EFFICACY OF PYODINE SOLUTION AND DUODERM GEL IN MANAGEMENT OF DIABETIC FOOT

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ABSTRACT

Background: Diabetic foot is most troublesome disability, with prolong hospital stay, and huge expenses, with an amputation of limb as an end result. In diabetic patients Lifetime risk of developing foot ulcers is 25% .In United States, diabetics constitute 60% of all lower limb amputation . Pakistan was 8th country in list of top ten countries with high diabetes prevelance in a survey conducted by WHO in 1995. This study will help us to identify local statistics regarding knowledge and practices of foot care and identify key lapses in diabetic foot care management

Objective: To determine efficacy of pyodine solution and duoderm gel in diabetic foot ulcer among Diabetic patients in term of healing of diabetic foot.

Material and Methods: This Descriptive Case Series study was conducted at the Department of Surgery, Khyber Teaching Hospital, Peshawar over a period of two years from April 3, 2015 to October 4, 2017 carried out over 179 patients. After written consent all the patients were treated with I/V antibiotics according to culture and sensitivity reports and were then followed by oral anibiotics for a two weeks period. Multiple dressings with pyodine solution and gel were performed till the complete healing of the wound after one month time . All the results were analyzed by SPSS version 16 and represented in the form of tables. In this study, 179 patients were observed. Average age was 50.64years+9.24SD. Male to female ratio was 2.14:1. There were 117(65.36%) patients shows efficacy of pyodine solution and duoderm gel in diabetic foot ulcer.

Results: A total of 174 patients either gender presenting with diabetes mellitus for the last 5 years were included in the study. There were 57 (31.84%) were females and 122(68.16%) were males. Male to female ratio was 2.14:1(.Fig 1) Average age of the patients was 50.64years+9.24SD with range 35-65 Years. Age of patients was divided into four categories, out of which age group most common for type II diabetes mellitus disease was more than 14-50 years of age.

There were 34(19%) patients of the age ≤ 40 years. Sixty seven (37.4%) patients have age range of 41-50 years, 41 (22.9%) were of age range 51-60 years and 37(20.7%) presented at more than 60 years of age. Average duration of diabetes was 4.08 years+1.55SD. (Table 1). Out of 179 diabetic patients, there were 117(65.36%) patients shows efficacy of pyodine solution and duoderm gel in diabetic foot ulcer while 62(34.64%) patients have no efficacy. (Fig 2)

Age wise distribution of efficacy shows that efficacy in younger age were high as that of older age. The patients having age less than or equal to 40 years of age have 76.5% efficacy while 23.5% patients have no efficacy, age group 41-50 years contain 65.7% efficacy and 34.3% shows no efficacy, 51-60 years age 85 groups have 61% efficacy, 39% shows no efficacy and patients having more than 60 years of age have 59.5% efficacy and 40.5% shows no efficacy. (Table 3)

Gender wise distribution of efficacy shows that gender has no role over efficacy. There were 64.4% patients having efficacy in male and 66.7% shows in female patients. Similarly on other hand 35.2% patients have no efficacy in male and 33.3% shows in female patients. Similarly as the duration of diabetes increase the efficacy decreases but statistically insignificant with p-value=0.134.(Table 4)

Conclusion: In our study there was good efficacy of pyodine solution and duoderm gel in management of diabetic foot ulcer so the RCT studies are recommended for better choice.

Key Words: Efficacy, Pyodine, Duoderm Gel, Diabetic Foot Ulcer, Diabetic, Wound Healing

INTRODUCTION

Diabetic foot is most troublesome disability, with prolong hospital stay, and huge expenses, with an amputation of limb as an end result. After an amputation for diabetic foot phantom limb has drastic effects on diabetic patients . although diabetic foot is one of the most worrysome complication of diabetes[1], it can be prevented and also cured. In diabetic patients lifetime risk of developing foot ulcers is 25%[2]. In United States, diabetics constitute 60% of all lower limb amputation[3]. Diabetic foot consists of various pathologies including diabetic neuropathy, peripheral vascular disease, Charcot's neuroarthropathy, foot ulceration, osteomyelitis and the potentially preventable endpoint, limb ampu-

