

A Study To Assess The Effectiveness Of Topical Insulin Dressing On Diabetic Foot Ulcer Among The Clients In Selected Wards At Marwari Hospitals, Guwahati, Assam.

Maishnam Sanathoi Devi¹ Himadri Kalita²

Assistant Professor, Apollo College Of Nursing, Guwahati, Assam, India¹

Associate Professor, Apollo College Of Nursing, Guwahati, Assam, India²

Abstract:

The study aims to assess the effectiveness of topical insulin among the clients. The assessment was done by quasi-experimental one group pre-test post-test design. Simple random sampling (lottery method) technique was used to assess the effectiveness of 30 samples in Marwari Hospitals, Guwahati, Assam. The data was collected by using demographic performa and Bates Jensen Wound Assessment Tool to assess the demographic data and effectiveness of topical insulin. The result shows that experimental group mean is 48.96 and SD is 3.24. The control group mean is 28.1 and SD is 4.76. It reveals that the effectiveness of topical insulin dressing on diabetic foot ulcer assessed with the help of paired t-test. The “t” calculated value is 5.20 and is greater than the “t” table value that is 2.05 at $P < 0.05$ level of significance. It denotes that topical insulin dressing is effective to improve the healing level of diabetic foot ulcer. There was a significant association of selected variables with post healing level of diabetic foot ulcer.

Keywords: Effectiveness, diabetic foot ulcer, topical insulin dressing

Date of Submission: 03-02-2024

Date of acceptance: 13-02-2024

I. INTRODUCTION

Chronic or non-healing wounds take an immense toll on health and health care systems. It particularly affects millions of clients with impaired mobility, as well as those with diabetes. Diabetic foot ulcers are sores on the foot that occur in 15% of diabetic clients, sometime during their lifetime.

Basit et al., (2007) reports that diabetic ulcers are caused by neuropathic and vascular complications of disease. Nerve damage due to diabetic causes altered or complete loss of sensation in the foot or leg, called as peripheral neuropathy. Pressure from shoes, unfitted foot wear, cuts, bruises or any injury to the foot may go unnoticed. The loss of perception leads to ischemia, necrosis, and gangrenous formation and ultimately leads to amputation.

Vascular disease is also a major problem in diabetes and especially affects very small blood vessels feeding the skin. The impaired blood flow may lead to ulceration. Tissue around ulcer may become black due to impaired blood flow to the foot. In severe cases partial or complete gangrene may occur. Management of diabetic ulcer primarily aimed at preventing them.

The strategies for prevention of diabetic foot ulcer includes, Optimising diabetes control to reduce neuropathic and vascular complications, diabetic foot care; which includes vigilant assessment of skin of both foot, regular skin care, and nail care and comfortable foot wear. Vascular or ischemic ulcer should be evaluated to determine extent of damage and whether surgery is necessary; in severe cases this may entail partial amputation of the limb. Whatever the cause of ulcer, the dead tissue should be debrided and wound dressings should apply to ensure a moist environment.

Researchers at the University of California, Riverside (2009) states that insulin is a hormone known primarily for regulating sugar levels in the blood, yet recently found that applying insulin directly to skin wounds significantly enhances the healing process. Using various cell and molecular techniques, insulin stimulates human keratinocytes in culture to proliferate and migrate. In cultured human micro vascular endothelial cells, the insulin stimulates only migration into the wound tissue. The insulin works by switching on cellular signalling proteins called kinases and a protein (SREBP) that binds elements in DNA that regulate the production of cholesterol and its relatives.

STATEMENT OF THE PROBLEM:

“A study to assess the effectiveness of topical insulin dressing on diabetic foot ulcer among the clients in selected wards at Marwari Hospitals, Guwahati, Assam.”

OBJECTIVES:

- 1) To assess the healing level of diabetic foot ulcer among clients.
- 2) To evaluate the effectiveness of topical insulin dressing by comparing pre and post healing level of diabetic foot ulcer among clients.
- 3) To determine the association between the selected demographic variables with post healing level of diabetic foot ulceramong clients.

HYPOTHESIS:

H1: There is statistically significant difference on healing level of diabetic foot ulcer after topical insulin dressing among the clients.

H2: There is a significant association between the selected demographic variables with post healing level of diabetic foot ulceramong clients.

II. METHODOLOGY

Research approach: quantitative research approach.

Research design: quasi experimental one group pre-test post-test group design.

The graphical presentation of the study is;

O₁ x O₂

O₁: assessment of the healing level of diabetic foot ulcer before application of topical insulin dressing among clients.

X: an application of topical insulin dressing on the diabetic ulcer to hasten the healing among the clients.

O₂: assessment of the healing level of diabetic foot ulcer after application of the topical insulin dressing among the clients.

Setting of study: the study conducted in surgical wards (male and female) and private cabinat marwari hospitals.

Variables:

independent variable:topical insulin dressing.

