Totally sixty patients admitted in surgical wards with diagnosis of diabetic foot ulcer was taken as samples. The significant 'p' value ($p<0.0001$) gave the inference that the difference in wound healing status existed (after citric acid dressing) among the pre and post assessments I, II, and III which were statistically significant.

Krishnaveni.R, (2016), conducted a experimental study on a study to assess the of 3% citric acid dressing on diabetic foot ulcer in Rajiv Gandhi Government General Hospital, Chennai. Using simple random sampling technique 60 samples were selected. The findings of the study reveals that in experimental group clients were reduced 22.1% of wound score after 3% citric acid dressing. Control group clients were reduced 7.9% of score. This shows the effectiveness of citric acid dressing.

Raji.R, (2012), conducted a experimental study on effect of citric acid on diabetic foot ulcer among patients admitted in selected wards at Ramakrishna Hospital, Coimbatore. Using convenient sampling technique 16 samples were selected in which 8 were in experimental group and 8 were in control group. The calculated 't' value was greater than the table value significant at 0.05 level.

2.4 Conceptual framework

A conceptual framework represents the researcher's synthesis of literature on how to explain a phenomenon. It maps out the actions required in the course of the study given his previous knowledge of other researchers' point of view and his observations on the subject of research. They also offer an explanation of why the study is pertinent and how the researcher expects to fill the gap in the literature.

The conceptual framework "sets the stage" for the presentation of the particular research question that drives the investigation being reported based on the problem statement. The problem statement of a thesis presents the context and the issues that caused the researcher to conduct the study.

The conceptual framework used in this study is based on Orlando's Nursing process theory. In this theory Orlando explains that the role of the nurse is to find out and meet the patient's immediate need for help. The patient's presenting behavior may be a plea for help, however, the help needed may not be what it appears to be. Therefore, nurses need to use their perception, thoughts about the perception, or the feeling engendered from their thoughts to explore with patients the meaning of their behavior. This process helps nurse find out the nature of the distress and what help the patient needs.

There are five phases in this theory as follows:

- Function of professional nursing - Organizing principle
- Presenting behavior - Problematic situation
- Immediate reaction - Internal response
- Nursing process discipline – Investigation
- Improvement – Resolution

Function of professional nursing - Organizing Principle

In this phase, the nurses find out and meet the immediate needs of the patient. According to Orlando, Nurse is responsible to individual who suffer or anticipate a sense of helplessness, it is focused on the process of care in an immediate experience, it is concerned with providing direct assistance to individuals in whatever setting they are found for the purpose of avoiding, relieving, diminishing or curing the individual's sense of helplessness.

In this study the researcher responds to patients with Diabetic foot ulcer who suffer with sense of helplessness. Researcher focused on the process of care, based on the information through the subjective and objective data and assess the Diabetic foot ulcer by using Modified PEDIS (Perfusion, Extent, Depth, Infection and Sensation) Classification and Scoring system and formulate the nursing diagnosis.

Presenting Behavior - Problematic Situation

In this phase, the situation is perceived as problematic. The presenting behavior of the patient, regardless of the form in which it appears, may represent a plea for help, this stimulus, causes an automatic internal response in the nurse, and the nurse's behavior causes a response in the patient.

In this study the researcher find out the immediate need for the patients with Diabetic foot ulcer based on the Modified PEDIS score and select the subject who is having Grade I and Grade II Diabetic foot ulcer with the level of Perfusion, Extent, Depth, Infection and Sensation based on this, formulate the nursing care plan in the term of short term and long term goals.

Immediate reaction - Internal response

In this phase, Person perceives with any one of his five sense organs an object or objects, the perceptions stimulate automatic thought, each thought stimulates an automatic feeling, then the person acts.

In this study the researcher perceives the complications of Diabetic foot ulcer decided and applied 3% Citric acid dressing (alters the wound pH to acidic which inhibits the bacterial growth, decreases the activity of proteolytic enzymes, increases oxygen concentration and promotes migration and proliferation of fibroblast growth) once a day for 5 consecutive days.

Nursing process discipline – Investigation

In this phase, any observation shared and explored with the patient is immediately useful in ascertaining and meeting his/her need or find out that he/she is not in need at that time. The nurse does not assume that, any aspect of her reaction to the patient is correct, helpful or appropriate until the nurse checks the validity of it in exploration with the patient. The nurse initiates a process of exploration to ascertain how the patient is affected by what the nurse says or does

In this study the researcher observe the level of Diabetic foot ulcer among Diabetic patients those who are admitted in Surgical Ward at Government Rajaji Hospital, Madurai by using Modified PEDIS (Perfusion, Extent, Depth, Infection and Sensation) Classification and Scoring system.

Improvement - Resolution

In this phase, evaluation of the result that whether the activity serves to help the patient communicate her or his need for help and how it is met.

In this study based on the Modified PEDIS (Perfusion, Extent, Depth, Infection and Sensation) Classification and Scoring system the researcher disseminate the results to the health care provider to continue the same intervention in future. At the same time based on the results (Post test level of Diabetic foot ulcer) the researcher plan for the further nursing interventions.

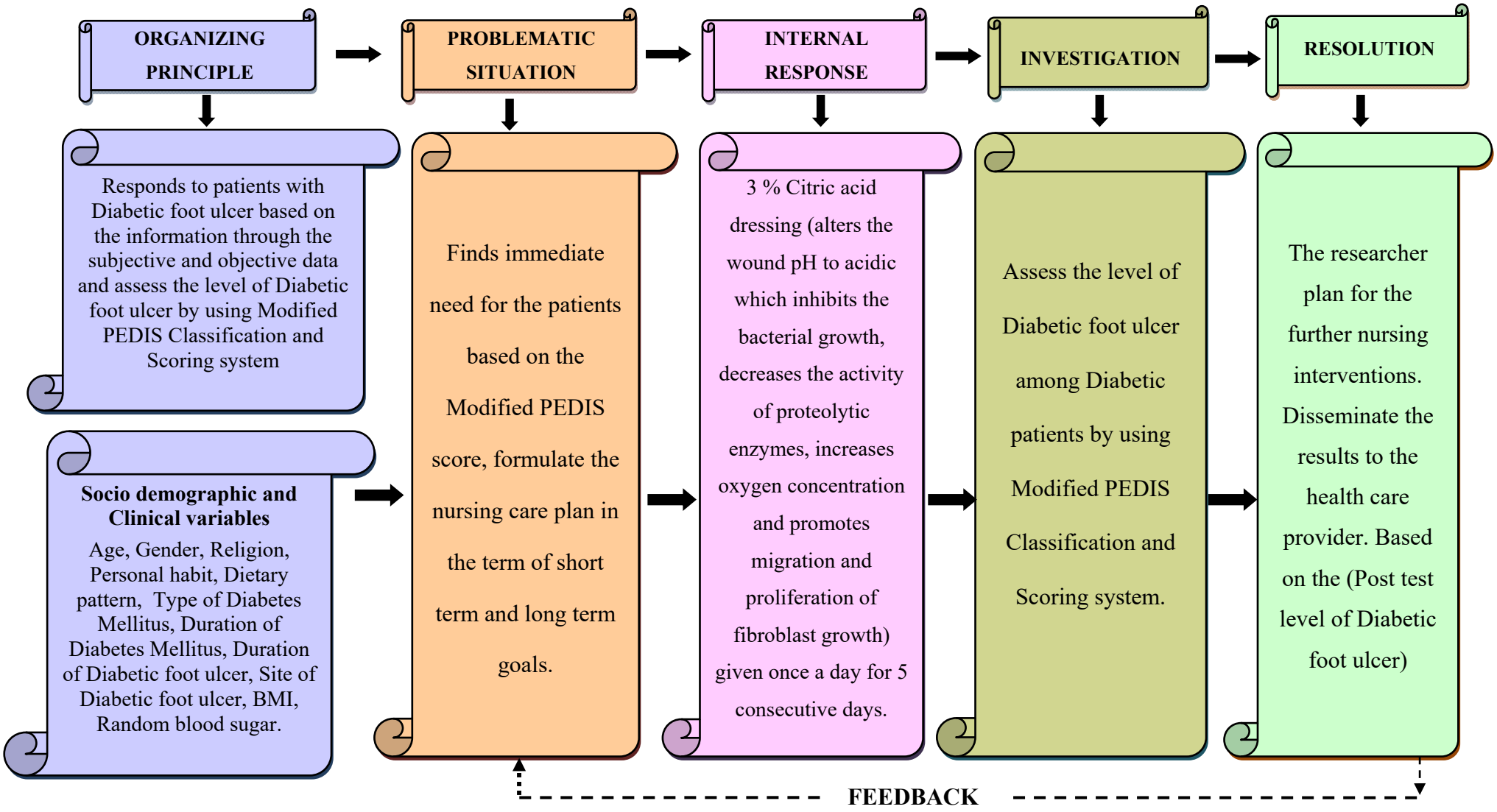


FIGURE 1: ORLANDO'S NURSING PROCESS THEORY -1961

METHODOLOGY

CHAPTER – III

RESEARCH METHODOLOGY

This chapter deals with the description of the research methodology adopted by the investigator to study. Research methodology is the most important part of the research study. This enables the researcher to form a blue print of the research undertaken. Research methodology involves the systematic procedure by which the researcher starts from the time of initial identifications of the problem to its final conclusions.

Research methodology helps the researcher in organizing the procedure for getting valid and reliable data for the problem under investigation.

3.1 Research approach

In this study, Quantitative evaluative approach was adopted by the researcher to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai.

3.2 Research design

Research plan is the researcher's overall plan for obtaining answer to the research question or for testing the research hypothesis. The research design used in this study was Pre experimental (one group pre test post test) research design.

O_1…….X…….O_2

O_{1-} Pretest level of healing process of diabetic foot ulcer among patients.

X- 3% Citric acid dressing once a day for 5 consecutive days

O_{2-} Post level of healing process of diabetic foot ulcer among patients.

3.3 Variables

Independent variable: Citric Acid dressing

Dependent variable: Healing process of diabetic foot ulcer among patients.

Socio demographic variables

Age, Gender, Religion, Area of residence, Dietary pattern, Education status, Type of Occupation, and Monthly income.

Clinical variables

Type of Diabetes, Duration of Diabetes Mellitus, Duration of Diabetic foot ulcer, Site of Diabetic foot ulcer, Type of Anti-Diabetic drug, Co-morbid conditions, Body mass index, Random blood sugar level and Adherence to treatment.

3.4 Setting of the study

The setting was selected based on acquaintance of the investigator with the institution, feasibility of conducting the study, availability of the sample, permission and proximity of the settings to investigation.

The study was conducted among patients with Diabetic foot ulcer who got admitted in Surgical Ward at Government Rajai Hospital, Madurai. At present there are 3102 beds available. It is a Multi-specialty attached hospital and it provides comprehensive care to all. Madurai Medical College is the second largest institution in Tamil Nadu by manpower and serving the poor people of whole South India. Surgical ward consists of 250 beds and nearly 35 to 40 patients with Diabetic foot ulcer get admitted every month.

3.5 Population

Population is the entire set of individuals or objects having some common characteristics; sometimes called Universe.

(Polit Hunger 2013)

Target population

Target population of the study was patients with diabetic foot ulcer.

Accessible population

Accessible population of the study was patients with diabetic foot ulcer who got admitted in Surgical Ward at Government Rajaji Hospital, Madurai.

3.6 Sample

Samples of this study were patients with diabetic foot ulcer who got admitted in Surgical ward and who met the Inclusion criteria.

3.7 Sampling technique

Non probability (Purposive) sampling technique was used in this study.

3.8 Sample Size

The sample size was 40 patients with Diabetic foot ulcer.

3.9 Criteria for selection of sample

The study sample was selected based on the following Inclusion and Exclusion criteria.

Inclusion criteria

- Patients who got admitted in Surgical Ward with Grade I and Grade II Diabetic Foot Ulcer.
- Patients who were willing to participate the study.

Exclusion criteria

- Critically ill patients
- Immuno compromised patients

3.10 Description of the tool

The tool consists of two sections

Section I: Socio Demographic variables and clinical variables

Socio Demographic variables

This section consists of Age, Gender, Religion, Education status, Dietary pattern, Occupation, Area of residence and Monthly income.

Clinical variables

This section consists of Type of diabetes, Duration of diabetes mellitus, Type of anti-diabetic drug, Adherence to treatment, Random blood sugar level, Body Mass Index, Co-morbid conditions, Duration of foot ulcer and Site of diabetic foot ulcer.

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

3.11 Validity of the tool

Content validity

The content validity of the tool with evaluation criteria checklist was submitted to five experts in the field of Medicine, Surgery and Medical Surgical Nursing for the opinion of the tools in the item. They judged the items for clarity, relatedness, meaningfulness and adequacy of content. Modifications was made in Socio demographic variables and Clinical variables based on their suggestions. Tool was translated to Tamil and retranslated into English to confirm language validity.

3.12 Reliability of the tool

The reliability of a measuring instrument is a major criterion for assessing its quality and adequacy. Reliability is the consistency with which it measures the target attribute. Modified PEDIS (Perfusion, Extent, Depth, Infection and Sensation) Classification and Scoring system is a standardized tool with the reliability of r=0.84. Hence the tool was considered reliable and used in this study.

3.13 Pilot study

A formal permission was obtained from the Ethical Committee of Madurai Medical College, Madurai, Head of the Department, Department of Medicine and General Surgery, Government Rajaji Hospital, Madurai. The Pilot study was conducted for 7 days from 18.02.2019 to 24.02.2019. Samples were selected as per the inclusion criteria using non probability purposive sampling technique. Informed oral and written consent was obtained from the participants after well 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 was applied to the subjects once a day for 5 consecutive days and the post test was conducted on 6th day using PEDIS classification and scoring system. Pilot study generally involves a sample of subjects drawn from the same populations as those from which the study sample will be drawn. The study was practically feasible to be conducted for a large population.

3.14 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.

3.15 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 6th day using PEDIS classification and scoring system. Sample procedure was followed for 6 weeks until the fulfillment of required samples.

3.16 Plan for data analysis

The data analysis involves the transition of information collected during the course of the research project into an interpretable and managerial form. The data was analyzed according to objectives of the study by using descriptive and inferential statistics. To compute the data master sheet was prepared by the researcher.

Descriptive statistics

- Analysis of baseline data was done by using Frequency and Percentage.
- 3% Citric acid dressing on healing process of diabetic foot ulcer among patients was analyzed by computing Frequency, Percentage, Mean and Standard Deviation.

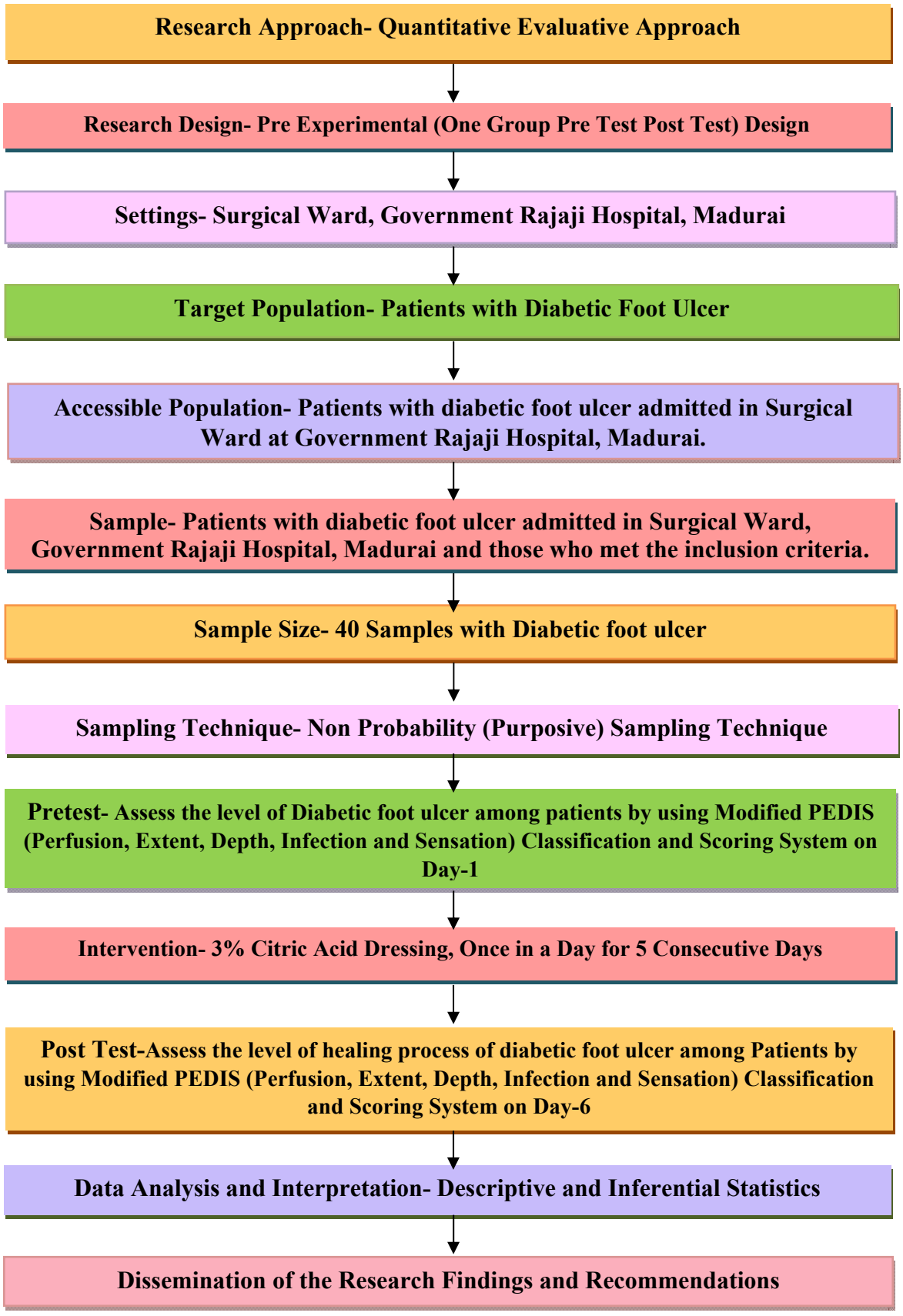
Inferential statistics

- ✓ Paired "t" test was used to evaluate the effectiveness of 3% Citric acid dressing on healing process of diabetic foot ulcer among Patients.
- ✓ Chi- square was used to analysis the association between level of healing process and selected Socio demographic variables and Clinical variables among patients with diabetic foot ulcer.

3.17 Protection of human rights

The research proposal was approved by the Ethical committee of Madurai Medical College, Head of the Department, Department of Medicine and General surgery, Government Rajaji Hospital, Madurai and the Principal, College of Nursing, Madurai Medical College, Madurai. Positive benefits was explained to the study subjects and to the care givers. Assurance given to the subjects that anonymity will be maintained throughout the study and assurance was given that they can withdraw from the study at any point of time.

3.18 Schematic Representation of Research Methodology



DATA ANALYSIS AND INTERPRETATION

CHAPTER – IV

DATA ANALYSIS AND INTERPRETATION

This chapter explains the statistical analysis performed on the collected data. Analysis is the method for reading quantitative data meaningful and intelligible information, so that the research problem can be studied and tested, including relationships between the variables. The data assembled, analyzed, tested for their significance. The findings based on the statistical analysis are presented in this chapter. Descriptive statistics was used for analyzing data in the light of objective of the study.