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tation[4]. Healing of diabetic foot can be achieved by wet dressings that provide favourable environment. in order to decrease amputation rate in diabetics, multidisciplinary approach be employed in treatment of diabetic foot ulcer, and every attempt be done to prevent diabetic foot ulceration. In mixed series 65 – 85% primary healing rate has been observed in ulcer healing. Diabetic foot should be considered as a life-long disease even if it is healed and to prevent recurrence it should be treated accordingly[9]. A study of diabetic foot disease with 200 patients was presented by GulA et all, in which there were 65% male patients and 35% female patients with average age of 53.40 years[10]. Pakistan was 8th country in list of top ten countries with high diabetes prevelance in a survey conducted by WHO in 1995 and there were 4.3 million diabetics. However Pakistan is estimated to be 4th on the list with 14.5 million population suffering from diabetes mellitus[11].Diabetic foot ulcer is the most common complication of diabetes mellitus that leads to hospitalization of the patient and there is 30-fold increased risk of amputation than the general population. For the current rate of 125 amputations carried out per week, up to 80 % of these are potentially preventable[12].

The rationale of our study is to assess efficacy of pyodine solution and duoderm gel in diabetic foot ulcer in terms of wound healing. In diabetics, high amputation rate and morbidity is due to lack of awareness regarding foot care and consequently lose their limbs and become permanently disabled. Frequency of wound development can be decreased by early detection of potential risk factors for foot ulceration. To determine the predisposing conditions to ulceration it is recommended that patients with diabetes should undergo foot examination at least annually. This study will help us to identify local statistics regarding knowledge and practices of foot care and identify key lapses in diabetic foot care management.

MATERIAL AND METHODS

This Descriptive Case Series study was conducted at the Department of Surgery, Khyber Teaching Hospital, Peshawar over a period of two years from April 3, 2015 to October 4 , 2017 carried out over 179 patients. All male and female patients aged 35 years to 65, having Type II diabetes.

Mellitus for the last 5 years or more and either receive oral anti diabetic drugs or insulin for the treatment of diabetes were included in the study. All those diabetic patients who have unilateral or bilateral foot amputation, immune compromise patients were excluded. This study were conducted after approval from the ethical board and research committee of the of the Hospital. All admitted patients meeting the inclusion criteria were counted in the study All the patients after history and clinical examination were investigated by CBC, Blood Sugar level. Blood sugar was controlled mostly by insulin injections. Patients with fasting glucose > 7mmol/L (126mg/dl) and random >11.1 mmol/L (200mg/dl) were considered diabetic. All the patients were treated with I/V antibiotics according to culture and sensitivity reports and were then followed by oral anibiotics for a period of 2 weeks..

Multiple dressings with pyodine solution and gel or duoderm were performed till the complete healing of the wound after one month time. To collect the information for each patient, a study Proforma were used. All the information including name, age, gender, address, wound healing etc were recorded in the proforma. Data were analyzed by using SPSS version 17 on computer. Mean ± Standard Deviation were computed for numerical variables like age and diabetes duration. Frequency and percentages were computed for categorical variables like gender, Efficacy. Efficacy were stratified among age gender duration of diabetes to control effect modifier post stratification were done through chi-square test keeping P-value < 0.05 were signification. All the results were presented in the form of tables and charts.

RESULTS

A total of 174 patients either gender presenting with diabetes mellitus for the last 5 years were included in the study. There were 57 (31.84%) were females and 122(68.16%) were males. Male to female ratio was 2.14:1(.Fig 1)

Average age of the patients was 50.64years+9.24SD with range 35-65 years. Age of patients was divided into four categories, out of which age group most common for type II diabetes mellitus disease was more than 14-50 years of age. There were 34(19%) patients of the age ≤ 40 years. Sixty seven (37.4%) patients were in the age range of 41-50 years, 41 (22.9%) were of age range 51-60 years and 37(20.7%) presented at more than 60 years of age. Average duration of diabetes was 4.08 years+1.55SD. (Table 1)

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Table 1: Age Wise Distribution of the Patients

Age	Frequency	Percent	Mean +SD (age)	Mean +SD (Duration of Diabetes)
≤ 40.00	34	19.0	50.64years+9.24	4.08 years+1.55
41.00 - 50.00	67	37.4		
51.00 - 60.00	41	22.9		
61.00+	37	20.7		
Total	179	100.0		