Dependent variable: diabetic foot ulcer.

Population: the clients with diabetic foot ulcers.

Sample: the clients with diabetic foot ulcers admitted in surgical wards and private cabin in marwari hospitals, guwahati, assam.

Sampling technique: non-probability simple random sampling technique (lottery method).

Sample size: 30 diabetic foot ulcers clients.

Criteria for sample selection:

Inclusive criteria:

1. The clients with diabetic foot ulcer who are admitted in the surgical wards and private cabin in marwari hospitals, guwahati, assam.
2. The clients whose age is between 35 to 65 years.
3. The study includes both male and female clients.
4. The diabetic foot ulcer clients who is willing to participate in the study.

Exclusive criteria:

1. The clients who are having terminal or critical illness.
2. The clients with diabetic foot ulcer who are admittedother than in the surgical wards and private cabin in marwari hospitals, guwahati, assam.
3. The clients who are not willing to participate in the study.

METHODS OF DATA COLLECTION AND ANALYSIS

DESCRIPTION OF THE TOOL:

Standardized rating scale. i.e., Bates Jensen Wound assessment tool was used to assess the effectiveness of the topical insulin dressing on wound healing.

The tool is divided into two parts.

TOOLS	COMPONENTS
Part I- Demographic data	Age, sex, education, occupation, income per month, duration of diabetes, practice of foot care and medication follow up.
Part II- Bates Jensen Wound assessment tool.	Wound size, depth, edges, undermining, necrotic tissue type, necrotic tissue amount, exudates type, exudates amount, skin colour surrounding wound, peripheral tissue oedema, peripheral tissue exudation, granulation tissue, and epithelialization.

The score has been calculated as follows:
 Good wound healing : 13-26
 Moderate wound healing : 27-40
 Mild wound healing : 41-54
 Poor wound healing : 55-65

DATA ANALYSIS AND STATISTICAL METHODS USED:

After scoring pre-test and post-test, the results were tabulated; the statistical methods used for analysis were mean, standard deviation, paired “t” test and chi-square test.

Sl.NO:	DATA ANALYSIS	METHOD	REMARKS
1.	Descriptive statistics	- Frequency, percentage, mean and standard deviation	<ul style="list-style-type: none"> • Distribution of demographic variables. • To assess the pre-test and post-test level of healing of diabetic foot ulcer among clients.
2.	Inferential statistics	- Paired “t” test	<ul style="list-style-type: none"> • To evaluate the effectiveness of topical insulin dressing on diabetic foot ulcer.
		- Chi-square test	<ul style="list-style-type: none"> • To find out association between demographic variables and post healing level of diabetic foot ulcer.

III. RESULT

The data obtained were classified mainly in to 4 sections.

Section I: Distribution of demographic variables among clients with diabetic foot ulcer.

Section II: Assessment of healing level of diabetic foot ulcer among clients.

Section III: Comparison of pre-test and post-test healing level of diabetic foot ulcer among clients.

Section IV: Association of demographic variables and post-test score of healing level of diabetic foot ulcer among clients.

SECTION – I

**TABLE - 1
 FREQUENCY AND PERCENTAGE DISTRIBUTION OF THE DEMOGRAPHIC VARIABLES.**

Sl. No.	Demographic variables	Frequency	Percentage
1	Age		
	35-45yrs	7	23.33%
	46-55yrs	11	36.67%
	56-65yrs	12	40%
2	Sex		
	Female	12	40%
	Male	18	60%
3	Education		
	Collegiate study	0	0%
	Highersecondary school	4	13.33%
	Secondary school	8	26.67%
	Primary school	12	40%
4	Illiterates	6	20%
	Occupation		
	Coolie	7	23.33%
	Daily wage	5	16.67%
	Employee	9	30%
5	Unemployed	9	30%
	Income per month		
	Nil	1	3%
	Rs<2000	7	23%
	Rs 2001-4000	3	10%
6	Rs 4001-6000	10	34%
	Rs>6001	9	30%
	Duration of diabetes		
	< 5yrs	6	20%
	5-10 yrs	16	16%
7	11-15 yrs	4	4%
	16-20 yrs	3	3%
	>21yrs.	1	1%
	Practiceof foot care		
Regular	0	0%	
Sometimes	18	60%	
Rare	12	40%	

8	Medication follow up		
	Regular	13	43.33%
	Irregular	17	56.67%

Table-1: It explains that, out of 30 clients, 40% (12)of clients with diabetic foot ulcer belongs to 56-65 yrs,36.67% (11) belongs to 46-55 yrs and 23.33% (7) are belongs to 35-45 yrs.60% (18) of clients are males, and 40%(12) are females. Educationally most of the clients belongs to primary school (40%), 26.67% (8) belongs to secondary school, 13.33%(4) higher secondary school and 20% (6) of clients are belongs to illiterates.23.33% (7)of the clients income per month is >2000 Rs, 10%(3) are having monthly income between Rs 2001-4000, 33.33%(10) are having income between Rs 4001-6000 and 3.33%(1) clients are having monthly income Rs>6001. The duration of diabetes of 20%(6) clients are < 5yrs, 53.33%(16) clients are having from 5-10 yrs, 13.33%(4) from 11-15 yrs,10%(3) of them with diabetes from 16-20 yrs and 3.33%(1) from >21yrs.60%(18) of the clients are doing foot care sometimes and 40%(12) are doing it rarely.43.33%(13) of the clients are taking medications regularly and 56.67%(17) of them are taking irregularly.