The data collected were interpreted, organized and finalized under the following sections

Section I

Distribution of patients with diabetic foot ulcer according to their selected Socio demographic variables and Clinical variables

Section II

Description of pre test level of healing process of diabetic foot ulcer among patients

Section III

Effectiveness of citric acid dressing on healing process of diabetic foot ulcer among patients

Section IV

Association between the post test level of healing process of diabetic foot ulcer among patients with their selected Socio demographic variables and Clinical variables

SECTION I

Distribution of patients with diabetic foot ulcer according to their selected socio demographic variables and clinical variables

Table- 1

Frequency and percentage distribution of patients with diabetic foot ulcer according to their selected socio demographic variables and clinical variables

n=40

Socio demographic variables		f	%
Age	< 30 years	0	0.00%
	31-40 years	5	12.50%
	41-50 years	8	20.00%
	51-60 years	18	45.00%
	>60 years	9	22.50%
Gender	Male	32	80.00%
	Female	8	20.00%
Religion	Hindu	35	87.50%
	Christian	3	7.50%
	Muslim	2	5.00%
Area of residence	Urban	4	10.00%
	Sub urban	17	42.50%
	Rural	19	47.50%
Dietary pattern	Vegetarian	4	10.00%
	Non Vegetarian	36	90.00%
Educational status	No formal education	9	22.50%
	Primary education	21	52.50%
	Higher Secondary school	7	17.50%
	Graduate	3	7.50%
Type of occupation	Profession	3	7.50%
	Clerical/ shop keeper/ farmer	24	60.00%
	Unskilled worker	8	20.00%
	Unemployed	5	12.50%
Monthly income	< Rs.5000	8	20.00%
	Rs. 5001-10,000	24	60.00%
	Rs.10,001-15,000	5	12.50%
	> Rs.15,000	3	7.50%

Type of diabetes mellitus	Type 1 Diabetes Type 2 Diabetes	0 40	0.00% 100.00%
Duration of diabetes mellitus	< 1 year 1-3 years 3-5 years > 5 years	2 15 6 17	5.00% 37.50% 15.00% 42.50%
Duration of diabetic foot ulcer	< 1 month 1- 6 months > 6 months	20 15 5	50.00% 37.50% 12.50%
Site of diabetic foot ulcer	Big toe ulcer Plantar surface of the foot Dorsal surface of the foot Foot	1 12 8 19	2.50% 30.00% 20.00% 47.50%
Type of antidiabetic drug	Oral hypoglycemic agents Insulin Insulin and Oral hypoglycemic agents	15 23 2	37.50% 57.50% 5.00%
Comorbid conditions	Hypertension Coronary artery disease Renal impairment Neurological disorder None of the above	9 1 0 2 28	22.50% 2.50% 0.00% 5.00% 70.00%
Body mass index	< 18.5 18.5-24.9 25.0-29.9 > 30	6 25 9 0	15.00% 62.50% 22.50% 0.00%
Random blood sugar	< 120 mg/dl 121- 160 mg/dl 161- 200 mg/dl > 200 mg/dl	2 8 21 9	5.00% 20.00% 52.50% 22.50%
Adherence to treatment	Regular treatment Irregular treatment	26 14	65.00% 35.00%

Table 1 explains the frequency and percentage distribution of patients with diabetic foot ulcer according to their selected socio demographic variables and clinical variables.

With respect to age, majority of the subjects, 18 (45%) were had between 51-60 years, 9 (22.5%) were had greater than 60 years, 8 (20%) were had between 41-50 years, 5 (12.5%) were had between 31-40 years and none of them less than 30 years.

While dealing with gender, majority of the subjects, 32 (80%) were males and 8 (20%) were females.

With regards to religion, majority of the subjects, 35 (87.5%) were Hindus, 3 (7.5%) were Christian and 2 (5%) were Muslim.

When comparing the area of residence, majority of the subjects, 19 (47.5%) were hailed from rural area, 17 (42.5%) were hailed from sub- urban area and 4 (10%) were hailed from urban area.

When determining the dietary pattern, majority of the subjects, 36 (90%) were non vegetarian and 4 (10%) were vegetarian.

With regards to educational status, majority of the subjects, 21 (52.5%) were studied up to primary education, 9 (22.5%) were no formal education, 7 (17.5%) were higher secondary education and 3 (7.5%) were graduate.

In the aspect of type of occupation, majority of the subjects, 24 (60%) were had clerical/ shop keeper/ farmer, 8 (20%) were unskilled worker, 5 (12.5%) were unemployed and 3 (7.5%) were profession.

When considering the monthly income, majority of the subjects, 24 (60.0%) were earned between Rs.5001- 10,000, 8 (20%) were earned less than Rs.5,000 and 5 (12.5%) were earned between Rs. 10,001- 15,000 and 3 (7.5%) were earned more than Rs. 15,000.

With regards to type of diabetes mellitus, majority of the subjects, 40 (100%) were had type 2 diabetes mellitus and none of them type 1 diabetes.

When considering the duration of diabetes mellitus, majority of the subjects, 17 (42.5%) were had more than 5 years, 15 (37.5%) were had between 1-3 years, 6 (15%) were had between 3-5 years and 2 (5%) were had less than 1 year.

In the aspect of duration of diabetic foot ulcer, majority of the subjects, 20 (50%) were had less than 1 month, 15 (37.5%) were had between 1-6 months and 5 (12.5%) were had more than 6 months.

While mentioning the site of diabetic foot ulcer, majority of the subjects, 19 (47.5%) were had in foot, 12 (30%) were had in plantar surface of the foot, 8 (20%) were had in dorsal surface of the foot and 1 (2.5%) was had big toe ulcer.

While dealing with the type of anti diabetic drug, majority of the subjects, 23 (57.5%) were had insulin, 15 (37.5%) were had oral hypoglycemic agents and 2 (5%) were had insulin and oral hypoglycemic agents.

While comparing the co morbid conditions, majority of the subjects, 28 (70%) were had no co morbidities, 9 (22.5%) were had hypertension, 2 (5%) were had neurological disorder, 1 (2.5%) was had coronary artery disease and none of them had renal impairment.

With regards to body mass index, majority of the subjects, 25 (62.5%) were had between 18.5- 24.9, 9 (22.5%) were had between 25-29.9, 6 (15%) were had less than 18.5 and none of them more than 30.

While determining the random blood sugar, majority of the subjects, 21 (52.5%) were had between 161-200mg/dl, 9 (22.5%) were had more than 200 mg/dl, 8 (20%) were had between 121-160 mg/dl and 2 (5%) were had less than 120 mg/dl.

While dealing with the adherence to treatment, majority of the subjects, 26 (65%) were had regular treatment and 14 (35%) were had irregular treatment

Distribution of the subjects according to age

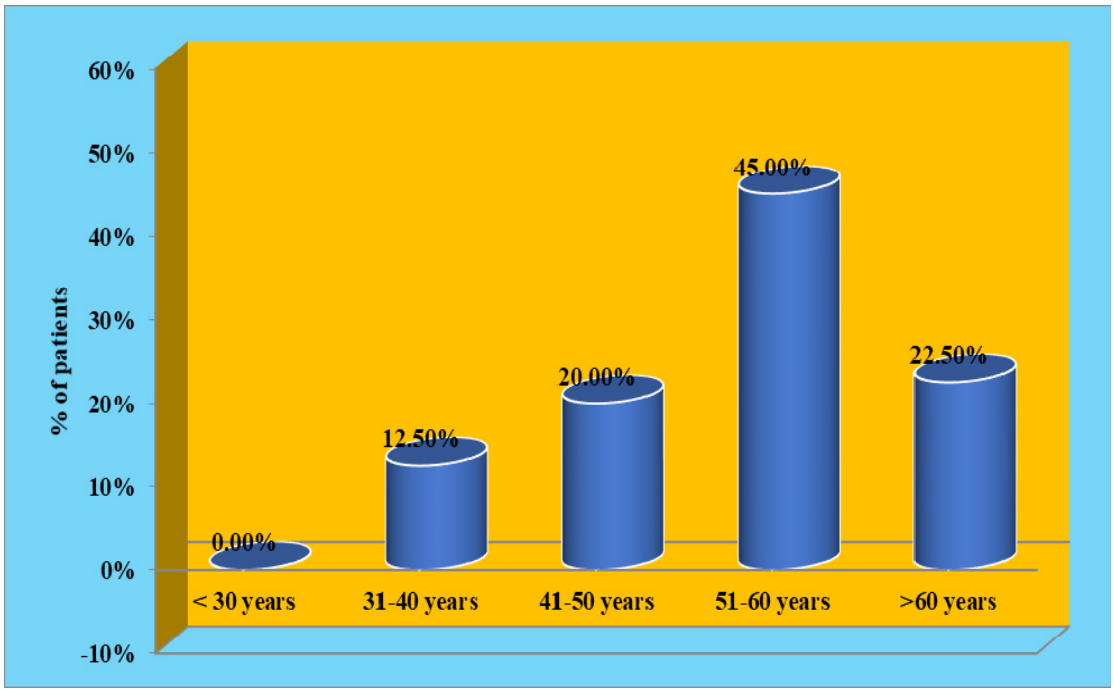


Figure: 2 Cylindrical bar diagram portrays the distribution of the subjects according to their age

The above cylindrical bar diagram revealed that, majority of the subjects, 18 (45%) were had between 51-60 years, 9 (22.5%) were had greater than 60 years, 8 (20%) were had between 41-50 years, 5 (12.5%) were had between 31-40 years and none of them less than 30 years.

Distribution of the subjects according to gender

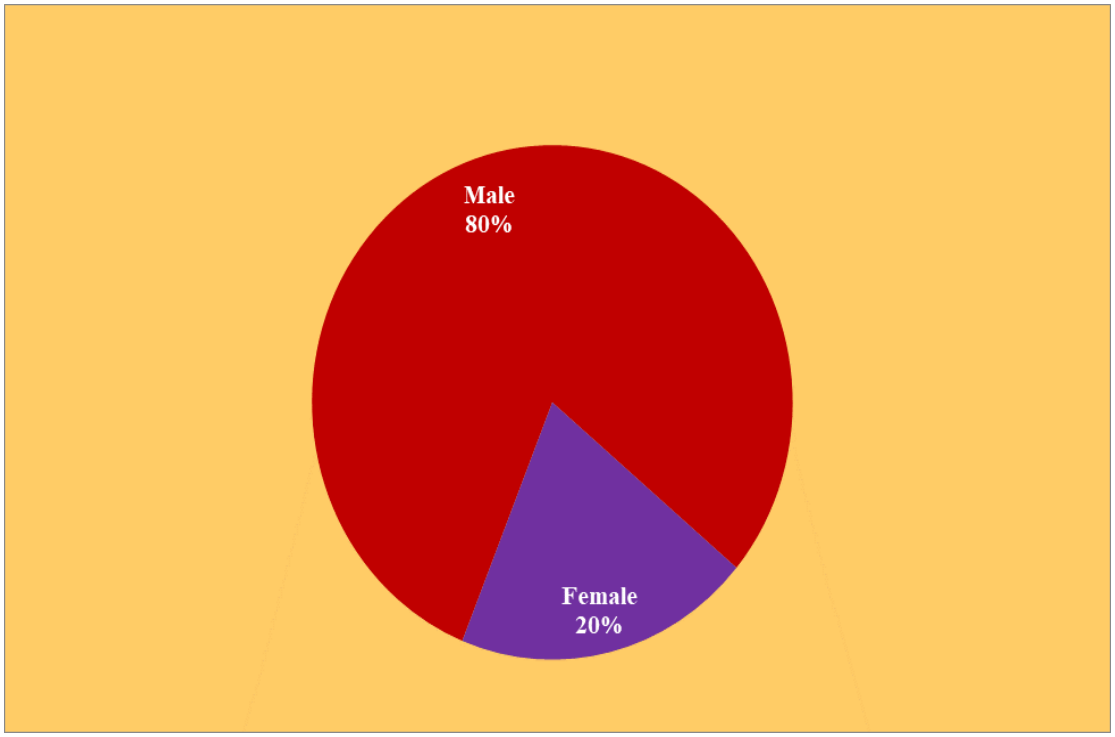


Figure: 3 depicts the distribution of the subjects according to their gender

The above pie diagram revealed that, majority of the subjects, 32 (80%) were males and 8 (20%) were females.

Distribution of the subjects according to religion

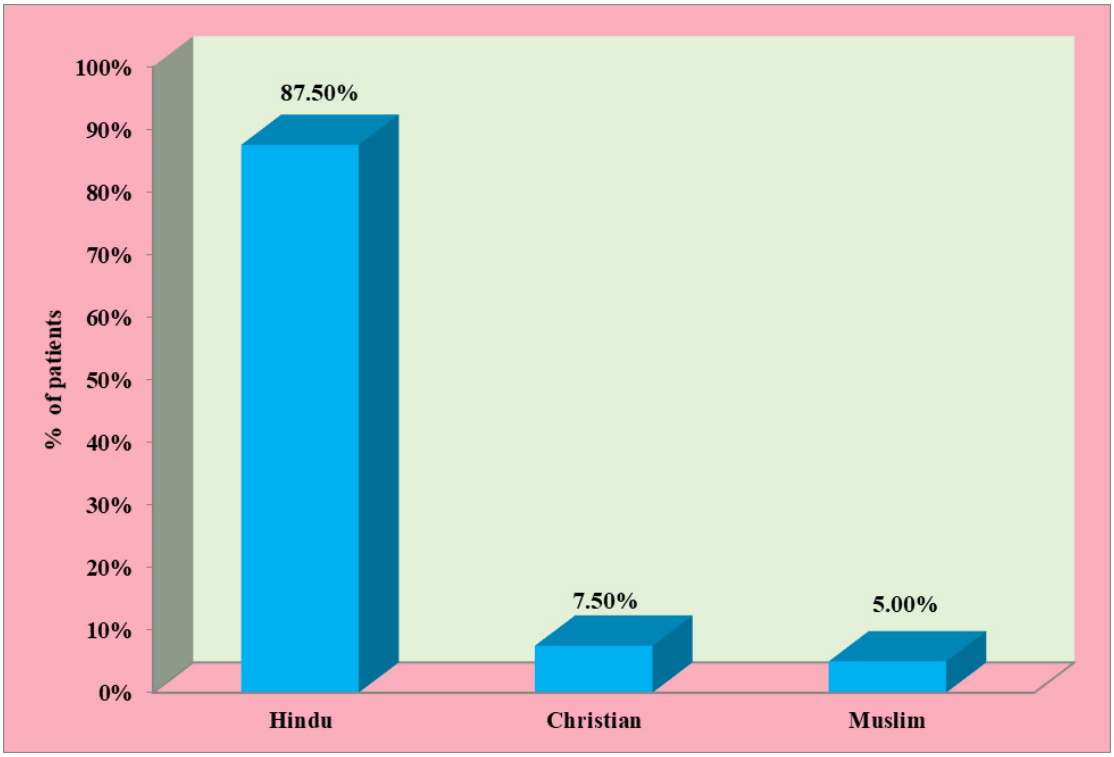


Figure: 4 denotes the distribution of the subjects according to their religion

The above bar diagram revealed that, majority of the subjects, 35 (87.5%) were Hindus, 3 (7.5%) were Christian and 2 (5%) were Muslim.

Distribution of the subjects according to area of residence

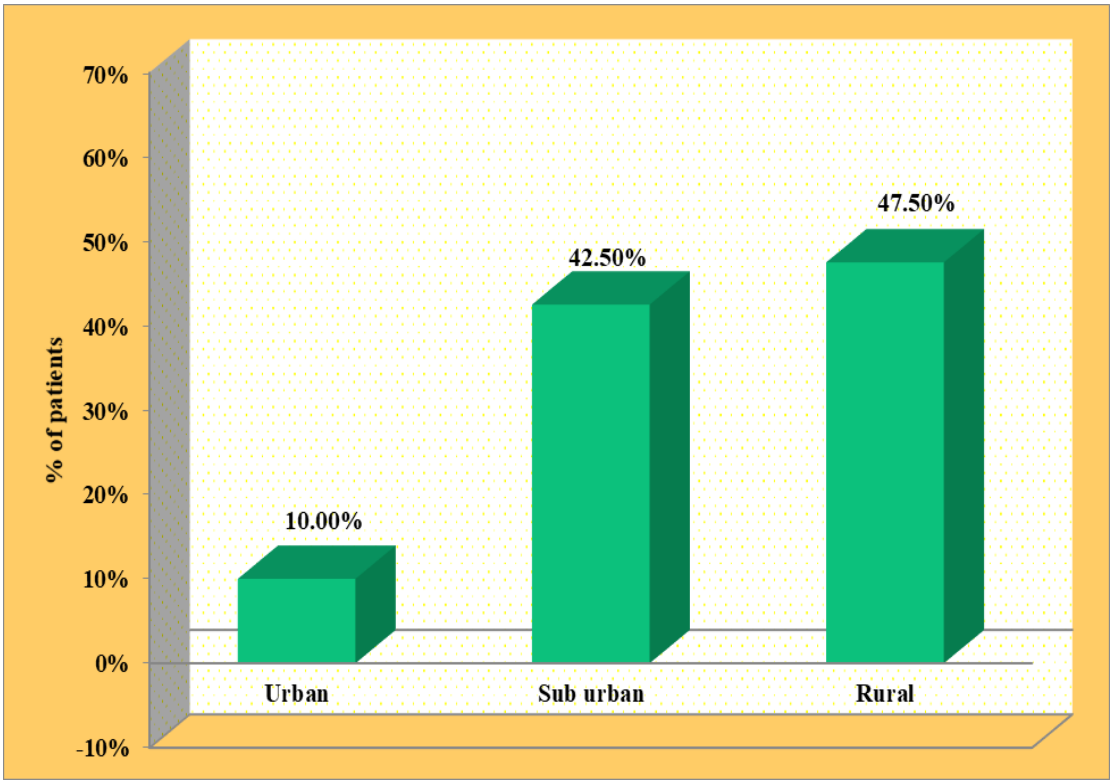


Figure: 5 states the distribution of the subjects according to their area of residence

The above column diagram revealed that, majority of the subjects, 19 (47.5%) were hailed from rural area, 17 (42.5%) were hailed from sub- urban area and 4 (10%) were hailed from urban area.

