

COST EFFECTIVENESS IN THE USE OF ALOEVERA GEL DRESSING IN DIABETIC FOOT ULCER MANAGEMENT

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ABSTRACT:

Patients with type – II diabetes foot ulcer endure a debilitating health because of the chronicity of ulcer. A true experimental study (RCT) research design was used to assess the cost effectiveness by the use of Aloe gel among 50 patients in the experimental group against 50 patients in the control group (betadine gel) with type – II diabetes with foot ulcer. Cluster random sampling was used to segregate the subjects. The total cost of the ulcer management was reduced significantly with the use of Aloe Gel(t value of 4.03, $p < .001$ level) when compared with the control group.

INTRODUCTION

Ulcers in foot are of a major concern for patients with type – II diabetes. They remain chronic leading to significant clinical and social implications. Recent statistics show that India has the world's largest diabetic population. In the position statement given by ADA (2011) on preventive foot care of diabetes it is reported that 12% of the urban population is suffering from diabetes. The prevalence of diabetes in the urbanizing rural population was found to be midway between rural and urban populations. Inlows et al (2001) have stated that the demand to

optimize the quality and cost effectiveness of ulcer management remains as a target of achievement. It is now time to take appropriate action to ensure that people with diabetes everywhere receive the quality of care that they deserve. Known Lee et al (2001) in their study have perceived that global awareness of diabetes and its complications will be raised and that the necessary attention will be paid to the need for improved foot care for people with diabetes throughout the world. Presently there is a lack of data to indicate the cost to heal wounds in an Indian set up, the timing in various care settings and the products that are most cost effective which promote best healing. Use of Aloe gel (hydrocolloid) with its natural properties of ulcer healing may help in fast healing of the foot ulcer leading to reduced cost in various aspects of ulcer management.

OBJECTIVES:

- To determine the cost effectiveness of Aloe gel dressing in the foot ulcer care management.
- To correlate between the cost and the rate of healing in both groups based on background variables.

METHODS:

A true experimental research design (RCT) was used. This method consisted of an experimental group (N=50) which had a dressing intervention with freshly prepared aloe gel and a control group (N=50) which had the conventional method of dressing done with betadine gel on diabetic foot ulcers. The study was done in a secondary hospital situated in a rural area of Trichy in Tamil Nadu. Both male and female patients with Type – II diabetes who were attending the OPD and were registered under care and with Grade – I ulcer (Wagner) were chosen as subjects. The sampling technique used was a cluster random sampling method. This was done by toss method. This study consisted of costing of ulcer management tool prepared by the investigator and validated. The patients with foot ulcer were undergoing dressing according to their groups, either as the outpatients or as inpatients. After the pre testing of the instrument and pilot study, the

necessary corrections were adopted and after the written consent from the individuals they were participating in the study. Dressings were done according to the respective groups and the rate of healing was assessed. The cost of ulcer management was assessed from the time of registration in the hospital for ulcer care till the time of healing of ulcer. The cost included the amount of money spent towards registration, treatment, bed charges, nursing care, investigation done and transport. The procedure was done by checking the bills paid in the hospital towards treatment, medicines and diet. Transport fees were checked by assessing the travel distance and the mode of transport used by them.

After the ulcer management is satisfactorily completed and the patient is discharged from ulcer care, then the analysis of the cost towards the ulcer care management was done. The study was carried over a period of 1 year and 6 months.

Results:

Table 1. Comparison of cost effectiveness between both groups

Components	Aloe gel dressing			Conventional dressing			t	P
	Mean	SD	N	Mean	SD	N		
Registration fees	20.0	0.0	50	20.0	0.0	50	-	-
Clinical fees	206.6	127.4	38	163.6	60.4	44	1.99*	0.050
Professional charges	550.0	261.8	38	852.3	370.9	44	4.2**	0.000
Bed service-Gen	1362.5	499.2	16	2097.4	868.3	19	2.99**	0.005
Private	2833.3	577.4	3	3570.0	981.3	10	1.21	0.250
Semi private	2980.0	1141.2	21	3520.0	1515.3	15	1.22	0.230
Nsg.Care.General	741.8	388.6	22	1171.3	512.3	23	3.16**	0.003
Private	3224.8	949.5	23	2383.6	1266.8	11	2.17*	0.038
Inj.Giving charges. Intravenous	1212.2	692.6	34	1570.3	1284.6	44	1.47	0.146