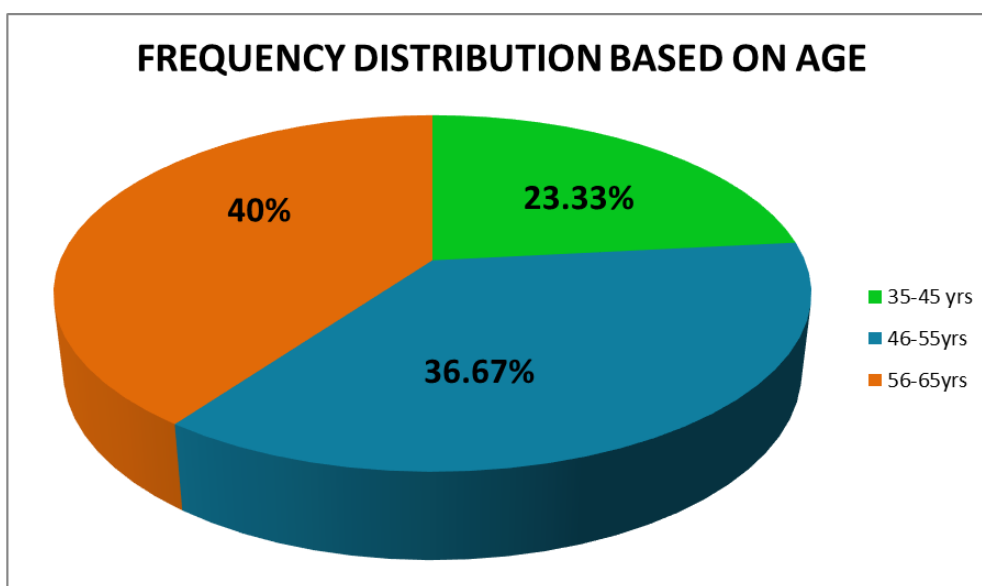


Figure 1: Frequency and Percentage distribution of age among clients with diabetic foot ulcer.

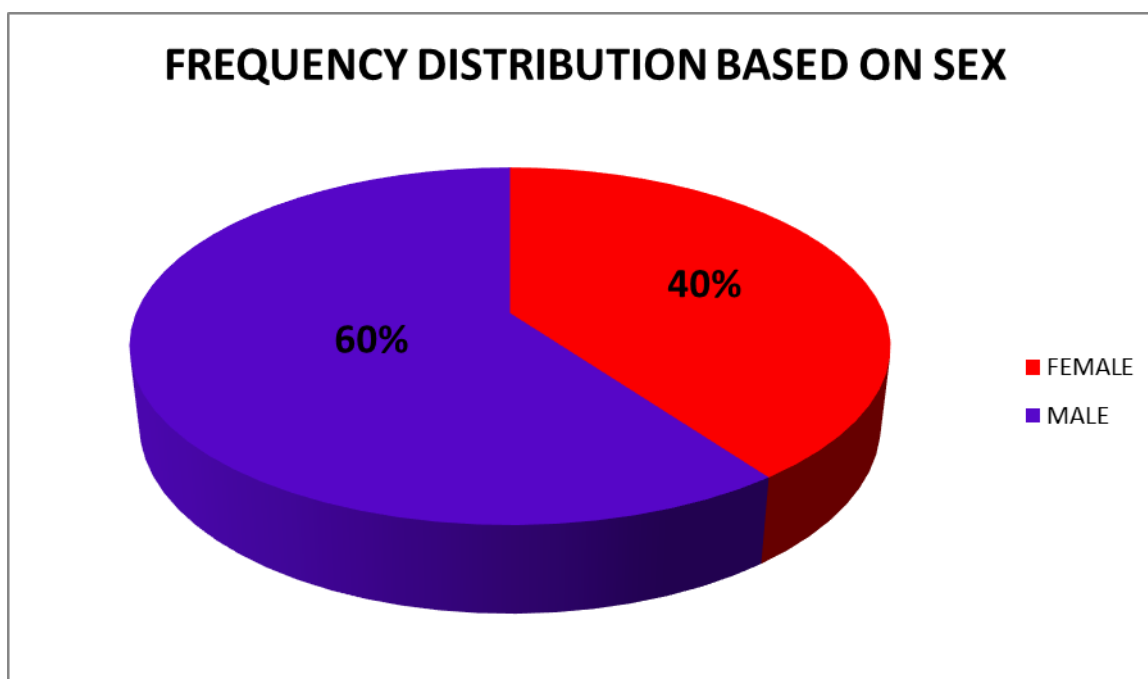


Figure 2: Frequency and Percentage distribution of sex among clients with diabetic foot ulcer.