Distribution of the subjects according to dietary pattern

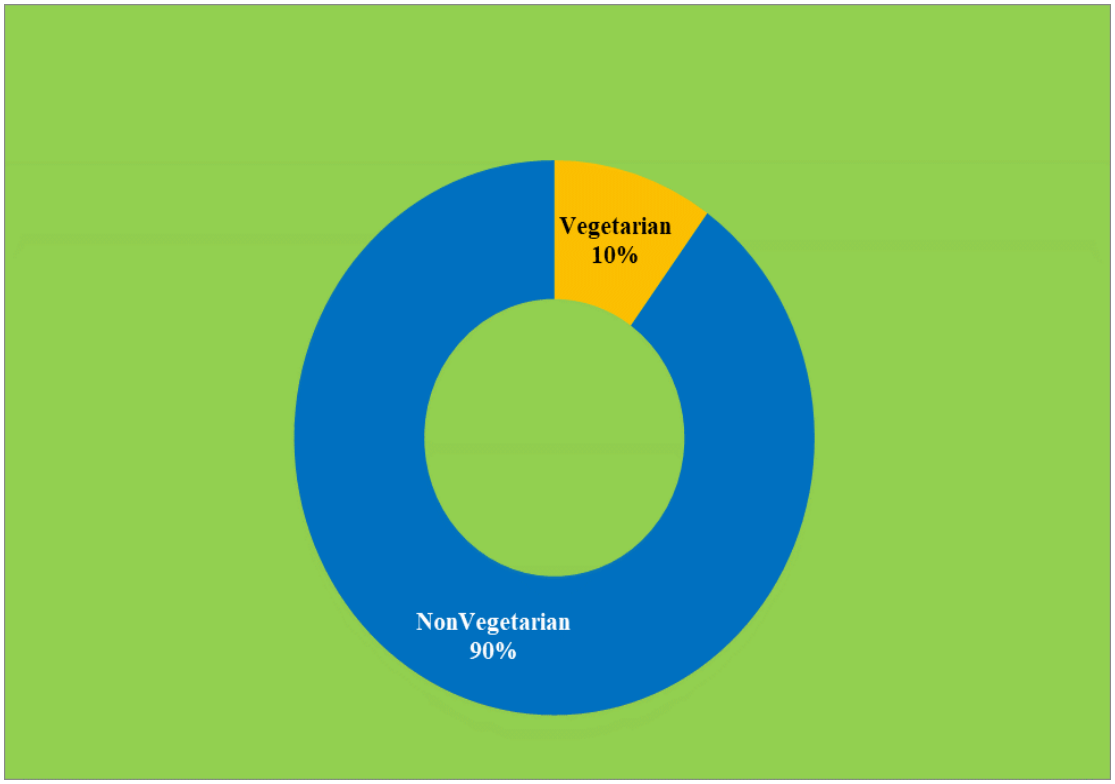


Figure: 6 explains the distribution of the subjects according to their dietary pattern

The above pie diagram revealed that, majority of the subjects, 36 (90%) were non vegetarian and 4 (10%) were vegetarian.

Distribution of the subjects according to educational status

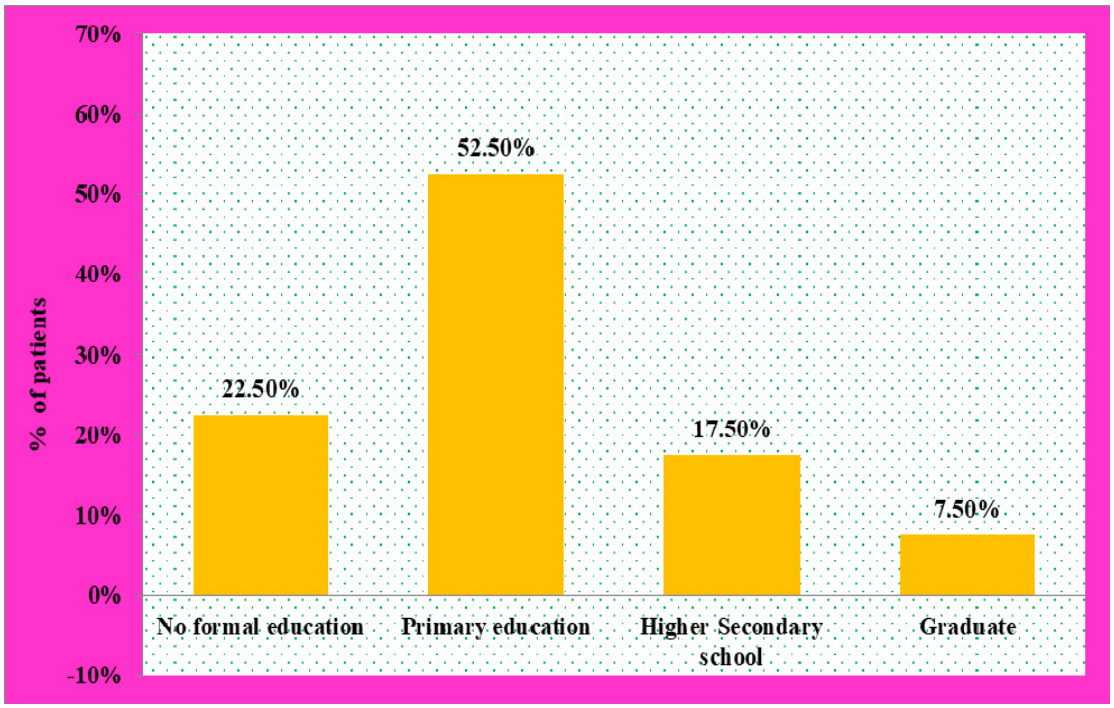


Figure: 7 discuss the distribution of the subjects according to their educational status

The above bar diagram revealed that, majority of the subjects, 21 (52.5%) were studied up to primary education, 9 (22.5%) were no formal education, 7 (17.5%) were higher secondary education and 3 (7.5%) were graduate.

Distribution of the subjects according to type of occupation

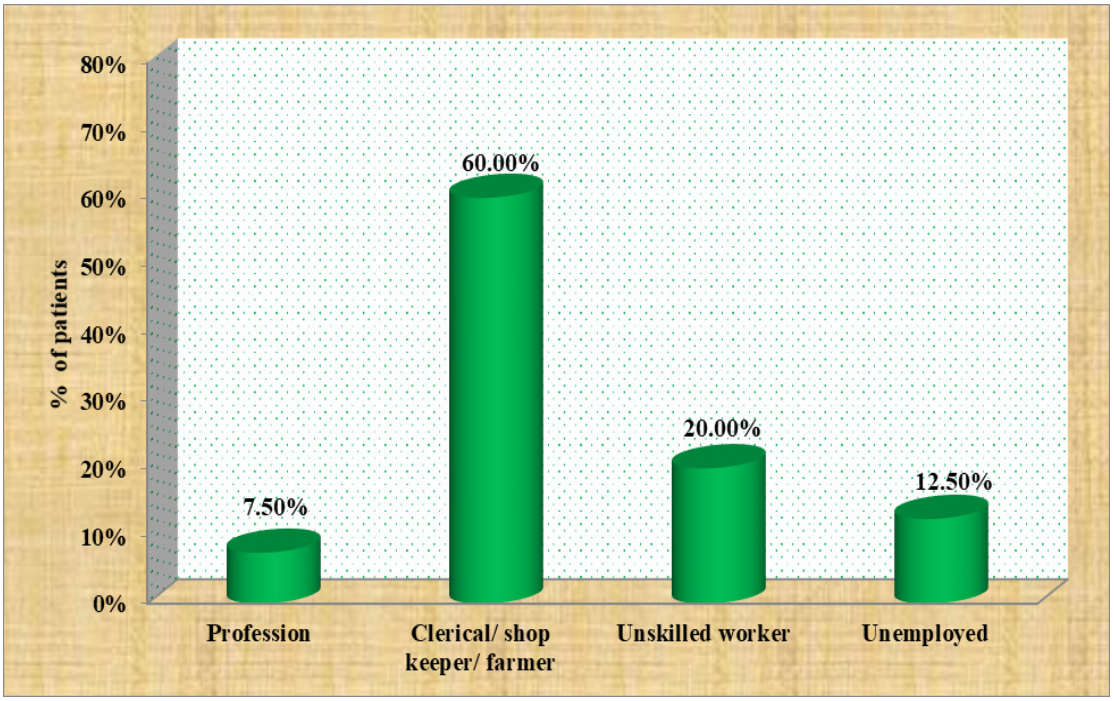


Figure: 8 compares the distribution of the subjects according to their type of occupation

The above cylindrical bar diagram revealed that, majority of the subjects, 24 (60%) were had clerical/ shop keeper/farmer, 8 (20%) were unskilled worker, 5 (12.5%) were unemployed and 3 (7.5%) were profession.

Distribution of the subjects according to monthly income

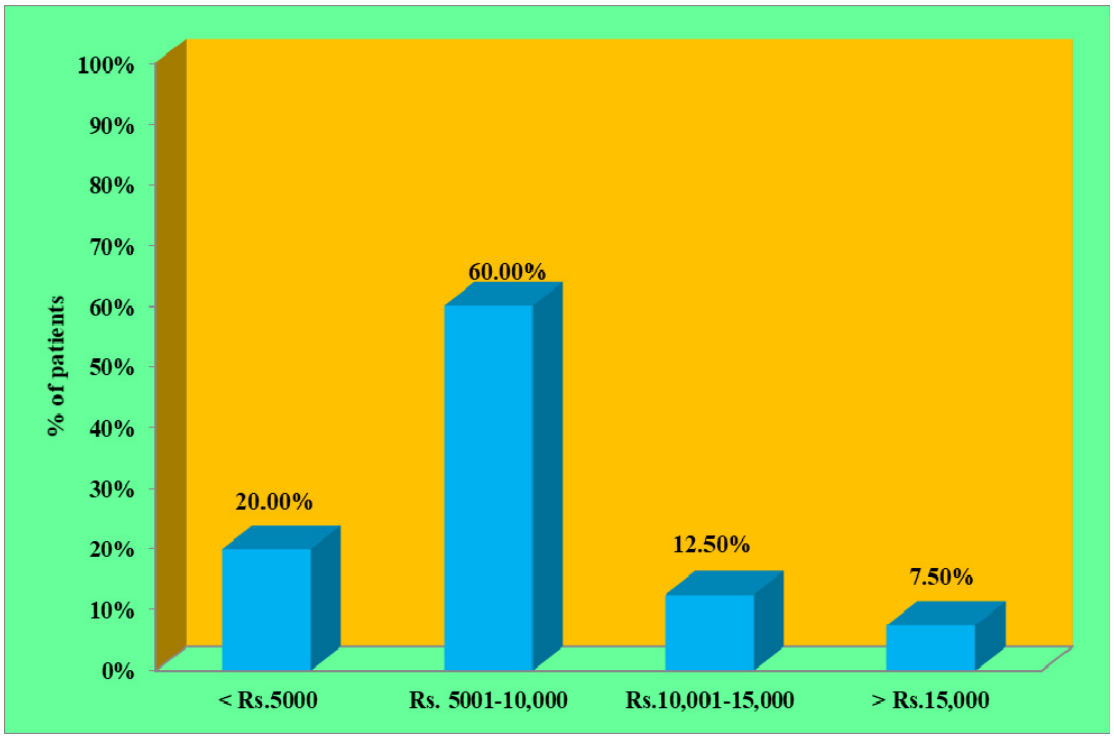


Figure: 9 Portrays the distribution of the subjects according to their monthly income

The above bar diagram revealed that, majority of the subjects, 24 (60.0%) were earned between Rs.5001- 10,000, 8 (20%) were earned less than Rs.5,000 and 5 (12.5%) were earned between Rs.10,001- 15,000 and 3 (7.5%) were earned more than Rs. 15,000.

Distribution of subjects according to type of diabetes mellitus

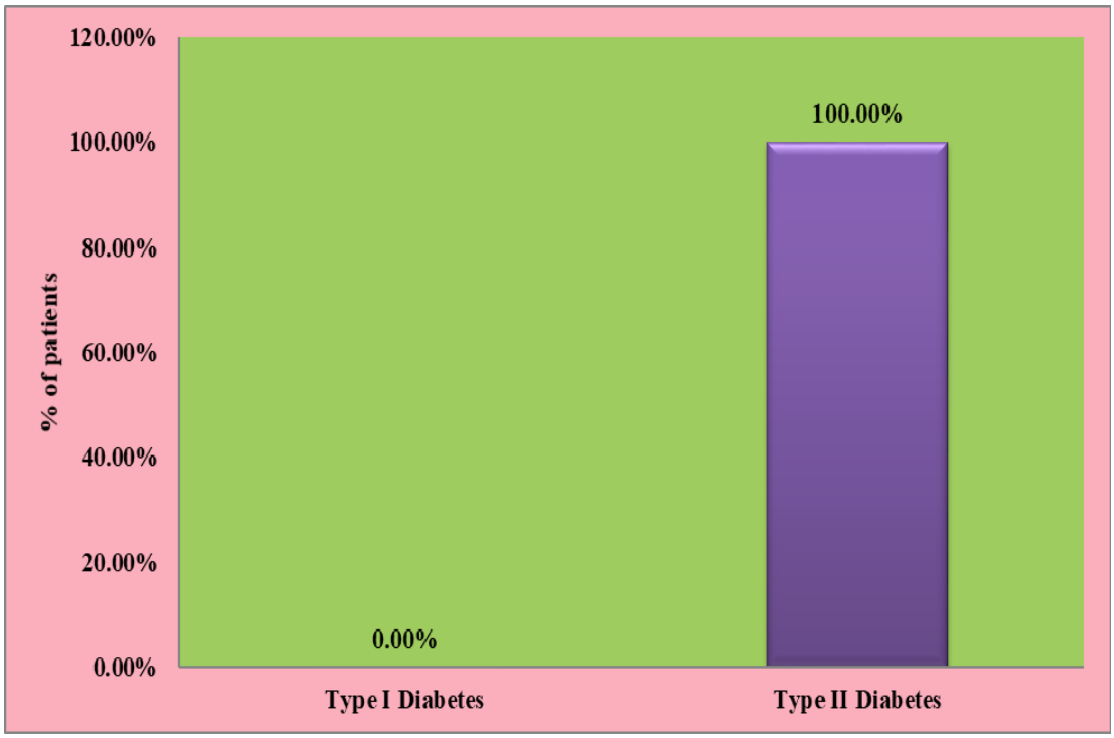


Figure: 10 depicts the distribution of the subjects according to type of diabetes mellitus

The above bar diagram revealed that, majority of the subjects, 40 (100%) were had type 2 diabetes mellitus and none of them type 1 diabetes.

Distribution of subjects according to duration of diabetes mellitus

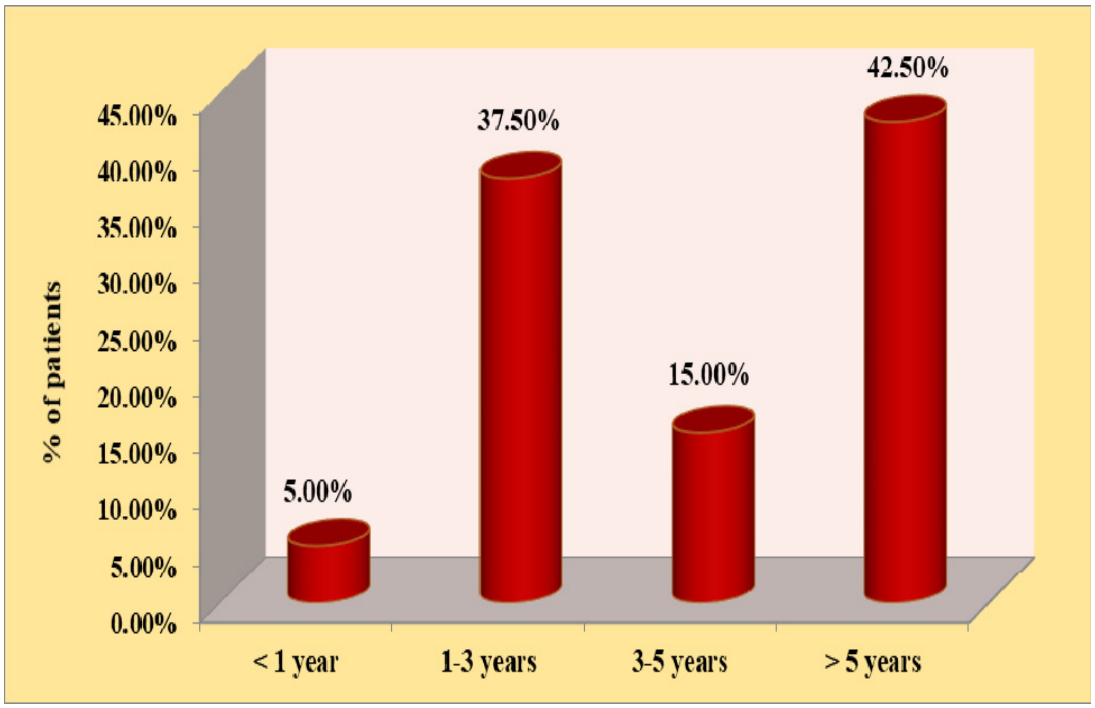


Figure: 11 discuss the distribution of the subjects according to duration of diabetic mellitus

The above cylindrical bar diagram revealed that, majority of the subjects, 17 (42.5%) were had more than 5 years, 15 (37.5%) were had between 1-3 years, 6 (15%) were had between 3-5 years and 2 (5%) were had less than 1 year.

Distribution of subjects according to duration of diabetic foot ulcer

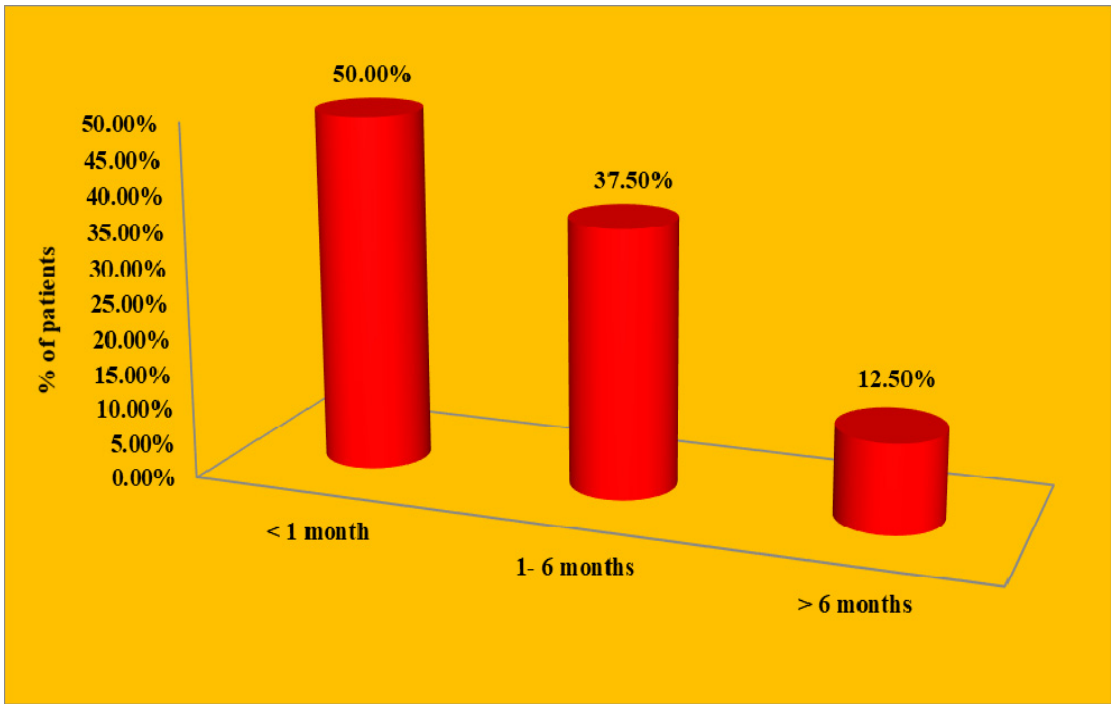


Figure: 12 states the distribution of the subjects according to duration of diabetic foot ulcer

The above cylindrical bar diagram revealed that, majority of the subjects, 20 (50%) were had less than 1 month, 15 (37.5%) were had between 1-6 months and 5 (12.5%) were had more than 6 months.