Intramuscular	438.2	238.3	34	743.2	366.4	45	4.22**	0.000
Investigations	1820.0	0.0	50	1820.0	0.0	50	-	-
Dressing	1197.8	817.1	50	3523.8	2582.9	50	6.07**	0.000
Hospitalisation - IP days	14.2	5.5	37	19.1	7.2	44	3.37**	0.001
OP days	20.5	7.0	50	37.2	16.8	50	6.51**	0.000
Transport Charges	6699.2	7400.0	50	8096.0	5111.5	50	1.1	0.275
Food	2148.6	787.5	36	2931.3	1127.4	47	3.55**	0.001
Systemic medicines	3026.1	1857.9	49	3934.0	2370.8	50	2.12*	0.037
Antibiotics								
Analgesics	359.3	141.6	50	285.1	97.2	50	3.05**	0.003
Hyoglycemic agent	879.0	793.4	50	964.0	1029.3	50	0.46	0.645
Total Cost	20054.6	10648.9	50	29141.5	11841.0	50	4.03**	0.000

**Significant at 0.01 level *Significant at 0.05 level

Table 1 revealed that the amount incurred on the professional charges, general side bed charges, nursing care charges in the general bed side, tariff related to intramuscular injections, diet and health, number of days of stay in the hospital, number of days of visit to OPD and the rates incurred on analgesics had

a high significant reduction at $p < 0.001$ level and the clinical fees, private nursing care charges cost of antibiotics had a clinically significant reduction at $p < 0.05$ level. The use of aloe gel dressing in the treatment of foot ulcer is cost effective.

Table 2 Correlation between cost and rate of healing in both groups

Selected Variables		R	N	95 % CI	CR	Sig.
Age	<=50	-0.156	41	(-0.45 - 0.14)	0.06	p>0.05
	>50	-0.169	59	(-0.42 - 0.08)		
Gender	Male	-0.005	61	(-0.26 - 0.25)	2.02	p<0.05
	Female	-0.408**	39	(-0.67 - 0.15)		

Duration of illness	0 - 2 yrs	0.051	17	(-0.42 - 0.53)	0.53	p<0.05
	2 - 3 yrs	-0.123	29	(-0.48 - 0.24)	1.17	p<0.05
	>3 yrs	-0.294*	54	(-0.54 - 0.05)	0.75	p<0.05
Education	Illiterate / Primary	-0.133	17	(-0.6 - 0.33)	0.07	p<0.05
	Above primary	-0.152	83	(-0.36 - 0.06)		
Economic status	Poor	-0.048	18	(-0.51 - 0.41)	0.78	p<0.05
	Lower middle class	-0.276	45	(-0.55 - 0.01)	0.02	p<0.05
	Middle class / Upper middle class	-0.042	37	(-0.36 - 0.28)	1.04	p<0.05
FBS	Normal	-0.024	49	(-0.3 - 0.26)	1.42	p<0.05
	Abnormal	-0.307*	51	(-0.56 - 0.06)		
PPBS	Normal	-0.317	17	(-0.74 - 0.11)	0.66	p<0.05
	Abnormal	-0.135	83	(-0.35 - 0.08)		
Total		-0.16	100	(-0.24 - 0.08)		

** Significant at 0.01 level * Significant at 0.05 level

Table 2 revealed, as the duration of treatment increases, the cost increases. In the case of females, there is a prolonged healing rate of diabetic foot ulcer that significantly increased in cost. The patients who had an abnormal fasting blood sugar level also were found to have a prolonged rate of healing with increased cost

DISCUSSION

The study finding reveals that the foot ulcer treated with aloe gel dressing had a significant reduction in the total cost with the $t=4.03$,