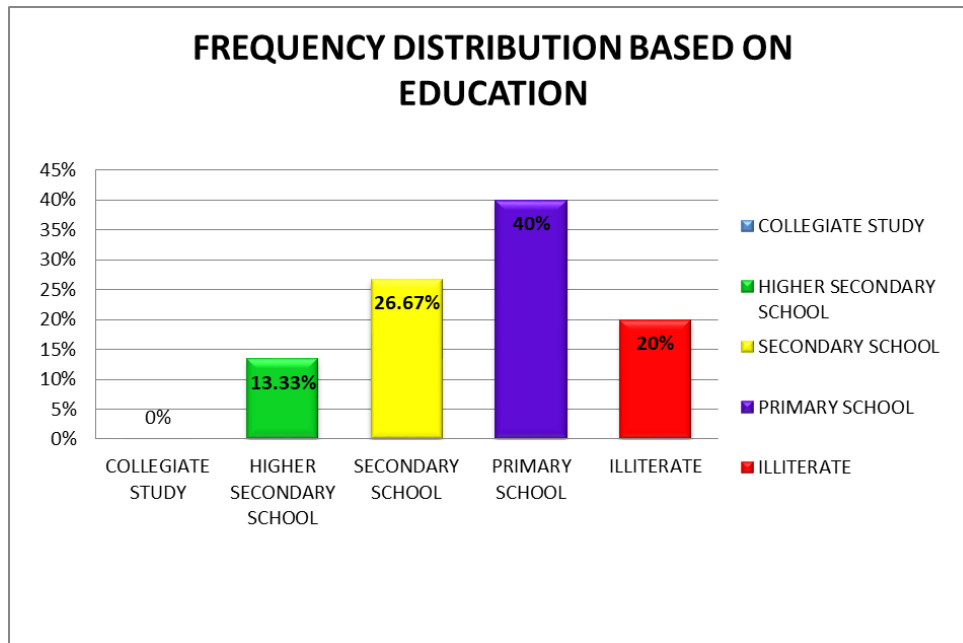


Figure 3: Frequency and Percentage distribution of education among clients with diabetic foot ulcer.

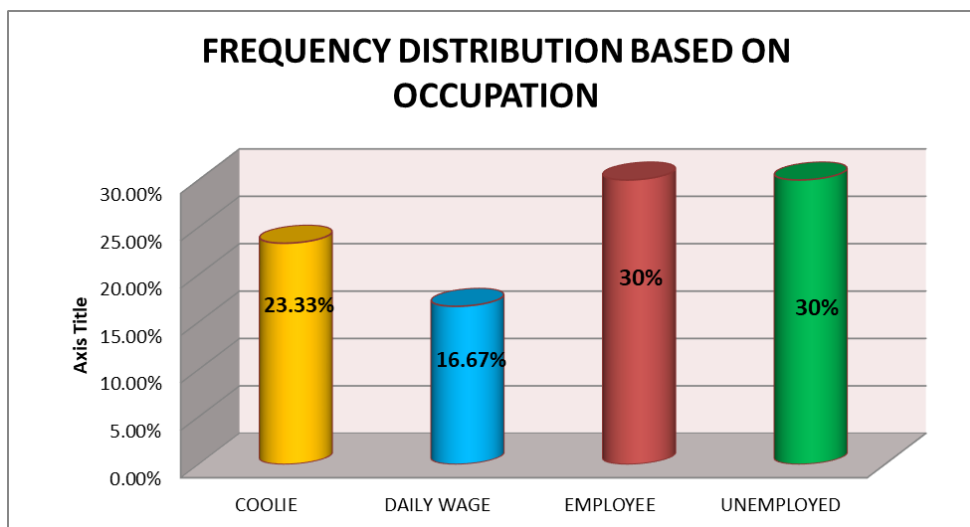


Figure 4: Frequency and Percentage distribution of occupation among clients with diabetic foot ulcer.