Distribution of subjects according to site of diabetic foot ulcer

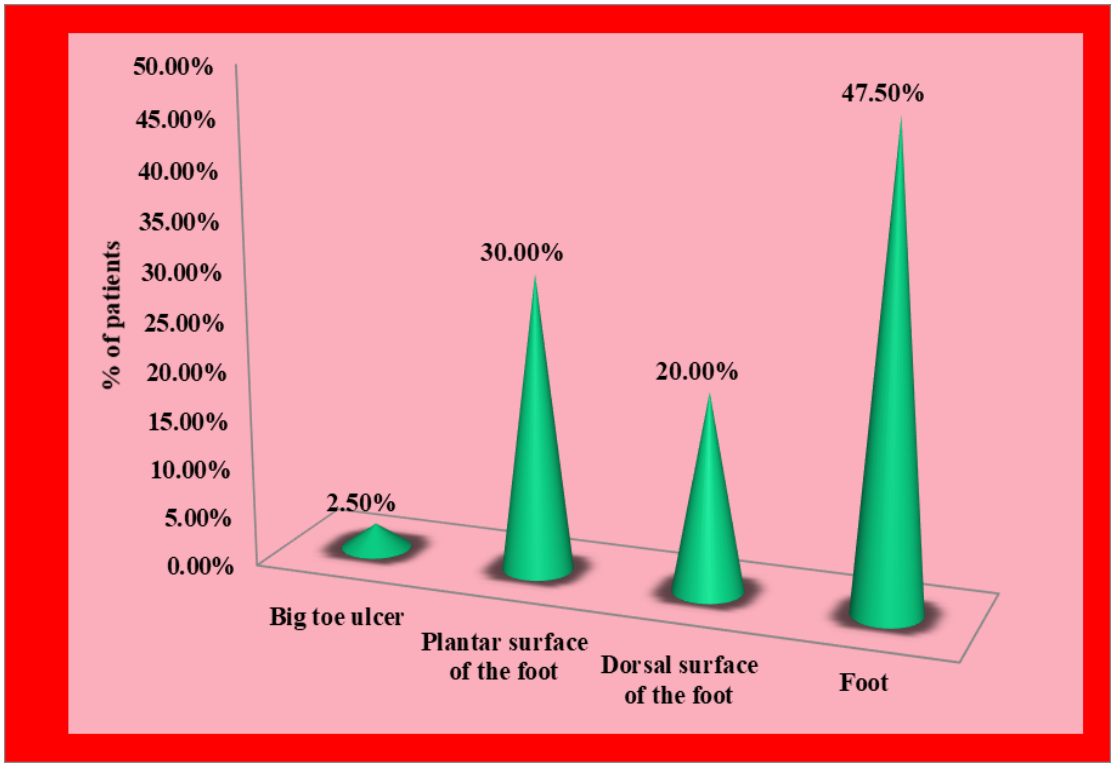


Figure: 13 explains the distribution of the subjects according to site of diabetic foot ulcer

The above cone diagram revealed that, majority of the subjects, 19 (47.5%) were had in foot, 12 (30%) were had in plantar surface of the foot, 8 (20%) were had in dorsal surface of the foot and 1 (2.5%) was had big toe ulcer.

Distribution of subjects according to type of anti diabetic drug

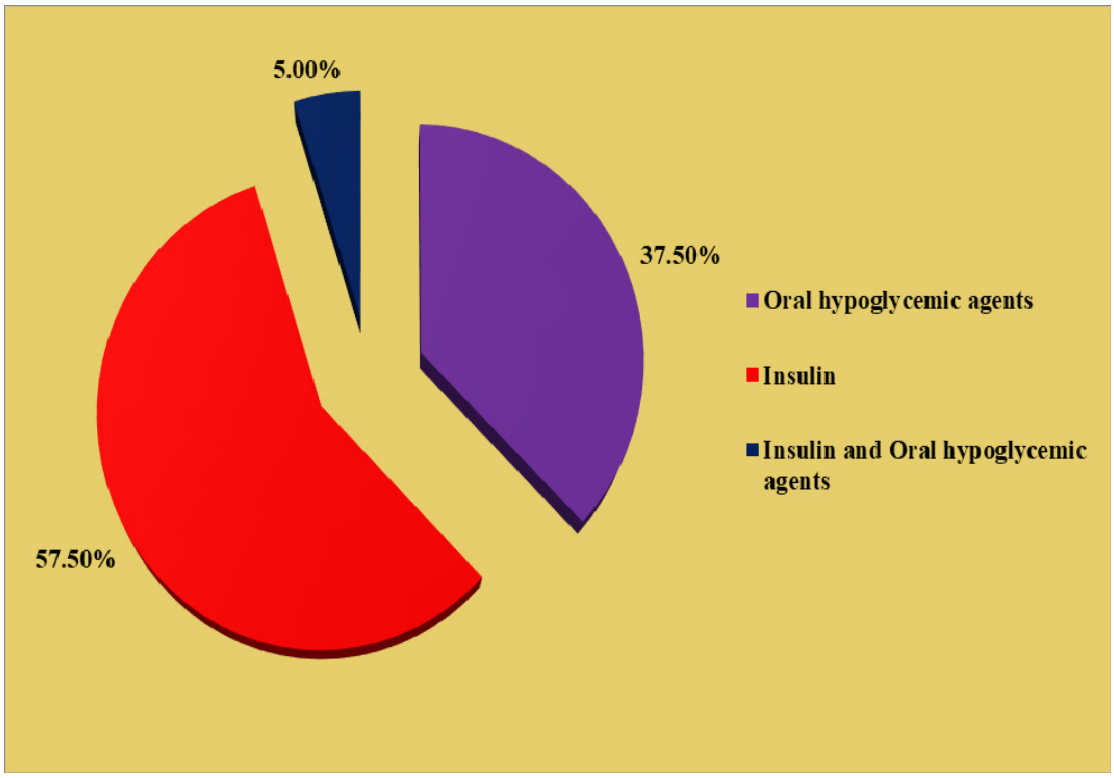


Figure: 14 portrays the distribution of the subjects according to type of antidiabetic drug

The above pie diagram revealed that, majority of the subjects, 23 (57.5%) were had insulin, 15 (37.5%) were had oral hypoglycemic agents and 2 (5%) were had insulin and oral hypoglycemic agents.

Distribution of subjects according to comorbid conditions

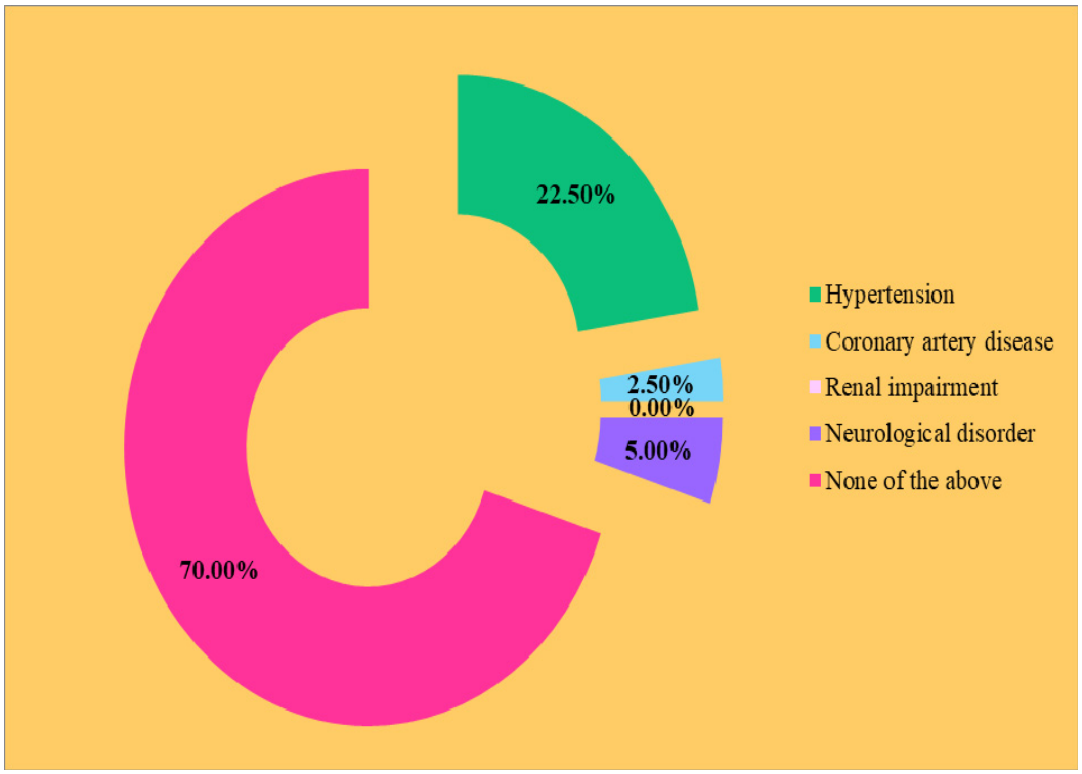


Figure: 15 compare the distribution of the subjects according to co morbid conditions

The above pie diagram revealed that, majority of the subjects, 28 (70%) were had no co morbidities, 9 (22.5%) were had hypertension, 2 (5%) were had neurological disorder, 1 (2.5%) was had coronary artery disease and none had renal impairment.

Distribution of subjects according to body mass index

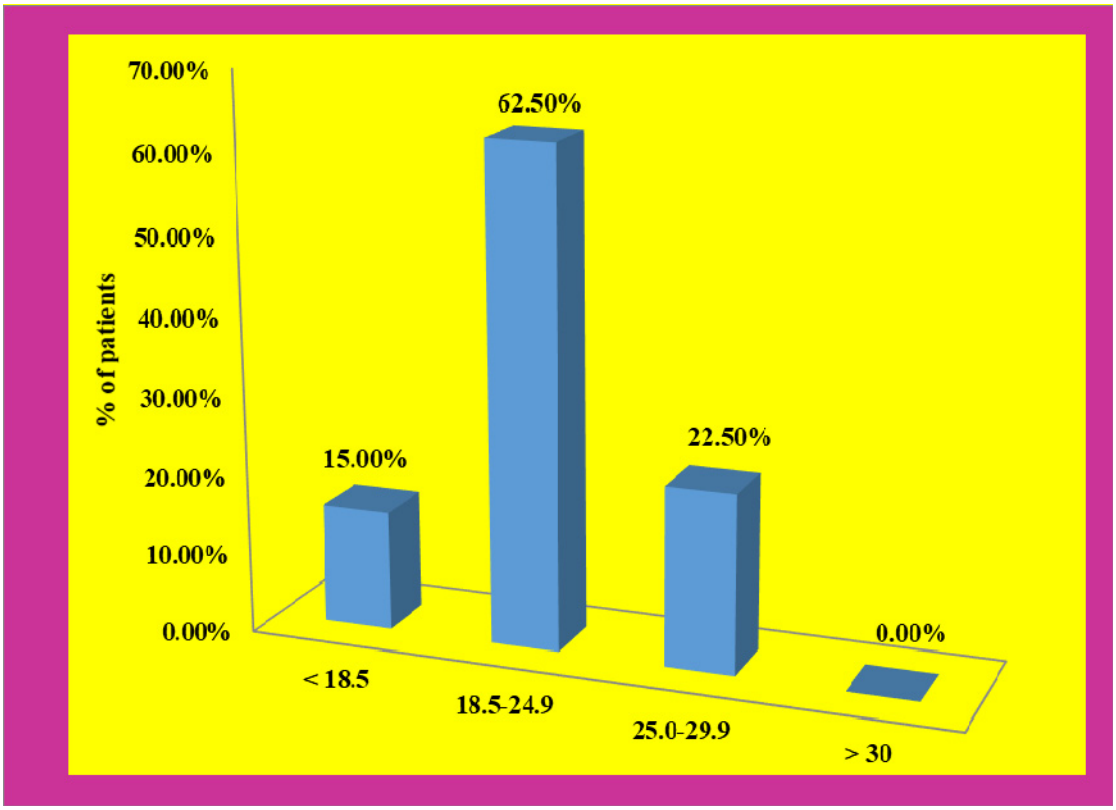


Figure: 16 portrays the distribution of the subjects according to body mass index

The above bar diagram revealed that, majority of the subjects, 25 (62.5%) were had between 18.5- 24.9, 9 (22.5%) were had between 25- 29.9, 6 (15%) were had less than 18.5 and none of them more than 30.

Distribution of subjects according to random blood sugar level

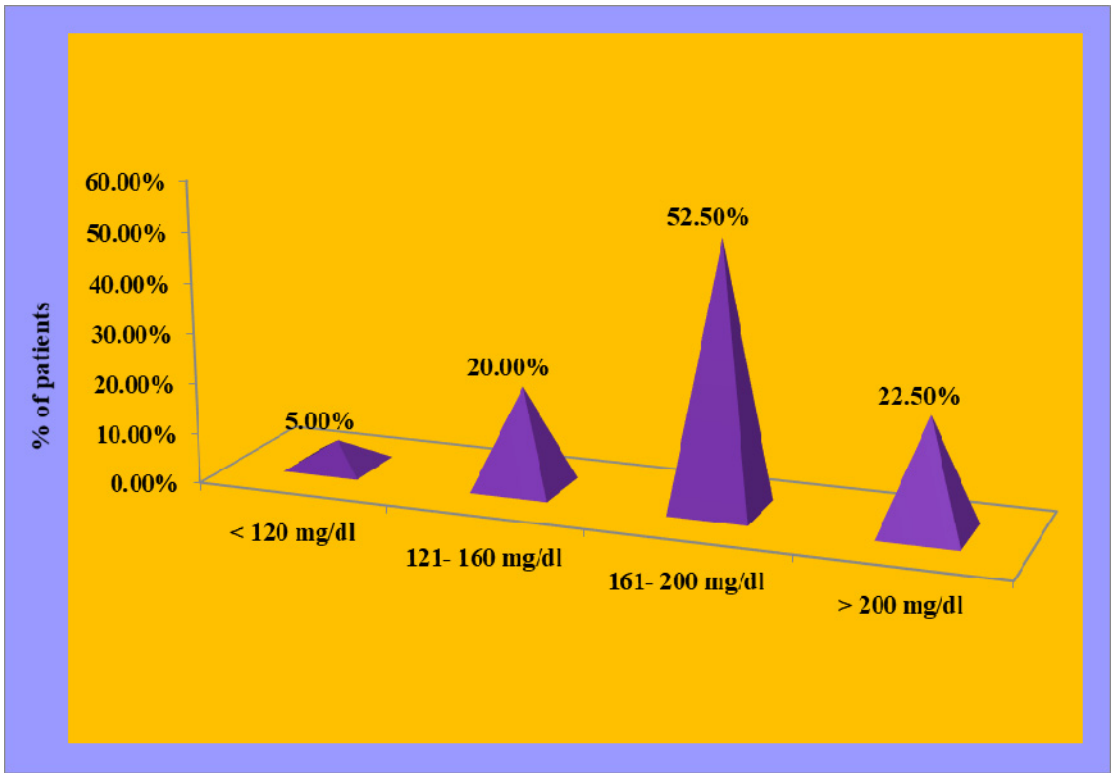


Figure: 17 depicts the distribution of the subjects according to random blood sugar level

The above pyramid diagram revealed that, majority of the subjects, 21 (52.5%) were between 161-200 mg/dl, 9 (22.5%) were more than 200 mg/dl, 8 (20%) were between 121-160 mg/dl and 2 (5%) were less than 120 mg/dl.

Distribution of subjects according to adherence to treatment

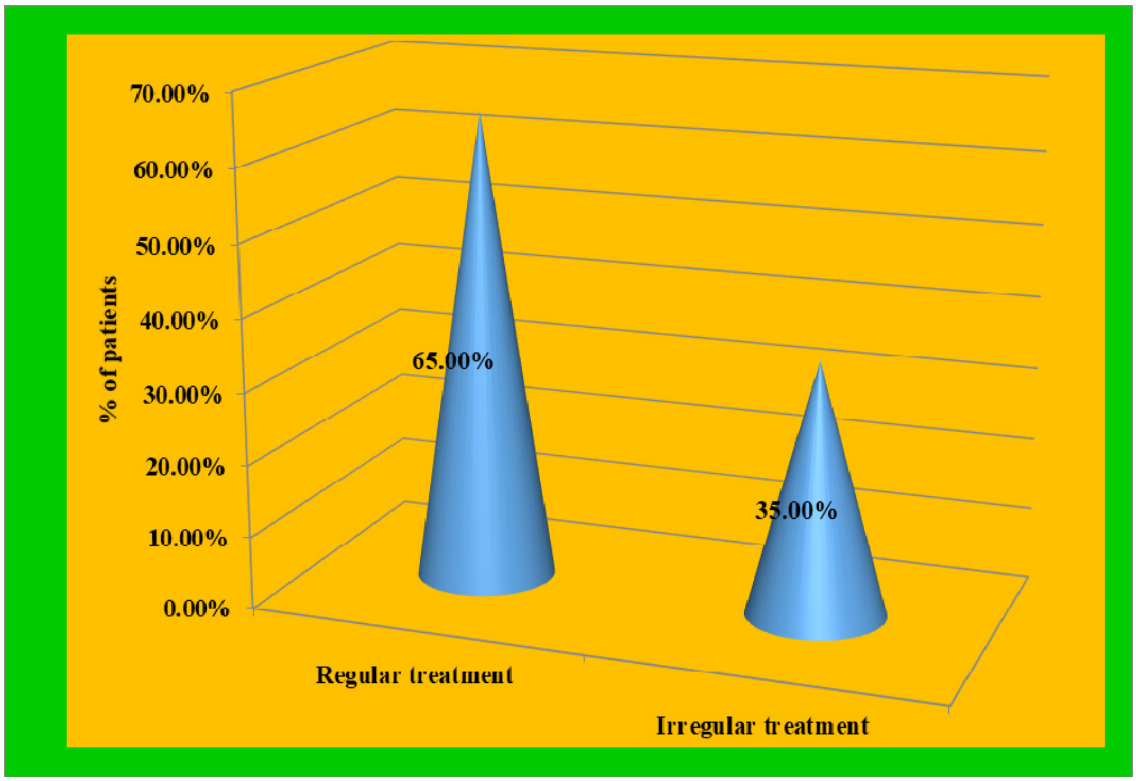


Figure: 18 explains the distribution of the subjects according to adherence to treatment

The above cone diagram revealed that, majority of the subjects, 26 (65%) were had regular treatment and 14 (35%) were had irregular treatment

SECTION II

Description of pre test level of healing process of diabetic foot ulcer among patients

Table 2

Frequency and percentage distribution of pretest level of healing process of diabetic foot ulcer among patients

n=40

S. No	Grade	Pre test	
		(f)	(%)
1	**I**	4	10%
2	**II**	36	90%
3	**III**	0	0%
4	**IV**	0	0%
		40	100.0%

The above table 2 depicts the frequency and percentage distribution of pretest level of healing process of diabetic foot ulcer among patients

In the pretest, majority of the subjects, 36 (90%) were had Grade II, 4 (10%) were had Grade I and none of them had Grade III or Grade IV diabetic foot ulcer.