Table 2: Age Wise Distribution of Efficacy Among Patients With Diabetes Foot Ulcer

Age (in years)	Efficacy		Total	P-value
	Yes	No		
≤ 40.00	26 76.5%	8 23.5%	34	0.428
41.00-50.00	44 65.7%	23 34.3%	67	
51.00 - 60.00	25 61.0%	16 39.0%	41	
61.00+	22 59.5%	15 40.5%	37	
Total	117 65.4%	62 34.6%	179 100.0%	

Table 3: Gender And Duration Of Diabetes Wise Distribution Of Efficacy Among Patients With Diabetes Foot Ulcer

		Efficacy		p-value
		Yes	No	
Gender	Male	79 64.8%	43 35.2%	0.470
	Female	38 66.7%	19 33.3%	
Duration of Diabetes (in years)	≥ 5.00	103 67.3%	50 32.7%	0.134
	6.00+	14 53.8%	12 46.2%	

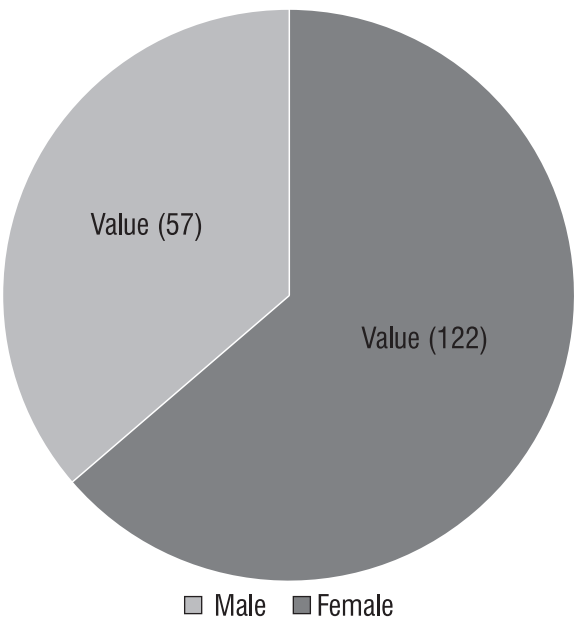

Figure 1: Gender Wise Distribution of the Patients

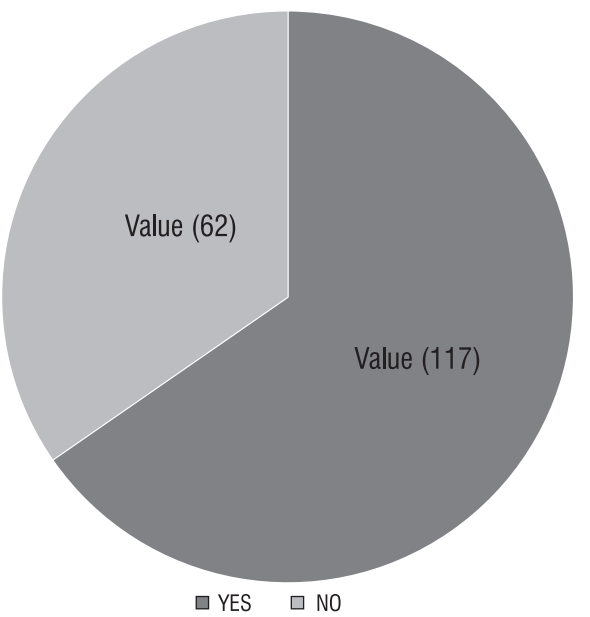

Figure 2: Efficacy Of Pyodine Solution And Duoderm Gel In Diabetic Foot Ulcer

have no efficacy in male and 33.3% shows in female patients. Similarly as the duration of diabetes increase the efficacy decreases but statistically insignificant with p-value=0.134. (Table 4)

DISCUSSION

In patients with diabetes mellitus major source of morbidity include foot ulcers and infections. Foot ulcer develop in approximately 15% of diabetics and a significant number of patient will ultimately undergo amputation (14 - 24% risk with that ulcer or subsequent ulceration)[13]. worldwide a lower limb is lost every 30 seconds due to diabetes and due to the expected rise in type 2 diabetes in future its incidence will increase[14]. In diabetic foot ulcers wound dressings have shown efficacy. By creation of moist environment and protection of the wound dressings promote wound healing. As medical costs and rates of DM continue to rise it is very important to identify and use low cost and effective dressings for diabetic foot ulcers. For thousands of years different substances were used to cover wounds, stop bleeding, treat infections, remove devitalized tissue, diminish pain, reduce swelling, and promote wound healing and care[15].Chemical preservatives and disinfectants discovered in 19th century gave good insight of controlling wound infection and gave better understanding of the nature of infection and inflammation[16].