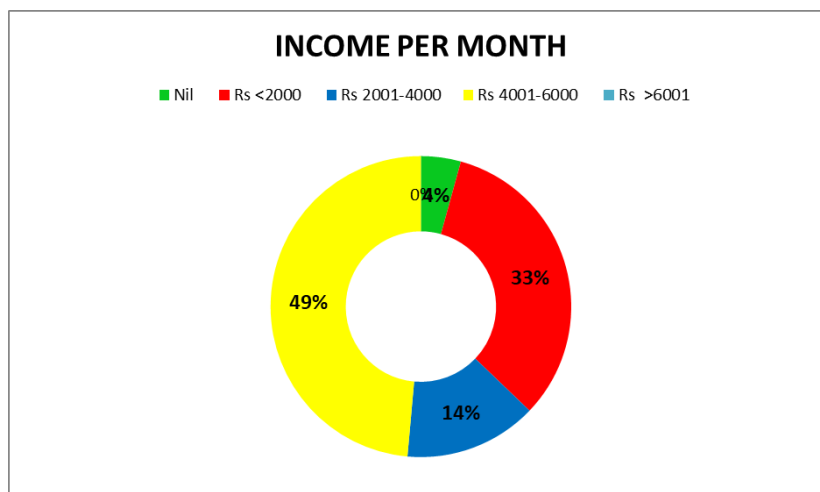


Figure 5: Frequency and Percentage distribution of income per month among clients with diabetic foot ulcer.

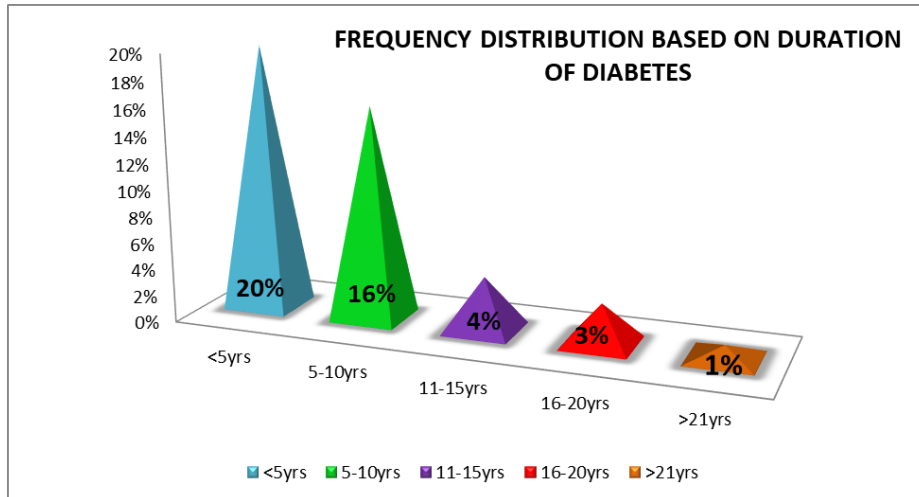


Figure 6: Frequency and Percentage distribution of duration of diabetes among clients with diabetic foot ulcer.

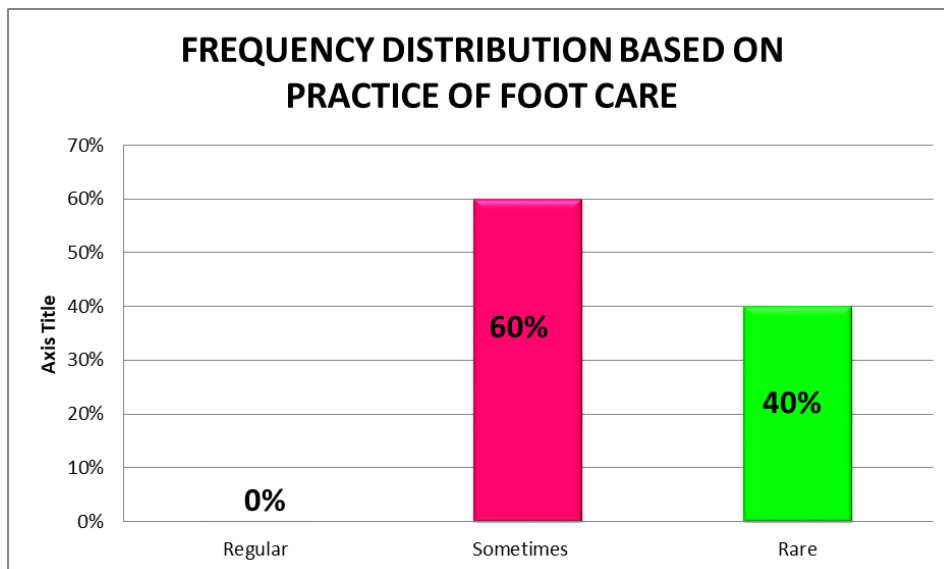


Figure 7: Frequency and Percentage distribution of foot care practice among clients with diabetic foot ulcer.