Distribution of subjects according to the pretest level of healing process of diabetic foot ulcer among patients

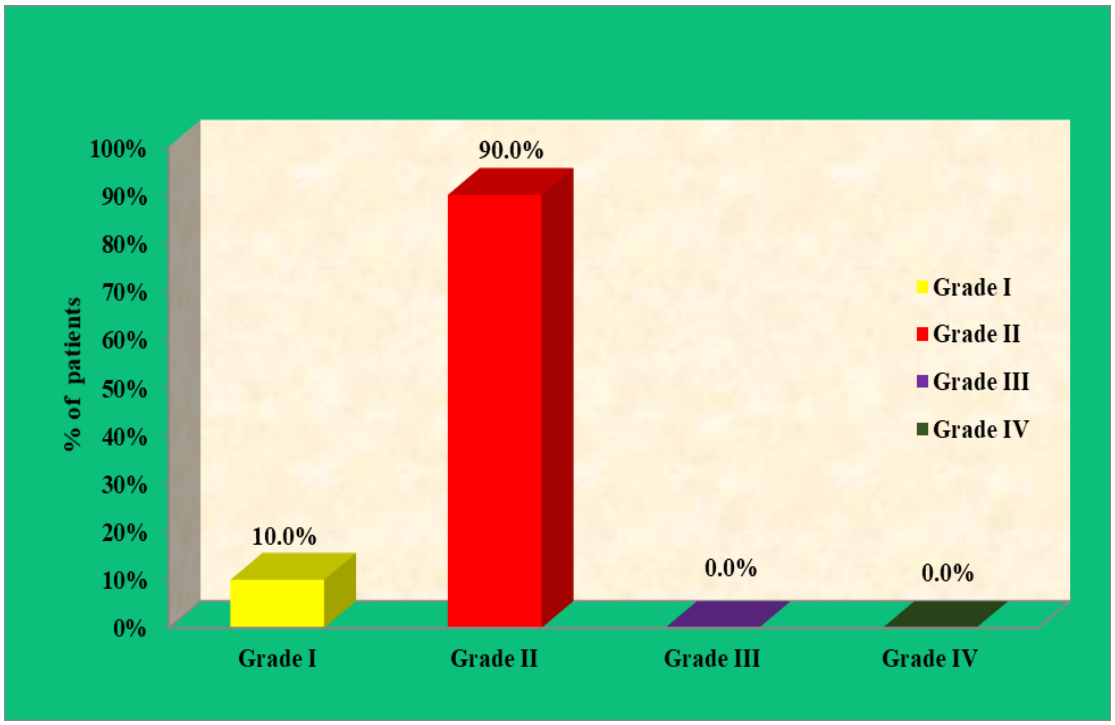


Figure: 19 Bar diagram portrays the distribution of pretest level of healing among patients with diabetic foot ulcer

In the pretest, majority of the subjects, 36 (90%) were had Grade II, 4 (10%) were had Grade I and none of them had Grade III or Grade IV diabetic foot ulcer.

SECTION III

Effectiveness of citric acid dressing on healing process of diabetic foot ulcer among patients

Table 3

Frequency and percentage distribution of pretest and posttest level of healing process of diabetic foot ulcer among patients

n=40

S.No	Grade	Pre test		Post test	
		(f)	(%)	(f)	(%)
1	**I**	4	10%	25	62.5%
2	**II**	36	90%	15	37.5%
3	**III**	0	0%	0	0%
4	**IV**	0	0%	0	0%
		40	100%	40	100%

The above table 3 depicts the frequency and percentage distribution of pretest and posttest level of healing process of diabetic foot ulcer among patients

In the pretest, majority of the subjects, 36 (90%) were had Grade II, 4 (10%) were had Grade I and none of them had Grade III or Grade IV diabetic foot ulcer.

Whereas in the post test, majority of the subjects, 25 (62.5%) were had Grade I, 15 (37.5%) were had Grade II and none of them had Grade III or Grade IV diabetic foot ulcer.

Comparison of pretest and posttest level of healing process of diabetic foot ulcer among patients

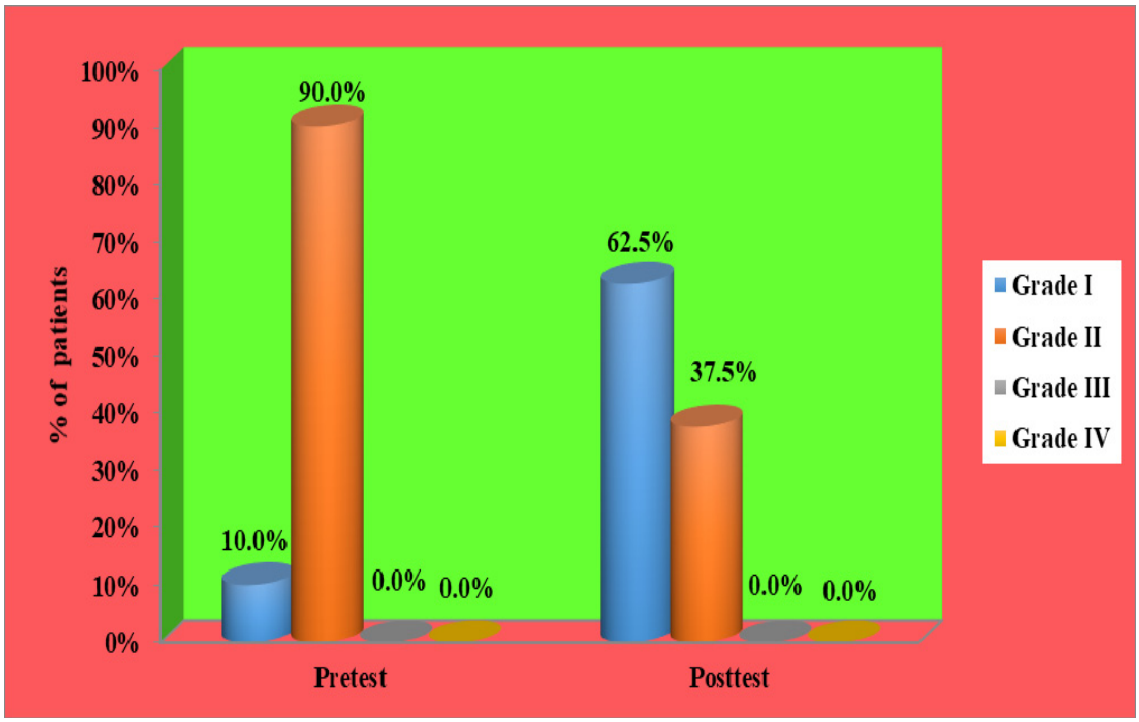


Figure 20: Cylindrical bar diagram portrays the pretest and posttest level of healing process of diabetic foot ulcer among patients

In the pretest, majority of the subjects, 36 (90%) were had Grade II, 4 (10%) were had Grade I and none of them had Grade III or Grade IV diabetic foot ulcer.

Whereas in the post test, majority of the subjects, 25 (62.5%) were had Grade I, 15 (37.5%) were had Grade II and none of them had Grade III or Grade IV diabetic foot ulcer.

Table 4

Comparison of pretest and posttest level of healing process of diabetic foot ulcer among patients

n=40

Level of PEDIS	Pretest		Posttest		Extended McNemar's test
	n	%	n	%	
Grade I	4	10.0%	25	62.5%	χ^2=21.00 p=0.001***(S)
Grade II	36	90.0%	15	37.5%	
Grade III	0	0.0%	0	0.0%	
Grade IV	0	0.0%	0	0.0%	
Total	40	100%	40	100.0%	

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

The above table 4 shows the pretest and posttest level of healing process of diabetic foot ulcer among patients. In the pretest, 36 (90%) were had Grade II, 4 (10%) were had Grade I and none of them had Grade III and Grade IV diabetic foot ulcer. Whereas in the post test, 25 (62.5%) were had Grade I, 15 (37.5%) were had Grade II and none of them had Grade III and Grade IV diabetic foot ulcer.

Extended McNemar's test revealed that, **(χ^2=21.00), (p = 0.001).** There was a statistically significant difference between the pretest and posttest level of healing process of diabetic foot ulcer among patients.

Table 5

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

n=40

Pretest		Posttest		Mean Difference	Student's paired t-test
Mean score	**SD**	**Mean score**	**SD**		
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**

Above table 5 portrays the comparison of pretest and posttest mean, standard deviation and mean score difference on level of healing process of diabetic foot ulcer among patients.

In the pretest, mean score was 5.05 with standard deviation 0.93 whereas posttest, mean score was 3.13 with the standard deviation 0.72 and the mean difference was 1.93.

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

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

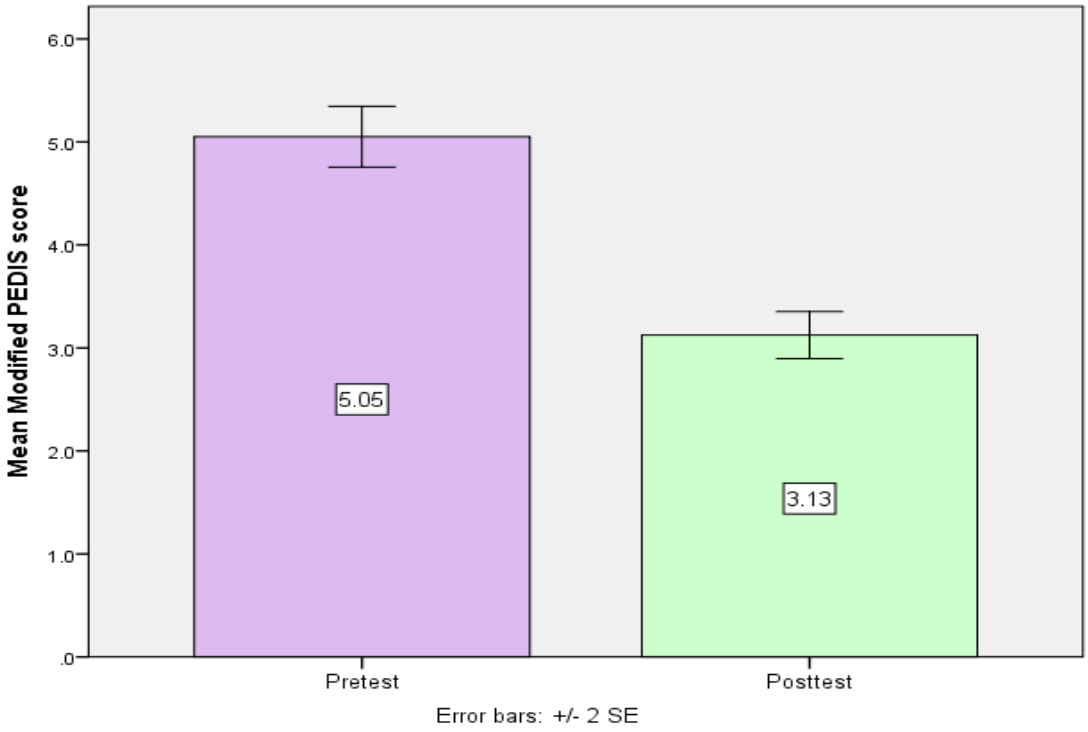


Figure 21 comparison of pretest and posttest mean, standard deviation and mean score difference on level of healing process of diabetic foot ulcer among patients.

In the pretest, mean score was 5.05 with standard deviation 0.93 whereas posttest, mean score was 3.13 with the standard deviation 0.72 and the mean difference was 1.93.

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

Table 6

Effectiveness of citric acid dressing on healing process of diabetic foot ulcer among patients

n=40

	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 (1.66 – 2.19)	16.00% (10.38% –18.25%)
Posttest	12	3.13		

Table no 6 shows the effectiveness of citric acid dressing on healing process of diabetic foot ulcer among patients.

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

The difference between the pretest and posttest 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.

SECTION IV

Associate the posttest level of healing process of diabetic foot ulcer among patients with their selected Socio demographic variables and Clinical variables

Table 7

Association between the posttest level of healing process of diabetic foot ulcer among patients with their selected socio demographic variables

n=40

Socio demographic variables		Posttest Level of PEDIS Grade								n	χ^2
		Grade I		Grade II		Grade III		Grade IV			
		f	%	f	%	f	%	f	%		
Age	< 30 years	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	**χ^2=9.89 p=0.02*(S)**
	31-40 years	5	100%	0	00.00%	0	0.00%	0	0.00%	5	
	41-50 years	6	75.00%	2	25.00%	0	0.00%	0	0.00%	8	
	51-60 years	12	66.67%	6	33.33%	0	0.00%	0	0.00%	18	
	>60 years	3	22.22%	6	77.78%	0	0.00%	0	0.00%	9	
Gender	Male	23	71.87%	9	28.13%	0	0.00%	0	0.00%	32	**χ^2=6.00 p=0.01**(S)**
	Female	2	33.33%	6	66.67%	0	0.00%	0	0.00%	8	
Religion	Hindu	22	62.86%	13	37.14%	0	0.00%	0	0.00%	35	χ^2=0.15 p=0.92 **(NS)**
	Christian	2	66.67%	1	33.33%	0	0.00%	0	0.00%	3	
	Muslim	1	50.00%	1	50.00%	0	0.00%	0	0.00%	2	
Area of residence	Urban	2	50.00%	2	50.00%	0	0.00%	0	0.00%	4	χ^2=0.91 p=0.63 **(NS)**
	Sub urban	12	70.59%	5	29.41%	0	0.00%	0	0.00%	17	
	Rural	11	57.89%	8	42.11%	0	0.00%	0	0.00%	19	
Dietary pattern	Vegetarian	3	75.00%	1	25.00%	0	0.00%	0	0.00%	4	χ^2=0.29 p=0.58 **(NS)**
	Non Vegetarian	22	61.11%	14	38.89%	0	0.00%	0	0.00%	36	
Educational status	No formal education	5	55.56%	4	44.44%	0	0.00%	0	0.00%	9	χ^2=0.44 p=0.93 **(NS)**
	Primary education	13	61.90%	8	38.10%	0	0.00%	0	0.00%	21	
	Higher Secondary school	5	71.43%	2	28.57%	0	0.00%	0	0.00%	7	
	Graduate	2	66.67%	1	33.33%	0	0.00%	0	0.00%	3	

Socio demographic variables		Posttest Level of PEDIS Grade								n	χ^2
		Grade I		Grade II		Grade III		Grade IV			
		f	%	f	%	f	%	f	%		
Type of occupation	Profession	2	66.67%	1	33.33%	0	0.00%	0	0.00%	3	χ^2=1.64 p=0.65 **(NS)**
	Clerical/ shop keeper/ farmer	15	62.50%	9	37.50%	0	0.00%	0	0.00%	24	
	Unskilled worker	6	75.00%	2	25.00%	0	0.00%	0	0.00%	8	
	Unemployed	2	40.00%	3	60.00%	0	0.00%	0	0.00%	5	
Monthly income	< Rs.5000	5	62.50%	3	37.50%	0	0.00%	0	0.00%	8	χ^2=1.74 p=0.62 **(NS)**
	Rs. 5001-10,000	15	62.50%	9	37.50%	0	0.00%	0	0.00%	24	
	Rs.10,001-15,000	4	80.00%	1	20.00%	0	0.00%	0	0.00%	5	
	> Rs.15,000	1	33.33%	2	66.67%	0	0.00%	0	0.00%	3	

***Significant at p< 0.05, **Highly significant at p<0.01, ***Very highly significant at p < 0.001, NS= Not Significant.**

The above table 7 explains the association between the posttest level of healing process of diabetic foot ulcer among patients with their selected socio demographic variables

In order to find out the association between the posttest level of healing process of diabetic foot ulcer with their selected socio demographic variables and clinical variables chi square analysis was done. The test revealed that, there was a statistically significant association between the posttest level of healing process of diabetic foot ulcer and Age between 51- 60 years **(χ^2=9.89), (p=0.02**) and Male Gender **(χ^2=6.00), (p=0.01).**

Association between the posttest level of healing process of diabetic foot ulcer and age

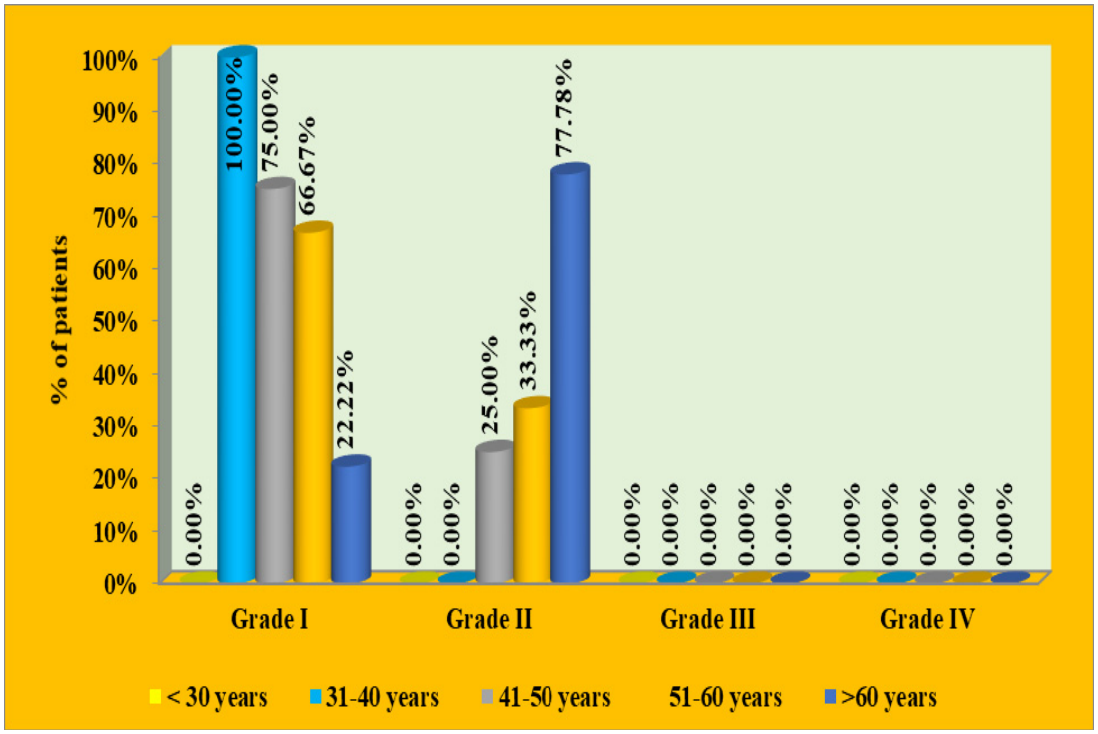


Figure: 22 cylindrical diagram portrays the association between the posttest level of healing process of diabetic foot ulcer and their age

Chi square analysis revealed that, there was a statistically significant association between the posttest level of healing process of diabetic foot ulcer and their age between 51- 60 years **(χ^2=9.89), (p=0.02**). Whereas, other age groups were not associated with the posttest level of healing process of diabetic foot ulcer.