$p < 0.001$ level. These findings are consistent with the study done by Known Lee et al (2001) on ulcer care where the results reveal alternative approaches to wound care have projected greater efficiency than traditional dressing with significant by lesser cost. The aloe gel is freely available may help in the fast healing of ulcer. Though there are controversies about wet to dry dressings aloe gel has helped in the enhancement of epithelialization and granulation of tissues in foot ulcer. These findings are supported by Known Lee et al (2001) and Teague and

Mahoney (2007) about the superiority of wet dressing over the dry dressing. Nurses need to assess the type of ulcer before choosing the dressing material for dressing. Hydrocolloids like aloe gel can be applied only on ulcers which are dry and needs a wet environment. The cost of ulcer management could be greatly reduced if these ulcers are treated in a home environment by a primary nurse after the initial line of management drawn by a physician. Shift of paradigm from hospital to home care ulcer management may reduce the indirect cost like transport, diet and bed charges.

This study finding reveals that costs escalate in the case of the diabetic foot ulcers that show a history of recurrence, which is evidence for sensory neuropathy and thus loss of protective sensation. The tissue metabolism of diabetes also reveals there is less production of collagen by the tissues in the site of ulcer and so tissue regeneration is highly affected. For these reasons of pathology in diabetes a patient that has a longer duration does not have a faster healing as compared to the others with less duration. Abnormal fasting blood sugar in the patients is highly correlated with the rate of healing and cost. This finding is supported by Gadepalli et al (2002), Ali SM et al (2011) where they conclude inadequate glycemic control has increased the risk of infection and need for surgical treatment and this increased the cost of management of ulcers. Edwards (2009) in her diabetic news stated that the increase in sugar level can inhibit the body's ability to fight off infection and also slow the rate of healing of wounds. A

help in the management of glycerin control will reduce the cost of treatment.

CONCLUSION:

Type – II diabetes foot ulcer will never be an economic burden for the patients if ulcers are treated with the aloe gel. Treatment with aloe gel incurs lesser cost and prevents the indirect cost towards ulcer.

Use of critical thinking in the ulcer assessment, ulcer care management and coordinated care for diabetic foot ulcer will enhance faster healing and will prove cost effectiveness. Aloe Vera gel offers a great scope as a better and more cost effective healing agent of foot ulcer than the conventional medicants. The cost of ulcer management could be greatly reduced if these ulcers are treated in a home environment by a primary nurse after the initial line of management drawn by a physician. Shift of paradigm from hospital to home care ulcer management may reduce the indirect cost like transport, diet and bed charges. These studies suggest that prospective multicentric studies are required to assess the appropriate use of dressing material in the management of diabetic foot ulcer considering the etiology and grade of ulcers.

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EGGS, MORE THAN ONE PER WEEK, RAISES THE RISK OF DIABETES

A new study has shown that people who eat eggs every day may substantially increase their risk of type 2 diabetes. India is already the diabetic capital of the world and continuing promotion of eating eggs every day will add to the burden.

A study done by Dr Luc Djoussé of Brigham at the Women's Hospital and Harvard is published in the Journal Diabetes Care. The study revealed that, men with the highest level of egg consumption, seven or more per week, were 58% more likely to develop type 2 diabetes than those who did not eat eggs, and women were 77% more likely to become diabetic if they ate at least an egg a day.

Other salient features of the study were:

- * Levels of egg intake above one a week incrementally increased diabetes risk in both men and women.
- * Eggs are a major source of dietary cholesterol (about 200 mg per egg).
- * Eggs add about 1.5 g of saturated fat each to the diet.

* Eggs may influence glucose metabolism primarily through their effect on cholesterol.

* Each egg also contributes about 0.7 g of polyunsaturated fat, which neutralize the risk to some extent only.

* The study included 20,703 male doctors without baseline diabetes from the Physicians' Health Study I (1982–2007) and 36,295 similarly diabetes-free female health professionals from the Women's Health Study (1992–2007). Over a mean follow-up of 20.0 years in men and 11.7 years in women, 1,921 men and 2,112 women developed type 2 diabetes.

Results:

- * The average one-egg-a-week consumption was not associated with increased diabetes risk.
- * Diabetes was more common in men and women who reported eating more than the average one egg a week.