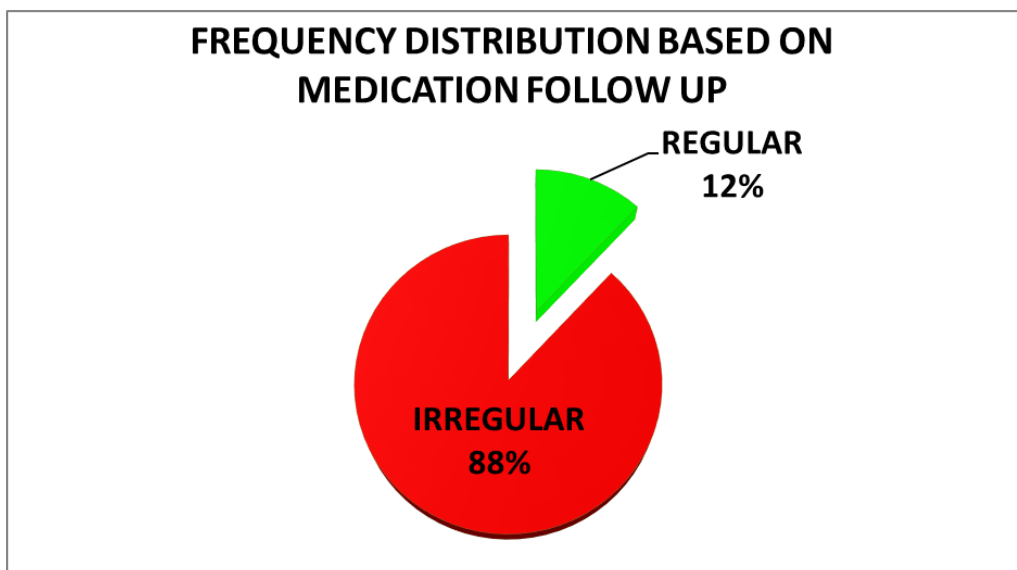


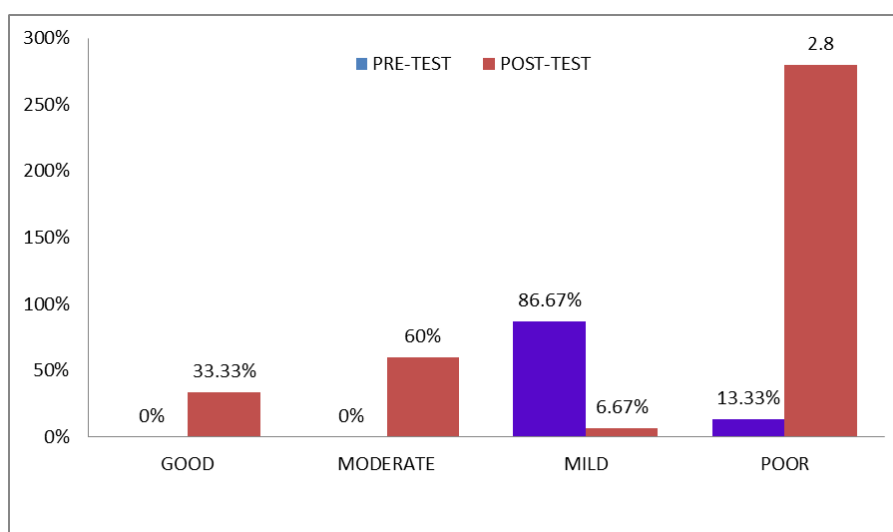
Figure 8: Frequency and Percentage distribution of medication follow up among clients with diabetic foot ulcer.

SECTION- II

TABLE - 2
DISTRIBUTION OF HEALING LEVEL OF DIABETIC FOOT ULCER AMONG CLIENTS IN PRE-TEST AND POST-TEST:

Healing level of diabetic foot ulcer after applying topical insulin dressing	GOOD	%	MODERATE	%	MILD	%	POOR	%
Pre-test	0	0%	0	0%	26	86.67%	4	13.33%
Post-test	10	33.33%	18	60%	2	6.67%	0	0%

Table 2 reveals that the pre-test score of healing level of diabetic foot ulcer. Out of 30 clients, 86.58% (26) of the clients are with mild wound healing and 13.33% (4) of the clients are with poor wound healing. In the post test score, out of 30, 33.33% (10) of the clients are with good wound healing, 59.4%(18) are with moderate wound healing and 6.66%(2) of them are with mild wound healing and none of them are with poor wound healing.



SECTION- III

TABLE-3
EFFECTIVENESS OF TOPICAL INSULIN DRESSING ON HEALING LEVEL OF DIABETIC FOOT ULCER AMONG CLIENTS:
N=30

Sl. No.	CRITERIA	MEAN	STANDARD DEVIATION	CALCULATED “t” VALUE	TABLE VALUE
1	PRE-TEST	48.96	3.24	5.20	2.05 (p<0.05)
2	POST-TEST	28.1	4.76		

Table 3 explains the effectiveness of topical insulin dressing on diabetic foot ulcer assessed with the help of paired ‘t’ test. The calculated ‘t’ value (5.20) is greater than the table value (2.05) at 0.05 level of significance. It denotes that topical insulin dressing is effective to improve the healing level of diabetic foot ulcer.