Association between the posttest level of healing process of diabetic foot ulcer and gender

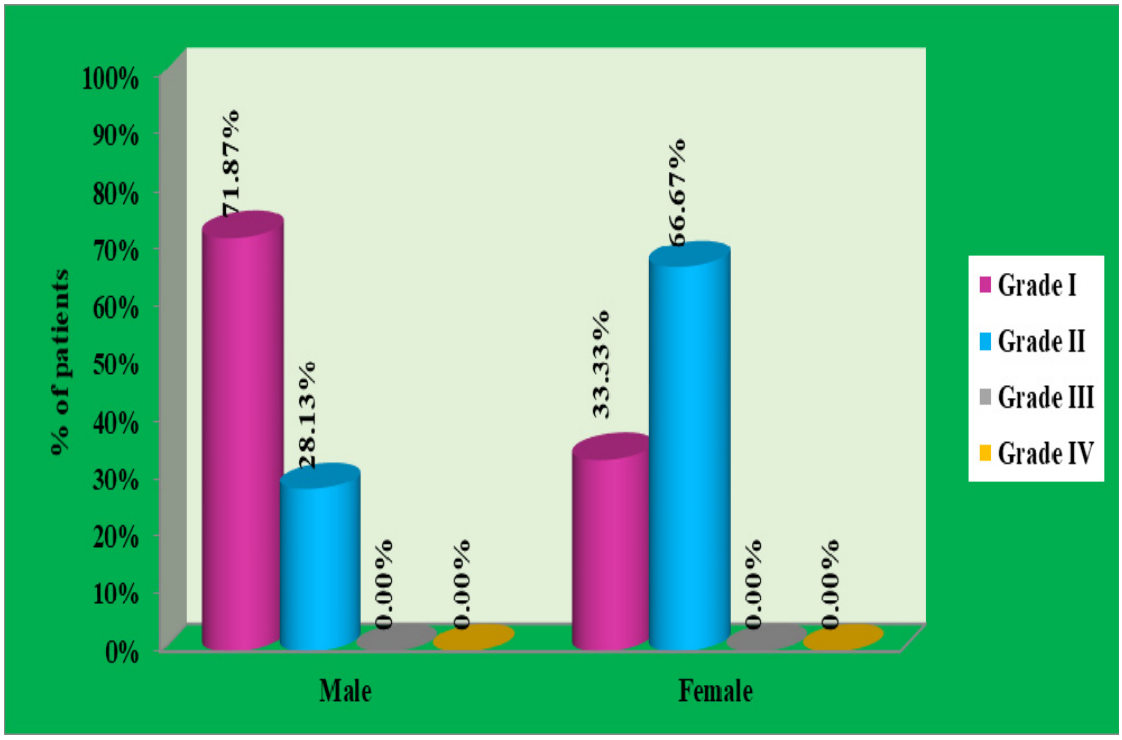


Figure: 23 cylindrical diagram reveals the association between the posttest level of healing process of diabetic foot ulcer and their gender

Chi square analysis revealed that, there was a statistically significant association between the posttest level of healing process of diabetic foot ulcer and male gender **(χ^2=6.00), (p=0.01)**. Whereas, females were not associated with the posttest level of healing process of diabetic foot ulcer.

Table 8

Association between the posttest level of healing process of diabetic foot ulcer among patients with their selected clinical variables

n=40

Clinical variables		Posttest Level of PEDIS Grade								n	χ^2
		Grade I		Grade II		Grade III		Grade IV			
		f	%	f	%	f	%	f	%		
Type of diabetes mellitus	Type 1 Diabetes	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	χ^2=0.00 p=1.00 **(NS)**
	Type 2 Diabetes	26	65.00%	14	35.00%	0	0.00%	0	0.00%	40	
Duration of diabetes mellitus	< 1 year	1	50.00%	1	50.00%	0	0.00%	0	0.00%	2	χ^2=3.87 p=0.27 **(NS)**
	1-3 years	9	60.00%	6	40.00%	0	0.00%	0	0.00%	15	
	3-5 years	6	100%	0	0.00%	0	0.00%	0	0.00%	6	
	> 5 years	10	58.82%	7	41.18%	0	0.00%	0	0.00%	17	
Duration of diabetic foot ulcer	< 1 month	16	80.00%	4	20.00%	0	0.00%	0	0.00%	20	**χ^2=6.59 p=0.03* (S)**
	1- 6 months	9	60.00%	6	40.00%	0	0.00%	0	0.00%	15	
	> 6 months	1	16.67%	4	83.33%	0	0.00%	0	0.00%	5	
Site of diabetic foot ulcer	Big toe ulcer	0	0.00%	1	100%	0	0.00%	0	0.00%	1	χ^2=3.15 p=0.36 **(NS)**
	Plantar surface of the foot	9	75.00%	3	25.00%	0	0.00%	0	0.00%	12	
	Dorsal surface of the foot	6	75.00%	2	25.00%	0	0.00%	0	0.00%	8	
	Foot	11	57.89%	8	42.11%	0	0.00%	0	0.00%	19	
Type of Antidiabetic drug	Oral hypoglycemic agents	10	66.67%	5	33.33%	0	0.00%	0	0.00%	15	χ^2=1.26 p=0.53 **(NS)**
	Insulin	14	60.87%	9	39.13%	0	0.00%	0	0.00%	23	
	Insulin and Oral hypoglycemic agents	2	100%	0	0.00%	0	0.00%	0	0.00%	2	

Clinical variables		Posttest Level of PEDIS Grade								n	χ^2
		Grade I		Grade II		Grade III		Grade IV			
		f	%	f	%	f	%	f	%		
Comorbid conditions	Hypertension	5	55.56%	4	44.44%	0	0.00%	0	0.00%	9	χ^2=3.33 p=0.38 **(NS)**
	Coronary artery disease	0	0.00%	1	100%	0	0.00%	0	0.00%	1	
	Renal impairment	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	
	Neurological disorder	2	100%	0	0.00%	0	0.00%	0	0.00%	2	
	None of the above	19	67.86%	9	32.14%	0	0.00%	0	0.00%	28	
Body mass index	< 18.5	3	50.00%	3	50.00%	0	0.00%	0	0.00%	6	χ^2=3.12 p=0.26 **(NS)**
	18.5-24.9	15	60.00%	10	40.00%	0	0.00%	0	0.00%	25	
	25.0-29.9	8	88.89%	1	11.11%	0	0.00%	0	0.00%	9	
	> 30	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	
Random blood sugar	< 120 mg/dl	2	100%	0	0.00%	0	0.00%	0	0.00%	2	**χ^2=7.76 p=0.05* (S)**
	121- 160 mg/dl	7	87.50%	1	12.50%	0	0.00%	0	0.00%	8	
	161- 200 mg/dl	15	71.42%	6	28.58%	0	0.00%	0	0.00%	21	
	> 200 mg/dl	2	22.22%	7	77.78%	0	0.00%	0	0.00%	9	
Adherence to treatment	Regular treatment	19	73.08%	7	26.92%	0	0.00%	0	0.00%	26	χ^2=0.44 p=0.93 **(NS)**
	Irregular treatment	7	50.00%	7	50.00%	0	0.00%	0	0.00%	14	

***Significant at p< 0.05, ** Highly significant at p <0.01, ***Very highly significant at p < 0.001, NS= Not Significant**

The above table 8 explains the association between the posttest level of healing process of diabetic foot ulcer among patients with their clinical variables

In order to find out the association between the posttest level of healing process of diabetic foot ulcer with their selected socio demographic variables and clinical variables chi square analysis was done. The test revealed that, there was a statistically significant association between the posttest level of healing process of diabetic foot ulcer and Duration of diabetic foot ulcer less than 6 months **(χ^2=6.59), (p=0.03)** and Random blood sugar between 161- 200 mg/dl **(χ^2=7.76), (p=0.05).**

Association between the posttest level of healing process of diabetic foot ulcer and duration of diabetic foot ulcer

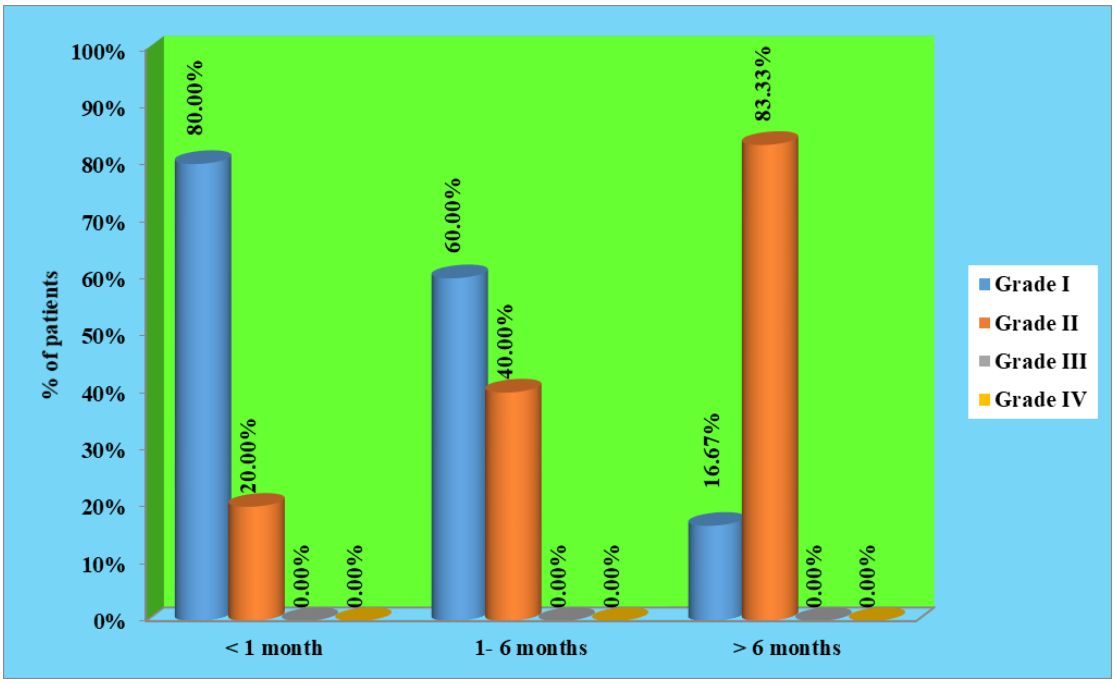


Figure: 24 cylindrical diagram depicts the association between the posttest level of healing process of diabetic foot ulcer and duration of diabetic foot ulcer

Chi square analysis revealed that, there was a statistically significant association between the posttest level of healing process of diabetic foot ulcer and the duration of diabetic foot ulcer less than 6 months **(χ^2=6.59), (p=0.03).** Whereas, duration greater than 1 month were not associated with the posttest level of healing process of diabetic foot ulcer.

Association between the posttest level of healing process of diabetic foot ulcer and random blood sugar

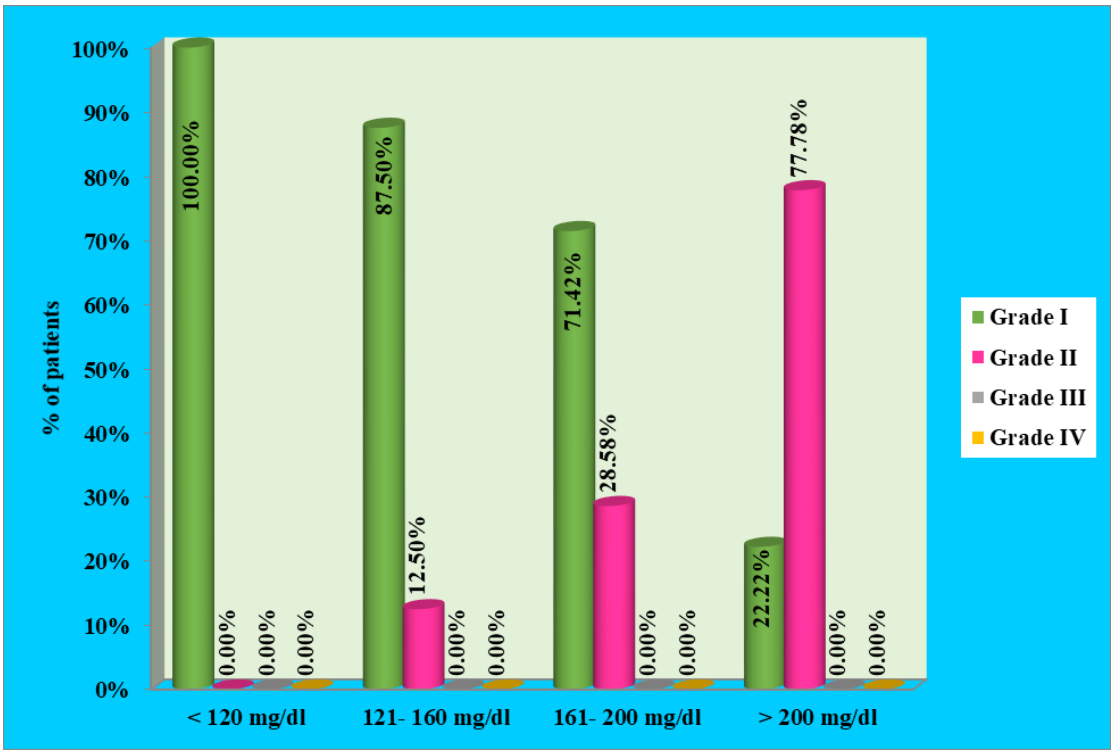


Figure: 25 cylindrical diagram explains the association between the posttest level of healing process of diabetic foot ulcer and random blood sugar

Chi square analysis revealed that, there was a statistically significant association between the posttest level of healing process of diabetic foot ulcer and random blood sugar between 161- 200 mg/dl **(χ^2=7.76), (p=0.05)**. Whereas, other blood sugar values were not associated with the posttest level of healing process of diabetic foot ulcer.

DISCUSSION

CHAPTER – V

DISCUSSION

This chapter deals to find meaningful answer to research questions, the collected data must be processed, analyzed in an order in coherent fashion, so that patterns and relationship can be discussed.

Based on the objectives of the study and hypotheses, this chapter deals with the detailed discussion of the results of the data interpreted from the statistical analysis. The purpose of the study was to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai.

Objectives of the study were,

- To assess the level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20.
- 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.
- 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 of the study were,

H_1: There is a statistically significant difference between the pretest and posttest level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20.

H_2: 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 socio demographic variables and clinical variables.

The findings of the study were discussed under the following headings

- Distribution of patients with diabetic foot ulcer according to their selected Socio demographic variables and Clinical variables
- Description of pretest level of healing process of diabetic foot ulcer among patients
- Effectiveness of citric acid dressing on healing process of diabetic foot ulcer among patients
- Association between the posttest level of healing process of diabetic foot ulcer among patients with their selected Socio demographic variables and Clinical variables

Diabetic foot ulcer is a major complication of diabetes mellitus and probably the major component of the diabetic foot. Foot ulcers are much feared complications of diabetes and recent studies have suggested that the risk of developing foot ulcer is as high as 25%. In India prevalence of foot ulcers in diabetes patients is 3% which is

lower compared with western population. The regional prevalence of diabetes varies from as low as 5.3% in Jharkhand to 10.4% in Tamil Nadu and 13.6% in Chandigarh.

Amputation in people with diabetes is 10 to 20 times more common than in people without diabetes and it is estimated that every 30 seconds a lower limb or part of a lower limb is lost somewhere in the world as a consequence of diabetes. In India, the age adjusted annual incidence of non traumatic lower limb amputations in persons with diabetes ranges from 2.1 to 13.7 per 1,000 persons. A study says that 40- 70 % of amputation in Tamil Nadu occurs due to diabetes. A prospective observational study was carried out in 120 patients who were admitted with diabetic foot infections in Government Rajaji Hospital, Madurai for a period of 18-month showed patients with age <50 -40%, went for amputation, 51 to 60- 34.3% went for amputation,61to 70- 20% went for amputation and > 70- 5.7% went for amputation.

The sample included 40 diabetic patients with foot ulcer.

5.1 Distribution of patients with diabetic foot ulcer according to their selected Socio demographic variables and Clinical variables

With respect to age, 18 (45%) were between 51-60 years and 32 (80%) were males.

With regards to religion, 35 (87.5%) were Hindus and 19 (47.5%) were hailed from rural area and 36 (90%) were non vegetarian.

When determining the educational status, 21 (52.5%) were studied up to primary education and 24 (60%) were had clerical/ shop keeper/ farmer.

When considering the monthly income, 24 (60.0%) were earned between Rs.5001- 10,000 and 40 (100%) were had type 2 diabetes mellitus.

When considering the duration of diabetes mellitus, 17 (42.5%) were had more than 5 years and 20 (50%) were had diabetic foot ulcer less than 1 month.

While mentioning the site of diabetic foot ulcer, 19 (47.5%) were had in foot and 23 (57.5%) were had insulin.

While comparing the co morbid conditions, 28 (70%) were had no co morbidities and 25 (62.5%) were had body mass index between 18.5- 24.9.

While determining the random blood sugar, 21 (52.5%) were between 161-200 mg/dl and 26 (65%) were had regular treatment.

Findings based on the objectives

The first objective was to assess the level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20.

Modified PEDIS classification and scoring system was used to assess the level of healing process of diabetic foot ulcer among diabetic patients. In the pretest, 36 (90%) were had Grade II diabetic foot ulcer.

The present study were supported by **Zhaoxin Zhang, et.al, (2015),** conducted a study on Wound bed preparation for ischemic diabetic foot ulcer with citric acid at People's Hospital of Xinjiang Uygur Autonomous Region, China. A total of 60 cases of patients with diabetic foot ulcer were randomly divided into the experimental group ($n = 30$) and the control group ($n = 30$). The wound bed preparation time of the experimental group was 14.37 ± 1.06 days ($t = 14.78$, $p < 0.0001$). The mean cure time of the experimental group was 32 ± 1.93 ($t = 12.521$, $p < 0.01$). There was statistically significant difference in the growth of granulation tissue between the experimental group and the control group ($p < 0.05$).

The second objective was 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.

In the pretest, 36 (90%) were had Grade II, in the posttest, 25 (62.5%) were had Grade I diabetic foot ulcer.

In the pretest, mean score was 5.05 with standard deviation of 0.93 whereas posttest, 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 revealed that, **(t=14.69), (p=0.001)**. There was a statistically significant difference between the pretest and posttest level of healing process of diabetic foot ulcer among patients.

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

The difference between the pretest and posttest 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.

The present findings were supported by **Kumari, M.J, Jeyagowri, Jagdish, S. (2017),** conducted a quasi experimental study on compare the effect of wound healing and cost of dressing solution between citric acid and conventional method of dressing among the patients with diabetic foot ulcer in tertiary hospital, Pondicherry. Using convenient sampling technique 120 patients with diabetic foot ulcer were recruited for the study. The researcher had chosen the first sixty patients

for conventional method of dressing after that next sixty patients allotted for 3% citric acid dressing. The significant 'p' value inferred that the difference in improvement in wound healing status among the patients in the citric acid dressing and conventional dressing groups after the intervention was statistically significant ($p<0.0001$).

Hence the stated hypothesis H_1: There is a statistically significant difference between the pretest and posttest level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20, was accepted and null hypothesis was rejected.

The third objective was 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.

There is a statistically significant association between the posttest level of healing process of diabetic foot ulcer among patients with their selected socio demographic variables and clinical variables. Chi square analysis revealed that, there was a statistically significant association between the posttest level of healing process of diabetic foot ulcer and Age between 51- 60 years, Male gender, Duration of diabetic foot ulcer less than 6 months and Random blood sugar between 161- 200 mg/dl**.**

Hence, the stated hypotheses H_2: 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 socio demographic variables and clinical variables, was accepted and null hypothesis was rejected.

SUMMARY, CONCLUSION, IMPLICATIONS & RECOMMENDATIONS

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

This chapter deals with the summary, conclusion and recommendation of the study further it includes implications for nursing practice, nursing education, nursing administration and nursing research.