Pyodine is an element that was discovered in 1811. It dissolves in alcohol and potassium iodide and has dark violet colour . In 1839 Davies was first to use pyodine in treating wounds [17]. Age of patients in our study ranged from 35-65 years with mean age of 50.64years+9.24SD that is younger than some reported age in literature[18].Ratio of male to female was 1.62:1 in our study and it is comparable with other published studies, possibly due to a society with male dominence[18,19].

Gul A et al[20] published a study of diabetic foot disease having 200 patients with diabetic foot ulcers; gender distribution was 65% males and 35% females and 53.40 years as an average age of patients. In our study, gender distribution was 72.3% males and 27.69% females and average age was 52 years. Regarding presentation of age and male to female ratio our study is comparable to this study.

Lazarus et al (1994) mentioned many factors like hypertension, venous disease and diabetes mellitus etc which directly affect wound healing, and it strengthen the findings of our study[18]. Patients using traditional medicines and avoid to visit hospitals and ignoring their wounds like most of people in rural areas of China and India which affect their health and same is the situation here, also reasons for injury and or wounds include low educations levels[23,21].

Positive results of honey in wound care have been shown in seventeen studies with 1965 patients, whereas effectiveness of honey in wounds healing is also revealed in 16 trials in animals as well, and these further augment our findings[22].

Patient education, foot care and increased awareness on the part of diabetes care teams of effective strategies in ulcer can prevent significant percentage of amputation rate in diabetics, however, a number of patients require amputation who are amenable to conservative limb surgery.

Amputation rate of 48% was reported in 100 diabetic foot patients by Muqueem et al[23]. Mivajima S et al[24] reported 52% limb amputation rate in a series of 210 diabetic foot patients.

Out of 94 diabetic patients, 39 (43.8%) patients had amputation, 24 major and 15 minor in the series of Ghanassia E et al[25].

Amputation rate in our study is low as compared to other studies. Major amputations can be reduced by combined efforts and management by multidisciplinary diabetic foot care team. Diabetes related amputations rate can be decreased by 50 - 70% by improving foot care and education about diabetes[26].

In a large series of 223 patients by Eneroth et al[27], 39% patients with diabetic foot infections including osteomyelitis were treated by aggressive initial surgical debridement without going for amputation.

As an initial intervention our findings also favor conservative management. Only six of our 65 patients required major amputation. 59 (90.76 %) patients responded well to either soft tissues and bone debridement, or minor amputation in our study. In one study, only two out of 50 patients required major amputation on their first admission[28]. In our study, the patients with Wagner's grade I and II were cured completely; grade iii patients treated by aggressive surgical resection with good results, whereas in grade iv and v patients' conservative treatment failed and most of them ended up with major amputation.

High amputation rate and mortality in diabetics was related to lack of education and awareness of foot care as reflected by a local study and many patients underwent lower limb amputation and become disabled[29]

CONCLUSION

In this era of diabetic management complications of diabetes is most prevalent and a challenging issue as well. Our study concluded that pyodine solution may help wound healing in patients with diabetic foot ulcers and when used along with duoderm gel it can more effective. A multimodality approach directed at regular foot care, blood glucose control, and early recognition of foot problems are involved in optimum management of diabetic foot ulcers. Progression of these ulcers can

be prevented by administration of systemic antibiotics, proper surgical debridement and offloading techniques.