SECTION- IV

TABLE-4
ASSOCIATION OF POST HEALING LEVEL OF DIABETIC FOOT ULCER WITH DEMOGRAPHIC VARIABLES:

Demographic variables	LEVEL OF WOUND HEALING				Calculated Value	df	Table Value	Significance
	Good	Moderate	Mild	Poor				
Age:	f	f	f	f			12.59	

35-45Yrs	0	7	0	0	14.59	6		S
46-55Yrs	2	9	1	0				
56-65Yrs	8	2	1	0				
Sex:								
Male	7	10	1	0	0.648	3	7.81	NS
Female	3	8	1	0				
Education:								
Collegiate study	0	0	0	0	4.917	12	21.02	NS
Higher secondary school	0	7	0	0				
Secondary school	4	3	1	0				
Primary school	4	7	1	0				
Illiterates	2	4	0	0				
Occupation:								
Cooli	0	7	0	0	10.03	9	16.91	NS
Daily wage	3	1	1	0				
Employee	3	6	0	0				
Income per month:								
Nil	4	4	1	0	6.71	12	21.02	NS
Rs<2000	2	5	0	0				
Rs 2001-4000	1	1	1	0				
Rs 4001-6000	3	7	0	0				
Rs> 6000	0	1	0	0				
Duration of diabetes:								
<5Yrs	1	5	0	0	12.90	12	21.02	NS
5-10 Yrs	5	11	0	0				
11-15Yrs	1	2	1	0				
16-20Yrs	2	0	1	0				
>21Yrs	1	0	0	0				
Foot care practice								
Regular	0	0	0	0	0.648	6	12.59	NS
Sometimes	3	11	1	0				
Rare	7	7	1	0				
Medication followup								
Regular	3	11	1	0	2.48	3	7.81	NS
irregular	7	7	1	0				

Table-4 shows the association of post healing level of diabetic foot ulcer with demographic variables. The demographic variable such as age of the diabetic clients is having the significant association with the healing level of diabetic foot ulcer. There is no significant relationship on the post healing of diabetic foot ulcer with the demographic variables such as sex, education, occupation, income per month, duration of diabetes, foot care practice and medication follow up.

IV. MAJOR FINDINGS OF THE STUDY:

The study was conducted from 7-08-2023 to 09-09-2023. A total number of 30 clients with diabetic foot ulcer who met the inclusion criteria were selected by using simple random technique. A time limit of 10 minutes was taken to each sample for pre-test. The clients were made comfortably in well ventilated room and privacy was maintained. The investigator gave the introduction followed by topical insulin dressing for 14 days. After finishing entire group data collection, on 15th day, the post-test was conducted by using the same tool.

A quasi experimental research was under taken to assess the effectiveness of topical insulin dressing on wound healing level of diabetic foot ulcer among clients.

The clients with diabetic foot ulcer were selected by simple random sampling [lottery method]. 30 clients were selected. A rating scale [Bates Jenson wound assessment tool] used to assess the level of wound healing on diabetic foot ulcer among clients before and after topical insulin dressing.

1. In the pre-test out of 30 clients, 86.58% (26) of the clients had mild wound healing, 13.33% (4) of clients had poor wound healing and no one had moderate or good wound healing. In the post test out of 30 clients, 33.33% (10) of clients had good wound healing, 59.4% (18) had moderate wound healing, 6.66% (2) with mild wound healing and no one had poor wound healing.
2. The effectiveness of topical insulin dressing on diabetic foot ulcer clients was assessed by using paired t test. Table 4 revealed that a marked improvement in mean value and the paired “t” test value is 5.20 significant at $p < 0.05$ level.

3. It was found that statistically there was no significant association between level of wound healing on diabetic foot ulcer on clients and demographic variables such as sex, education, occupation, income per month, duration of diabetes, foot care practice and medication follow up except age of clients.

V. CONCLUSION:

The main conclusion drawn from the present study was majority of the clients with diabetic foot ulcer had mild and others had poor wound healing in the pre-test. After giving topical insulin dressing on the diabetic foot ulcer majority of them had good and moderate wound healing and none of them had mild or poor wound healing. This implies that topical insulin dressing has a beneficial effect on the healing level of the diabetic foot ulcer.

VI. IMPLICATIONS OF THE STUDY:

NURSING PRACTICE:

- The present study indicated that topical insulin dressing has a beneficial effect on the healing level of the diabetic foot ulcer.
- So it can be included in the nursing practice to prevent the complications with delayed wound healing.

NURSING EDUCATION:

- Nursing curriculum has to focus on nursing care of the clients with diabetic foot ulcer.
- Student nurses has to update their knowledge on topical insulin dressing for healing of diabetic foot ulcer to practice evidence based care in the clinical settings.

NURSING ADMINISTRATION:

- The present study proposed to help the hospital administrator to plan for continuing education programme for nurses regarding topical insulin dressing for healing of diabetic foot ulcer.