6.1 Summary

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.

Objectives of the study were

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.

The following hypotheses were tested

H_1: There is a statistically significant difference between the pretest and posttest level of healing process of diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai-20.

H_2: 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 socio demographic variables and clinical variables.

The study assumption were

Patients have different levels of healing process of Diabetic foot ulcer.

Study finding were followed

A pre experimental one group pretest posttest design was used in this study. The conceptual framework of this study was based on Orlando's nursing process theory (1961). The study was conducted at Surgical ward at Government Rajaji Hospital, Madurai. The population of the study was patients with diabetic foot ulcer, selected by Non probability (Purposive) sampling technique. The study consists of 40 samples. After testing the validity and reliability of the tool, pilot study was conducted on 5 non study subjects at Government Rajaji Hospital to find out the feasibility and practicability. The main study was conducted from 18.03.2019 to 12.04.2019. Rapport established with patients with diabetic foot ulcer after a brief introduction about the study and its purpose. The informed oral and written consent was obtained from the patients after fully explaining the procedure of the study. On the first day data was collected and the researcher selected sample as per the inclusion

criteria using purposive sampling technique. Subjects selected for intervention and pretest was conducted by the researcher using Modified PEDIS classification and scoring system. Citric acid dressing was applied once a day for 5 consecutive days and post test was conducted on 6th day to assess the level of healing process of diabetic foot ulcer by using Modified PEDIS classification and scoring system. Data gathered and analyzed using both descriptive and inferential statistics.

The data collection tool consists of two parts

Section I: Socio Demographic variables and clinical variables

Section II: Modified PEDIS (Perfusion, Extent, Depth, Infection and Sensation) classification and scoring system

Scoring procedure

Modified PEDIS classification and scoring system was designed to assess the healing process of the diabetic foot ulcer. It consists of 5 items namely Perfusion, Extent, Depth, Infection and Sensation. Each item is scored on a scale of 0 to 3.

Collected data was analyzed by using descriptive statistics (Mean, Standard deviation, Mean score, Frequency and Percentage) and inferential statistics (Student paired 't' test and Chi square test) and results were analyzed.

6.2 Major findings of the study

The study findings are summarized as below,

The distribution of socio demographic and clinical variables of the study subjects showed that, 18 (45%) were had age 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 up to primary education, 24 (60%) were had clerical/ shop keeper/ farmer, 24 (60.0%) were earned between Rs.5001-10,000, 40 (100%) were had type 2 diabetes mellitus, 17 (42.5%) were had duration of diabetes mellitus more than 5 years, 20 (50%) were had less than 1 month of diabetic foot ulcer, 19 (47.5%) were had diabetic foot ulcer in foot, 23 (57.5%) were had insulin, 28 (70%) were had no co morbidities, 25 (62.5%) were had body mass index between 18.5- 24.9, 21 (52.5%) were between random blood sugar of 161-200 mg/dl and 26 (65%) were had regular treatment.

In pretest, 36 (90%) were had Grade II diabetic foot ulcer, in the posttest, 25 (62.5%) were 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.

6.3 Conclusion

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.

6.4 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

- The findings of the study proved the fact that citric acid can be used to improve the level of healing process of diabetic foot ulcer among patients.
- The study findings will help the nursing personnel to include Citric acid dressing as a nursing intervention in the management of diabetic foot ulcer.
- Nurses must be trained in the aspect of citric acid dressing and they should know the scientific principles involved in it to improve the level of healing process of diabetic foot ulcer among patients.
- Nurses are the key persons of the Health team, who play a major role in the health promotion and maintenance. The main focus of nursing practice is to reduce the morbidity and mortality rate to improve the quality of life. So nurses can intervene to other physical discomfort among patients with diabetic foot ulcer.

Implication for nursing education

- Nursing education motivate the nursing student to use Modified PEDIS classification and scoring system among patients with diabetic foot ulcer in surgical ward.
- Nursing personnel need to have enough knowledge, desirable attitude and skills about citric acid dressing and its benefits.
- These findings would help nursing faculty to give importance for citric acid dressing as a nursing intervention in the management of diabetic foot ulcer and motivate the nursing students to use this intervention in the management of these patients.

Implications for nursing administration

- 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 Modified Perfusion, Extend, Depth, Infection and Sensation (PEDIS) classification and scoring system.
- Administrator can encourage the nurses to assess the level of diabetic foot ulcer and make it as one of the assessment procedure.
- Administrator should guide the nurses to use standardized classification, grading and scoring system for diabetic foot ulcer.
- Nursing administrator can formulate protocols to incorporate the citric acid dressing as diabetic foot ulcer in surgical ward.
- 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 diabetic foot ulcer and update their knowledge about the various types of management for managing diabetic foot ulcer.
- 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

- This study also brings an idea for doing more studies at different settings which is culturally acceptable.
- The study would help to expand the scientific body of professional knowledge from which further research can be conducted.

- Nurse researcher should challenge to perform scientific work and take part in assessment, application and evaluation of level of healing process among patients with diabetic foot ulcer.
- 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.

6.5 Recommendations

Keeping in view the findings of the present study the following recommendations are made

- Similar kind of study can be conducted for a large sample size.
- The same study can be conducted among different age group.
- The study can be conducted in various settings.

REFERENCES

REFERENCES

Book Reference

1. Alice Augustine, (2004). *Clinical Nursing Procedure manual*. New Delhi. K.K. Mathew for B.I. publication Pvt. Ltd.,
2. Annammal Jacob, M.Sc., (N), et al (2009), *Clinical Nursing Procedures*: The art of nursing practice. (1st edition). New Delhi, Jay pee brothers, Medical publishers (P) Ltd.,
3. Barabara, K. Timby. (2007). *Introductory Medical – Surgical Nursing.* London: Lippincott Williams & Wilkins Publications.
4. Basavanthappa, B.T. (2008). *Nursing research*. (1nd edition). New Delhi: Jaypee Brothers Publications.
5. Basavanthappa, B.T. (2009). *Medical Surgical Nursing*. (2nd edition). New Delhi: Jaypee Brothers Publications.
6. Basavanthappa, B.T. (2009). *Nursing theories*. (2nd edition). New Delhi: Jaypee Brothers Publications.
7. Black, J.M., & Hawks, J.H. (2005). *Medical surgical nursing – clinical management for positive outcomes*. (7th edition). Missouri: Saunders Publication.
8. Brunner and Suddarth. (2010). *Text book of Medical Surgical Nursing.* (11th edition). New Delhi: Wolter Kluwer Publications.
9. Burns. N (2007). *Understanding Nursing Research.* (4th edition). Philadelphia: W.B Saunders Company.
10. Carol Taylor & Carol Lillis., Pricilla (2003). *Fundamentals of Nursing*. Wolters Kluwer Health New Delhi. Private Limited.

11. Christine Maskenwnshki. (1997). *Oncology Nursing. An essential guide for patient care*. Philadelphia: W.B. Saunders Company.
12. Denis, P.F. (2004). *Nursing research principles and methods*. (7th edition). Philadelphia: Lippincott Williams and Wilkins Publications.
13. Gupta, S.P. (2002). *Statistical methods*. (5th edition). New Delhi: Sultan Chand publications.
14. Joyce M Black. (2005). *Medical Surgical Nursing*. (7th edition). New Delhi: Red Elsevier publications.
15. Judith M.Wilkinson, (2008). *Karren Van Leuuen, Fundamentals of nursing*. (1st edition), Jay pee brothers, Medical Publishers.
16. Kothari, C.R. (2004). *Research Methodology: Methods & Techniques.* New Delhi: New Age International Publishers.
17. Kozier, Barbara, et.al., (2000). *Fundamentals of Nursing: Concepts, Process and practice* (6th edition). Upper Saddle River, NJ, Prentice Hall Health publishers.
18. Kumar and Clark. (2002). *Clinical Medicine*. (5th edition). W.B. U.K. Saunders Pvt Ltd.
19. Leonardi, D. (1998). *Mosby's comprehensive review of dental hygiene* (1st edition). London: Mosby.
20. Lewis. (2011). *Medical Surgical Nursing – Assessment and Management of clinical problems.* (9th edition). Missouri: Mosby publications.
21. Lippincott Williams and Wilkins. (2007). *Lippincott manual of nursing practice.* (8th edition). London: Lippincott Raven Publishers.
22. Liza Dougherty, *The royal Marsden hospital manual of clinical nursing procedure.* (5th edition) Black well science.

23. Long Phipps. (1993). *Medical Surgical Nursing*. (3rd edition). London: Mosby.
24. Mahajan, B.K. (1991). *Methods in Biostatistics*. New Delhi: Jaypee Brothers.
25. Marin, H. Kollef (2011). *The Wasington Manual of Critical Care*. New Delhi; Wolters Kluwaer publications.
26. Nichola, A. Boon (2006). *Davidson's Principles and Practice of Medicine*. New York: Churchill Livingstone.
27. Pareek Bharat & Sharma shivani. (2009). *A Text Book of Nursing Research and Statistics*. Jalandhar: S. Vikas & Co. Publishers.
28. Patricia. P (2005). *Basic nursing theory and practice* (5th edition). U.S.A: Mosby publications.
29. Peggy. L (1994). *Theory and Nursing*. (3rd edition). New Delhi: St. Louis publications.
30. Polit & Hungler. (1999). *Nursing Research: Principles and Methods.* Philadelphia: J.B. Lippincott Company.
31. Saraswati Swami Muktananda. (1999). *Asana, pranayama, Mudra, Banda. Revised edition. Bihar school of yoga munger.*
32. Sembulingam. K (2003). *Essentials of medical physiology*.)4th edition). New Delhi. Jaypee Brothers Publications.
33. Sundar Rao. P.S.S (1996). *An introduction to biostatistics*. (11th edition). Vellore: Orient Longman Publications.

Journal Reference

1. Boyko EJ, Ahoroni JH, Cohen V, et.al., (2006). Prediction of diabetic foot ulcer occurrence using commonly available clinical information. *Diabetes Care,* 29, 1202-1207.
2. Boyko EJ, Ahoroni JH, Stensel V, et.al., (1999). A prospective study of risk factors for diabetic foot ulcer. *The Seattle Diabetic Foot Study: Diabetes Care.* 22, 1036-1042.
3. Chandrashekar S., Suraj Muralidhar (2017). Prevalence of risk factors and presence of diabetic foot ulcers at Mysore Medical College and Research Institute, Mysuru, *International surgery journal*, 2349-3305.
4. Dr. Kumari, et.al., (2016). Effect of citric acid dressing on wound healing of diabetic foot ulcer at JIPMER, Pudhucherry, *International journal of developmental research*, 2230- 9926.
5. Edmonds ME, Blundell MP, Morris ME, et.al., (1986) Improved survival of the diabetic foot: the role of a specialized foot clinic. Q J Med 60, 763-771.
6. Faglia E, Favales F, Aldeghi A, et.al., (1998) Change in major amputation rate in a center dedicated to diabetic foot care during the 1980s: prognostic determinants for major amputation. J Diabetes Complications.12, 96-102.
7. Krishnaveni. R, (2016). Assess the of 3% citric acid dressing on diabetic foot ulcer in Rajiv Gandhi Government General Hospital, Chennai.
8. Kumari, M.j, Jeyagowri, Jagdish, S, (2017). Quasi experimental study on compare the effect of wound healing and cost of dressing solution between citric acid and conventional method of dressing, *International journal of current research*, p.55022-55026,

9. Leese GP, Nathwani D, Young MJ, et.al., (2009). Good practice guidance for the use of antibiotics in patients with diabetic Foot ulcers: *Diabetic foot Journal;* 12, 62-78

10. Leila Yazdanpanah, et.al., (2018). Incidence and Risk Factors of Diabetic Foot Ulcer, *International journal of endocrinology* 2018(39):1-9

11. Linda S. Geiss, Liping Pan, Besty Cadwell, Edward W. Gregg, Stephanie M. Benjamin, Michael MEngelgau. (2006). Changes in Incidence of Diabetes in U.S.

12. Maty SC, L ynch JW, Raghunathan TE, Kaplan GA. (2008) Childhood socioeconomic position, gender, adult body mass index and incidence of type 2 diabetes mellitus over 34 years in the Alameda country study: *American Journal of Public Health*. August: 98(8), 1486-1494

13. Ms. Lakhwinder kaur, Ms. Amanjit kaur, Ms. Amanjot kaur, Ms. Amardeep kaur, Ms. Gagandeep kaur (2008). Prevalence of obesity amoung adolescents*: Nightingale Nursing times.* February; Vol 3(11), 33 & 58.

14. Pengzi Zhang, et.al., (2016). Global epidemiology of diabetic foot ulceration, through searching PubMed, EMBASE, ISI Web of science, and Cochrane database, *Pubmed* 49(2):106-116

15. Rajendra G Malu, et.al., (2014). Topical use of citric acid for wound bed preparation at MIMSR Medical College, Latur, *International wound journal* 13:5

16. Raji. R, (2012). Effect of citric acid on diabetic foot ulcer among patients admitted in selected wards at Ramakrishna Hospital, Coimbatore

17. S. P. Vibha, et.al., (2018), Prevalence of diabetic foot syndrome at Udupi district, *BMC Endocrine disorders* 18:43

18. Sayeed MA, Mahtab H, Khanam PA, Latif ZA, Banu A, Khan AK. (2007). Prevalence of diabetes and impaired fasting glucose in urban population of Bangladesh: Bangladesh *Medical Research Council Bulletin*. April; 33(1), 1-12.
19. Supaksh Mahindru, et.al., (2017), Evaluation of effect of topical application of 3% citric acid on wound healing at Government Medical College, Amritsar, *International journal of current research in medical sciences,* Issue 8 -2017.
20. Tesfamichael G. Mariam, et.al., (2016), Prevalence of Diabetic Foot Ulcer and Associated Factors among Adult Diabetic Patients, *Journal of diabetes research* ID 2879249, 8 pages
21. V. U.Thool, et.al., (2014), Prospective study on Permeabilizer citric acid treatment for VISA infections at RTM Nagpur University, Nagpur, *International journal of current microbiology and applied sciences.* 177-183
22. Veves A, Marie HJ, Young MJ, Boulton AJM. (1992). The risk of foot ulceration in diabetic patients with high foot pressure: a prospective study. Diabetologia. 35, 660-663.
23. Vinod prabhu, et.al., (2014). Does wound pH modulation with 3% citric acid solution dressing help in wound healing at Bharati Vidyapeeth University, Sangli, Maharashtra, *Saudi surgical journal*, Page : 38-46
24. Young MJ, Mc Cardle JE, Randall LE, Barclay JI. (2008). Improved survival of diabetic foot ulcer patients 1995-2008: Possible impact of aggressive cardiovascular risk management: *Diabetes Care:* 31, 2143- 21437.
25. Zhaoxin Zhang, et.al., (2015). Wound bed preparation for ischemic diabetic foot ulcer with citric acid, *International journal of clinical and experimental medicine* 8(1): 897–903.

Net Reference

1. https://www.researchgate.net
2. https://www.bmcendocrdisord.biomedcentral.com
3. https://www.ijsurgery.com
4. https://www.ncbi.nlm.nih.gov
5. https://www.hindawi.com
6. https://www.ijcrimas.com
7. https://www.saudisurgj.org
8. https://www.sciencedirect.com
9. https://www.onlinelibrary.wiley.com
10. https://www.journalcra.com
11. http://www.diabeticfootulcer.wikipedia.com
12. URL: http://www.who.int.

APPENDICES

APPENDIX- I

ETHICAL COMMITTEE APPROVAL LETTER

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ETHICS COMMITTEE CERTIFICATE

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Course of Study	:	2017-2019
College	:	MADURAI MEDICAL COLLEGE
Research Topic	:	A study to assess the effectiveness of citric acid dressing on healing process of diabetic foot ulcer among patients admitted in Surgical Ward at Govt. Rajaji Hospital, Madurai
Ethical Committee as on	:	07.12.2018

The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.

Member Secretary Chairman Dean / Convenor

Prof Dr V Nagaraajan
M.D., MNAMS, D.M., Dsc.,(Neuro), Dsc (Hons)
CHAIRMAN
Madurai Medical College
Madurai

DEAN
Madurai Medical College
Madurai-20

10 DEC 2018

APPENDIX II

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY IN SURGICAL WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI.

LETTER SEEKING AND GRANTING PERMISSION TO CONDUCT STUDY IN SURGICAL WARD, GOVERNMENT RAJAJI HOSPITAL, MADURAI.

From

Abinaya.B,
II Year M.Sc Nursing
College of Nursing,
Madurai Medical College,
Madurai -20.

To

The Dean,
Madurai Medical College,
Madurai -20.

Through The proper channel

Respected Sir,

Sub: CON-MMC- Madurai- II year M.Sc (N) [Medical Surgical Nursing]-

Requesting permission to conduct the study - regarding.

As per curriculum recommended by the Indian nursing Council and The Tamil Nadu Dr.M.G.R. Medical University of M.Sc [Nursing] candidates are required to conduct a dissertation study for the partial fulfillment of the course in their respective departments.

I wish to conduct a study topic **on "A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical Ward at Government Rajaji, Hospital, Madurai"** for my dissertation.

Hence I kindly request you to consider my requisition and permit me to conduct the study in the Surgical Ward, Government Rajaji Hospital, Madurai.

Thanking you

Place: Madurai

Date: 13.11.2018

yours sincerely,

(ABINAYA.B)

Forwarded
S. Rajamani
13/11/18

Principal
COLLEGE OF NURSING
Madurai Medical College
Madurai-20.

Dean
Govt. Rajaji Hospital
Madurai-20.

LETTER SEEKING AND GRANTING PERMISSION TO CONDUCT STUDY IN SURGICAL WARD, GOVERNMENT RAJAJI HOSPITAL, MADURAI.

From

Abinaya.B,
II year M.Sc Nursing,
College of Nursing,
Madurai Medical College,
Madurai-20.

To

The Professor and Head of the Department,
Department of General Surgery,
Government Rajaji Hospital,
Madurai-20.

Through the proper channel

Respected Madam/ Sir,

Sub: CON-MMC-Madurai- II year M.Sc (N), [Medical Surgical Nursing]- Requesting permission to conduct the study- regarding.

As per curriculum recommended by the Indian nursing Council and The Tamil Nadu Dr.M.G.R. Medical University of the M.Sc [Nursing] candidates are required to conduct a dissertation study for the partial fulfillment of the course in their respective departments.

I wish to conduct a study topic on **"A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical Ward at Government Rajaji, Hospital, Madurai"** for my dissertation.

Hence, I humbly request you to consider my requisition and permit me to conduct study in Surgical Ward at Government Rajaji Hospital, Madurai.

Thanking you

Place: Madurai.

Date: 13.11.2018

Yours sincerely,

(ABINAYA.B)

Forwarded
13/11/18
Forwarded
S. Rajammal

Principal
COLLEGE OF NURSING
Madurai Medical College
Madurai-20.

Permitted

PROFESSOR AND HEAD
DEPARTMENT OF GENERAL SURGERY
MADURAI MEDICAL COLLEGE
GOVT. RAJAJI HOSPITAL
MADURAI

Dean
Govt. Rajaji Hospital
Madurai-20.