REFERENCES

1. 1. Pendsey SP. Understanding diabetic foot. Int J Diabetes DevCtries. 2010;30(2):75–9.
2. Singh N, Armstroog DG, Armstroog LBA. Preventing foot ulcers in patients with diabetes. JAMA. 2005;293:217-28
3. Shabbier G, Amin S, Khattak I, Rehman S. Diabetic foot risk classification in a tertiarycare teaching hospital of peshawar. JPMI. 2010;24:22-6.
4. Rathur HM, Boulton AJ. The diabetic foot. Clin Dermatol. 2007;25:109-20.
5. Khanolkar MP, Bain SC, S tephens JW. Diabetic foot. Q J Med. 2008;101:685-95
6. RonaldA, Bage DPM. Biomechanics of ambulation after partial foot amputation, prevention of re-ulceration. J Prosthetics Orthotics. 2007;19:77-9
7. Shojarefard, A, Khorgami Z, Zlarijani B. Independent risk factors for amputation in diabetic foot. Int J Diabetes Dev Ctieis. 2008;28:32-7
8. Yusof M, Suleman AR, Muslim DA. Diabetic foot complication: a two year review of limb amputation in a Kelantanes population. Singapore Med J. 2007;48:729
9. Vuorisalo S, Venermo M, Lepäntalo M. Treatment of diabetic foot ulcers. J CardiovascSurg (Torino). 2009 Jun;50(3):275-91
10. Gul A, Basit A, Ali SM, Ahmadani MY , Miayan Z. Role of wound classification in predicting the outcome of diabetic foot ulcer. J Pak Med Assoc. 2006;56:444-7
11. World Health Organization. The World Health Report 2003. Geneva Organization; 2003: World Health.
12. Foot checks. State of the nation England.2012:17.
13. Fauci AS, Braunwald E, Kasper DL, Hauser SL, Dan LL, Jamesson JL. Harrison's Principles of Internal Medicine. 17th ed. New York: McGraw-Hill Professional; 2008.
14. Boulton AJ, Vileikyte L, Ragnarson-Tennvall G, Apelqvist J. The global burden of diabetic foot disease. Lancet. 2005;366(9498):1719–24.
15. Mollering RC. Past, present and future of antimicrobial agents. Am J Med. 1995;99(Suppl 6A):11-8.
16. Hugo WB. A brief history of heat and chemical preservation and disinfection. J Appl Bacteriol. 1991;71(1):9-18.
17. Davies J. Selections in Pathology and Surgery. Part II. London: Longman, Orme, Browne, Greene and Longmans, 1839.
18. Lazarus GS, Cooper DM, Knighton DR, Margolis DJ, Pecoraro RE, Rodeheaver G, et al. Definitions and guidelines for assessment of wounds and evaluation of healing. Arch Dermatol. 1994;130(4):489-93.
19. Jan WA, Shah HU, Usman M, Khan SM, Shah NA, Sharif N. Management of diabetic foot according to Wagner's classification and frequency of diabetic foot disease in other foot a study of 98 cases. J Postgrad Med Inst. 2009;23(3):245-50.
20. Gul A, Basit A, Ali SM, Ahmadani MY, Miayan Z. Role of wound classification in predicting the outcome of diabetic foot ulcer. J Pak Med Assoc. 2006;56:444-7.
21. Nathens AB, Neff MJ, Goss CH. Effect of an older sibling and birth interval on the risk of childhood injury. Inj Prev. 2000;6:219-22.
22. Al-waili SN. Honey for wound healing, ulcer and burns; data supporting its use in clinical practice. The scient world J. 2011;11:766-87.
23. Makhdoom A, Khan MS, Lagahari MA, Rahopoto MQ, Tahir SM, Siddiqui KA. Management of diabetic foot by natural honey. J Ayub Med Coll Abbottabad. 2009;21:103-5.
24. Dos Santos Tavares DM, Dias FA, Araújo LR, Pereira GA. Profile of patients submitted to amputation related to diabetes mellitus. Rev Bras Enferm. 2009;62:825-30.
25. Shabbier G, Amin S, Khattak I, Rehman S. Diabetic foot risk classification in a tertiary care teaching hospital of Peshawar. J Postgrad Med Inst. 2010;24:22-6.
26. Molan PC. A brief review of honey as clinical dressing. Prim Intension. 1998;6:148-58.
27. Molan PC. The role of honey in the management of wounds. J Wound Care. 1999;8:423-6.
28. Farouk A, Hassan T, Kashif H, Khalid SA, Mutawali I, Wadi M. Studies on sudaniese Bee honey: laboratory and clinical evaluation. Int J Crude Drug Res. 1988;26:161-8.
29. Lucke H. Wundbehandlung mit honing und lebertran. Dtsch Med Wochenschr. 1935;61:1638-40.