NURSING RESEARCH:

- More research studies in the area of wound healing should be done to expand the base of knowledge and evidence based practice.

VII. RECOMMENDATIONS

Based on the findings, the following recommendations are made;

1. The study can be replicated with large sample size.
2. The study can be conducted as comparative study with other topical agents.
3. More research studies can be done on other alternative therapies to hasten the healing of diabetic foot ulcer.

LIMITATIONS

- a. The preinterventional assessment and post interventional assessment done by the same investigator.
- b. The wound healing can be affected by multifactors.

BIBLIOGRAPHY

- [1]. Brunner And Suddarth's, "Text Book Of Medical Surgical Nursing", 10th Edition, Lippincott Williams And Wilkins, Page No: 1194.
- [2]. Phipp's, "Medical Surgical Nursing, Health And Illness Perspectives", 8th Edition, Mosby Publications, Page No: 1121-1122.
- [3]. Lewis, "Medical Surgical Nursing", 6th Edition, Mosby Publications, Page No: 1296-1300.
- [4]. Luckman's, "Core Principles And Practice Of Medical Surgical Nursing", W.Bsaunders's Company, Page No:1195.
- [5]. Joyce. M. Black, "Medical Surgical Nursing", 6th Edition, Volume.1, W. B Saunder's Company, Page No: 330-334.
- [6]. The Journal Of Diabetic Foot Complications(2010)Volume 2, Issue 1, No.2, Page No:21-23.
- [7]. Wounds International,2010, Volume.1, Issue 2, Page No: 5-7.
- [8]. The New England Journal Of Medicine, 2007, Volume 351, Page: 48-55.
- [9]. The British Journal Of Diabetes And Vascular Disease, 2010, Volume 10, Page No: 54-56.
- [10]. Journal Of Wound Care, 2008, Volume: 17, No:10, Page No: 30-31.
- [11]. American Journal Of Clinical Dermatology, 2008, Volume 1, Issue 2, Page No: 117-123.
- [12]. Current Diabetes Report, 2007, Volume 2, No: 6, Page No: 510-518.
- [13]. Clinical Diabetes, 2006, Volume. 24, No:2, Page No: 91-97.
- [14]. Sage Journal, 2009,Volume 1,Issue 2, Page No: 119-128.
- [15]. Annals Royal College Of Surgeons Of England,2008, Volume 90, No:2, , Page No: 160.
- [16]. Diabetes Care, 2007, Volume:14, No: 10, , Page No: 909-911.
- [17]. Clinical Diabetics, 2006, Volume 24, No.2, Page No: 91-93.
- [18]. Diabetes Digest, 2008, Volume 7, Issue 4, Page No: 13-17.
- [19]. Journal Of Diabetes Nursing, Volume 13, Issue 5, Page No: 60-62.
- [20]. The Diabetic Foot Journal, 2008Volume 12, Issue 1, 2009, Page No: 50-55.
- [21]. Diabetic Foot, 2003, Volume 1, No: 2, Page No: 122-135.

- [22]. Diabetics Care, 2006, Volume 29, Issue 1, Page No: 43-48.
- [23]. BMJ, 2008, Volume 306, Issue 2, Page No: 630-634.
- [24]. Diabetes-Metabolism Research And Reviews, Volume 17, Issue 4, Page No: 246-249.
- [25]. [Http://Www.Sciencedaily.Com/Releases/2006/12/061211092559.Htm](http://www.sciencedaily.com/releases/2006/12/061211092559.htm).
- [26]. [Http://Www.Pubmedcentral.Nih.Gov/Articlerender.Fcgiartid2443316](http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2443316).
- [27]. [Http://Www.Woundsresearch.Com/Article/6722](http://www.woundsresearch.com/article/6722).
- [28]. [Http://Clinicalevidence.Bmj.Com/Ceweb/Conditions/Dia/0602/0602](http://clinicalevidence.bmj.com/ceweb/conditions/dia/0602/0602)
- [29]. [Http://Www.Woundsresearch.Com](http://www.woundsresearch.com)
- [30]. [Http://Bestpractice.Bmj.Com/Bestpractice/Treatment/Evidence/ Intervention/0602/0/Sr-0602-17.Html](http://bestpractice.bmj.com/bestpractice/treatment/evidence/intervention/0602/0/sr-0602-17.html).
- [31]. [Http://Journals.Lww.Com/Aswcjournal/Citation/2008/07000](http://journals.lww.com/aswcjournal/citation/2008/07000)
- [32]. [Http://Www.Searchmedica.Com/ Diabetic Foot Ulcer](http://www.searchmedica.com/diabetic-foot-ulcer).
- [33]. [Http://Www.Encyclopedia.Com/Doc/165474044.Html](http://www.encyclopedia.com/doc/165474044.html).
- [34]. [Http://Emedicine.Medscape.Com/Article460282](http://emedicine.medscape.com/article/460282).