APPENDIX III

CERTIFICATE OF CONTENT VALIDITY

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A: Socio demographic variables and clinical variables

SECTION B: PEDIS (Perfusion, Extent, Depth, Infection, Sensation) Classification and scoring system

Prepared for the data collection by Abinaya.B, II Year M.Sc (N) student, College of Nursing, Madurai Medical College, Madurai who has undertaken the study field on thesis entitled **"A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai."** has been validated by me.

Signature

Name

Designation :

Name of the college :

PROFESSOR AND HEAD
DEPARTMENT OF GENERAL SURGERY
MADURAI MEDICAL COLLEGE /
GOVT. RAJAJI HOSPITAL
MADURAI

CONTENT VALIDITY CERTIFICATES

Content validity certificate

This is to certify the tool

SECTION A – Sociodemographic and clinical variables

SECTION B – PEDIS Classification and Scoring System

Prepared for data collection by Ms.Abinaya.B, II year M.Sc (N) Student, College of Nursing, Madurai Medical Collegr, Madurai -20, who has undertaken the study field on dissertation **"A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai".**

Has been validated by me.

Signature of the Expert

PROFESSOR AND HEAD
DEPARTMENT OF MEDICINE
MADURA E CAL COLLEGE
MADURAI-625 020.

Name :

Designation :

Date :

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A: Socio demographic variables and clinical variables

SECTION B: PEDIS (Perfusion, Extent, Depth, Infection, Sensation) Classification and scoring system

Prepared for the data collection by Abinaya.B, II Year M.Sc (N) student, College of Nursing, Madurai Medical College, Madurai who has undertaken the study field on thesis entitled **"A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai."** has been validated by me.

Signature : 15/12/19

Name : Jaya Shanthi

Designation : Principal

Name of the college : Meenakshi Coll, Kotlakudi

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A: Socio demographic variables and clinical variables

SECTION B: PEDIS (Perfusion, Extent, Depth, Infection, Sensation) Classification and scoring system

Prepared for the data collection by Abinaya.B, II Year M.Sc (N) student, College of Nursing, Madurai Medical College, Madurai who has undertaken the study field on thesis entitled **"A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai."** has been validated by me.

Signature : PRINCIPAL RASS ACADEMY COLLEGE OF NURSING Poovanthi-630 611.

Name : Prof. H. Ummul Hapipa

Designation : Principal.

Name of the college : RASS Academy college of Nsg. Poovanthi. Sivagangai Dt.

CERTIFICATE OF VALIDATION

This is to certify that the tool

SECTION A: Socio demographic variables and clinical variables

SECTION B: PEDIS (Perfusion, Extent, Depth, Infection, Sensation) Classification and scoring system

Prepared for the data collection by Abinaya.B, II Year M.Sc (N) student, College of Nursing, Madurai Medical College, Madurai who has undertaken the study field on thesis entitled **"A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai."** has been validated by me.

Signature :

Name : M. Visalakeli

Designation : Professor

Name of the college : Rass Academy College of Nursing Pasuvanthanai

APPENDIX IV

CONSENT FORM

NAME:

DATE:

I have been well explained about the citric acid dressing on diabetic foot ulcer wound healing. The uses and the complications have been clearly explained to me. Hereby I agree to participant in this study if any complications arises the doctors, nurses and the management is not responsible for that. I have given full freedom to leave the study at any time and I am assured by the researcher that my information will be confidential.

Signature of the participants

முறையான அனுமதி படிவம்

பெயர் :

தேதி :

எனக்கு சிட்ரிக் அமிலம் பயன்படுத்தி நீரிழிவு நோயினால் உருவாகும் கால்புண் ஆற்றும் சிகிச்சை முறை பற்றி நன்கு விளக்கப்பட்டது. பயன்கள் மற்றும் விளைவுகள் பற்றி தெளிவாக விளக்கினர். ஏந்தவித சிக்கலுக்கும் மருத்துவர்கள், செவிலியர்கள் மற்றும் மருத்துவ மேலாண்மை என்றும் பொறுப்பேற்காது என்பதை உணர்ந்து ஆய்வில் பங்கேற்கிறேன். நான் எப்போது வேண்டுமானாலும் இந்த ஆய்வைவிட்டு பின்வாங்கலாம் என்றும் மேலும் எனது தகவல்கள் ரகசியமாக வைக்கப்படும் என்றும் மறுபார்வை செய்வதன் மூலம் எனக்கு உறுதி அளிக்கப்படுகிறது.

கையொப்பம்

APPENDIX V

RESEARCH TOOL- ENGLISH

SOCIODEMOGRAPHIC DATA

SECTION A

1. Age
   a) < 30 years
   b) 31-40 years
   c) 41-50 years
   d) 51- 60 years
   e) > 60 years

2. Gender
   a) Male
   b) Female

3. Religion
   a) Hindu
   b) Christian
   c) Muslim

4. Area of residence
   a) Urban
   b) Sub-urban
   c) Rural

5. Dietary pattern
   a) Vegetarian
   b) Non vegetarian

6. Educational status
    a) No formal education
    b) Primary education
    c) Higher Secondary school
    d) Graduate

7. Type of Occupation
    a) Profession
    b) Clerical/ shop keeper/ farmer
    c) Unskilled worker
    d) unemployed

8. Monthly Income
    a) < Rs.5000
    b) Rs. 5001-10,000
    c) Rs.10,001-15,000
    d) > Rs.15,000

CLINICAL VARIABLES

1. Type of Diabetes
   a) Type 1 Diabetes
   b) Type 2 Diabetes

2. Duration of Diabetes Mellitus
   a) < 1 year
   b) 1-3 years
   c) 3-5 years
   d) > 5 years

3. Duration of Diabetic foot ulcer
   a) < 1 month
   b) 1- 6 months
   c) > 6 months

4. Site of Diabetic foot ulcer
   a) Big toe ulcer
   b) Plantar surface of the foot
   c) Dorsal surface of the foot
   d) Foot

5. Type of Anti-Diabetic Drug
   a) Oral hypoglycemic agents
   b) Insulin
   c) Insulin and Oral hypoglycemic agents

6. Co-morbid conditions
   a) Hypertension
   b) Coronary artery disease
   c) Renal impairment
   d) Neurological disorder
   e) None of the above

7. Body mass index
    a) < 18.5
    b) 18.5-24.9
    c) 25-29.9
    d) > 30

8. Random blood sugar level
    a) < 120 mg/dl
    b) 121- 160 mg/dl
    c) 161- 200 mg/dl
    d) > 200 mg/dl

9. Adherence to treatment
    a) Regular treatment
    b) Irregular treatment

SECTION B

Modified PEDIS classification and scoring system

Hospital Register Number:

Sample No:

Age/ Gender:

S.NO	COMPONENTS	0	1	2	3
1	**Perfusion**				
	No symptoms/ signs of Peripheral Arterial Disease				
	Symptoms or signs of PAD, but not Critical Limb Ischemia				
	Critical Limb Ischemia				
2	**Extent**				
	Skin intact				
	< 1cm^2				
	1-3 cm^2				
	> 3cm^2				
3	**Depth**				
	Skin intact				
	Superficial				
	Fascia, Muscle, Tendon				
	Bone or Joint				
4	**Infection**				
	No symptoms/ signs				
	Inflammation of skin/ subcutaneous only				
	Extensive erythema deeper than skin/ Sc				
	Systemic Inflammatory Response Syndrome(SIRS)				
5	**Sensation**				
	No loss of protective sensation				
	Loss of protective sensation				
	TOTAL				

Scoring interpretations

1-3= GRADE I

4-6= GRDE II

7-9= GRADE III

10-12= GRADE IV

APPENDIX VI

RESEARCH TOOL- TAMIL

ஆராய்ச்சி கருவி – தமிழ்

சமூக ஜனத்தொகை மாதிரிகள்

பிரிவு – அ

பெயர்: **தேதி:**

வார்டு: **மாதிரி எண்:**

1. **வயது (ஆண்டுகளில்)**
   - அ) 30க்கும் குறைவாக
   - ஆ) 31-40 வயது
   - இ) 41-50 வயது
   - ஈ) 51-60 வயது
   - உ) 60க்கும் அதிகமான

2. **பாலினம்**
   - அ) ஆண்
   - ஆ) பெண்

3. **மதம்**
   - அ) இந்து மதம்
   - ஆ) கிறிஸ்துவர்
   - இ) முஸ்லீம்

4. **குடியிருப்பு பகுதி**
   - அ) நகரம்
   - ஆ) சப் - நகர்புறம்
   - இ) கிராமம்

5. **உணவு வகை**
   - அ) சைவம்
   - ஆ) அசைவ உணவு

6. கல்வித் தகுதி

அ) முறையான கல்வியின்மை

ஆ) ஆரம்பக்கல்வி

இ) உயர்நிலைக் கல்வி

ஈ) பட்டதாரி

7. தொழில்

அ) தொழிற்சார்ந்த வேலை

ஆ) பயிற்சித் திறமையற்ற தொழிலாளி

இ) எழுத்தர் பணி / கடை முதலாளி / விவசாயி

ஈ) வேலையில்லாதவர்

8. மாத வருமானம்

அ) ரூ.5000க்கும் குறைவாக

ஆ) ரூ.5001 - ரூ. 10000

இ) ரூ.10001 - ரூ. 15000

ஈ) ரூ. 15000க்கும் அதிகமாக

மருத்துவ மாதிரிகள்

1. நீரிழிவு நோயின் நிலை

அ) முதல் நிலை நீரிழிவு நோய்

ஆ) இரண்டாம் நீரிழிவு நோய்

2. நீரிழிவு நோய் கால அளவு

அ) 1 வருடத்திற்கும் குறைவாக

ஆ) 1-3 வருடங்கள்

இ) 3-5 வருடங்கள்

ஈ) 5 வருடத்திற்கும் அதிகமாக

3. நீரிழிவு கால்புண் காலஅளவு

அ) 1 மாதத்திற்கும் குறைவாக

ஆ) 1-6 மாதங்கள்

இ) 6 மாதத்திற்கும் அதிகமாக

4. நீரிழிவு நோய் கால்புண் பகுதி

அ) பாதத்தின் பெருவிரல்

ஆ) பாதத்தின் அடிபகுதி

இ) பாதத்தின் மேல் பகுதி

5. நீரிழிவு நோய் மருந்து வகை

அ) நீரிழிவு நோய் மாத்திரைகள்

ஆ) இன்சுலின்

இ) இன்சுலின் மற்றும் நீரிழிவு நோய் மாத்திரைகள்

6. நீரிழிவு நோயின் உடன் இணைந்த உபாதைகள்

அ) உயர் இரத்த அழுத்தம்

ஆ) இருதய இரத்தக் குழாய் நோய்

இ) சிறுநீரக பிரச்சனை

ஈ) நரம்பியல் பிரச்சனை

7. உடல் நிறை குறையீட்டெண்

அ) 18.5க்கும் குறைவாக

ஆ) 18.5-24.9

இ) 25-29.9

ஈ) 30க்கும் அதிகமாக

8. சீரற்ற இரத்த சர்க்கரை அளவு

அ) 120 மி.கி. டெலி க்கும் குறைவாக

ஆ) 121 – 160 மி.கி. டெலி

இ) 161 – 200 மி.கி. டெலி

ஈ) 200 மி.கி. 1 டெலிக்கும் அதிகமாக

9. சிகிச்சை பின்பற்றும் முறை

அ) முறையான சிகிச்சை முறை

ஆ) முறையற்ற சிகிச்சை முறை

APPENDIX VII

ENGLISH EDITING CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the dissertation by Ms.Abinaya.B, II Year M.Sc Nursing student, college of nursing, Madurai medical college, Madurai-20. "A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai" has been edited for English language appropriateness.

SIGNATURE :

NAME : F. AMALORPAVAMARY

DESIGNATION: தலைமை ஆசிரியர்

INSTITUTION: அர. ஒ. தொ. பள்ளி
கோசாரிப்பட்டி.
கள்ளந்தேரி (Po.)
மதுடஞ்சாவடி ஒன்றியம்
சேலம் மாவட்டம்-637 102

APPENDIX VIII

TAMIL EDITING CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that the dissertation by Ms.Abinaya.B, II Year M.Sc Nursing student, college of nursing, Madurai medical college, Madurai-20. "A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai" has been edited for Tamil language appropriateness.

SIGNATURE : 15-3-19

NAME : P. TAMILARASAN

DESIGNATION:

தலைமை ஆசிரியர்
ஊ.ஒ.தொ. பள்ளி
கன்னந்தேரி, மகுடஞ்சாவடி ஒன்றியம்
சங்கரி வட்டம்,
சேலம் மாவட்டம் - 637 102.

INSTITUTION:

APPENDIX IX

PLAGIARISM CERTIFICATE

This is to certify that this dissertation titled, **"EFFECTIVENESS OF CITRIC ACID DRESSING ON HEALING PROCESS OF DIABETIC FOOT ULCER AMONG PATIENTS ADMITTED IN SURGICAL WARD AT GOVERNMENT RAJAJI HOSPITAL, MADURAI"** of the candidate **Ms. ABINAYA.B** with registration number **301712101** for the award of **MASTER OF SCIENCE IN NURSING** in the branch of **Branch I, Medical Surgical Nursing.** I personally verified iThenticate website for the purpose of plagiarism check. I found that the uploaded thesis file contains from Introduction to Conclusion pages and the results shows **8** percentage of plagiarism in the dissertation.

Name and Signature of the Guide **Name and Signature of the Principal**

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Phone: +1-510-764-7610

iThenticate Plagiarism Detection Software

CERTIFICATE

This is to certify that the manuscript submitted by **ABINAYA.B, College of Nursing - Madurai Medical College** with the following details has been processed using iThenticate Software and it is acceptable for submission as a thesis/ dissertation.

Reference No: 2177

Title: "A study to assess the effectiveness of Citric acid dressing on Healing process of Diabetic foot ulcer among patients admitted in Surgical ward at Government Rajaji Hospital, Madurai".

Abinayathesis.docx

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14,174 words - 17 matches – 25 sources

Similarity Index	**8%**

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APPENDIX X

CITRIC ACID DRESSING PROCEDURE

Citric acid dressing

Citric acid dressing is the nursing intervention using aseptic technique for the purpose of promoting healing process of the wound. Dressing is done by cleaning the wound with normal saline solution followed by placing sterile gauze soaked in citric acid solution on diabetic foot ulcer and apply simple gauze dressing over the wound for once a day.

Objectives

- To remove and dispose off soiled dressing to prevent spread of infection.
- To cleanse the area around the wound to prevent additional infections.
- To cleanse the wound area of pus and infection.
- To apply sterile dressing to promote healing process.
- To promote wound granulation.
- To promote thermal insulation to the wound surface.
- To provide and maintain high humidity between the wound and dressing
- To promote physical, psychological and esthetic comfort.

Principles

- Everything that comes in contact with the wound must be sterilized in the most effective way.
- Hand must be thoroughly washed when handling equipments before dressing the wound.
- When cleaning the wound, clean from the least contaminated area to the most contaminated area.

Articles

S.NO	ARTICLES	RATIONALE
A STERILE TRAY CONTAINING		
1	Gauze piece	To clean the diabetic foot ulcer
2	Sterile bowl	To keep the diabetic foot ulcer To pour 3% citric acid solution
3	K basin	To receive the waste
4	Artery forceps	To hold the gauze piece by cleaning the wound
5	Non toothed thumb forceps	To squeeze the excess amount of solution
6	Gamgee pad	To cover the wound after 3% citric acid soaked gauze
7	Sterile roller bandage	To secure the citric acid dressing and to prove compression over the wound
A CLAEN TRAY CONTAINING		
8	3& Citric acid solution	To apply dressing over the wound
9	0.9% Normal saline	To clean the wound
10	Adhesive or non allergic tape	To secure the dressing
11	Scissors	To cut the roller bandage and gauze piece
12	Sterile gloves (1 pair)	To prevent infection
13	Clean gloves	To remove the soiled dressing
14	Paper bag	To receive the waste
15	towel	To prevent soiling of the patient's clothing and linen
16	mackintosh	To prevent soiling of the patient's clothing and linen
17	Kidney tray	To receive the waste
18	Cheatle forceps	To take the sterile articles

Preliminary assessment

- ❖ Level of consciousness and ability to follow the instructions
- ❖ Vital signs
- ❖ Bleeding and drainage from the wound site.
- ❖ Condition of the wound.

Patient and unit preparation

- Check whether unit cleanliness is completed.
- Explain the procedure to the patient and his/ her family members.
- Arrange the necessary articles near the bedside.
- Adjust the working area lie adequate lighting, switch off the fan and make surrounding space as convenient to work.
- Provide privacy to the patient to feel comfortable.

Procedure

S.NO	NURSING ACTION	RATIONALE
1	Explain the procedure to the patient and his/her family members	To win confidence and cooperation during dressing
2	Provide privacy to the patient	Comfortable to the patient
3	Position the patient	To provide comfort
4	Arrange the articles near the bedside an instruct them not to touch the sterile field and dressings.	To prevent contamination of the sterile field
5	Wash the hands	To prevent transmission of infection
6	Wear the clean gloves	To prevent contamination
7	Remove the soiled dressing and properly dispose to the kidney tray	To provide dressing
8	Open the sterile dressings transfer gauze piece into the sterile dressing tray	Preparing for dressing
9	Place the mackintosh and towel	To prevent soiling of patient clothing and linen

10	Perform surgical hand washing	To prevent soiling of patient clothing and linen
11	Wear sterile gloves	To prevent contamination
12	Flip open the dressing cover by inserting in the inner layer of the wrapper	To make ready for dressing
13	Using the thumb forceps to pick up gauze and wet it with 0.9% normal saline	To cleanse the wound
14	Use artery forceps to clamp and thumb forceps to squeeze the gauze	Prevent spoiling and spillage of solution
15	Clean the diabetic foot ulcer with 0.9% normal saline using the same artery clamp, remove gauze and dispose in the paper bag	To remove the debris and dead tissue from the foot ulcer
16	Before cleaning, observe the character and nature of the foot ulcer.	To assess the characteristics of diabetic foot ulcer
17	Use only thumb forceps to pick up the gauze piece	To prevent contamination of sterile field
18	Pick up the gauze piece every time in thumb forceps and clean the foot ulcer wit 0.9% normal saline from less contaminated area to more contaminated area.	To prevent cross contamination
19	Use only one gauze piece for single stroke	To prevent infection
20	Ensure that the foot ulcer id thoroughly cleaned	To maintain cleanliness of the wound
21	Finally, clean the skin approximately to the wound edge with stroke away from foot ulcer.	To prevent transmission of infection
22	Soak the sterile gauze with 3% citric acid solution in a bowl.	To apply 3% citric acid dressing
23	Apply the 3% citric acid gauze on the diabetic foot ulcer once a day	To prevent the microbial growth and to improve the healing process

24	Apply gauze pad over the citric acid dressing and put roller bandage over the foot ulcer	To secure the citric acid dressing
25	Discard the used disposable articles	To prevent the infection
26	Secure the dressing with adhesive tapes	To keep the dressing in position
27	Position the patient in comfortable position	To promote comfort to the patient
28	Replace all the articles after proper discarding of waste	To prevent transmission of micro organisms
29	Document the date, time, type of solution used and nature of the wound.	For further reference

APPENDIX XI

PHOTOGRAPHS

RESEARCHER CLEANING THE DIABETIC FOOT ULCER

RESEARCHER APPLYING DRESSING