



Effectiveness of Aloe Vera gel application on the treatment of intravenous phlebitis among patients receiving intravenous therapy at tertiary hospitals of Gangtok, Sikkim

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Abstract

Introduction: Intravenous infusion is the organization of liquid or medicine intravenously in intense conditions for impact. Phlebitis is one of the foremost common complications of intravenous treatment. Around 80% of hospitalized patients are given intravenous infusion therapy at a point admit their remain in an advanced medical facility. Aloe Vera may be a best known plant utilized for treating skin wounds, but it has few other uses that could potentially benefit health.

Objective: To evaluate the effectiveness of Aloe Vera gel application among patients with IV phlebitis.

Methods: Quasi Experimental study was conducted among 60 hospitalized patients who developed intravenous phlebitis. Purposive sampling technique was used and randomly assigned to the experimental and control groups that met the inclusion criteria. On the first day, a VIP score was used to determine the degree of phlebitis, and then the Aloe Vera gel was applied twice a day for three days in the experimental group and once a day in the control group. On the fourth day, both groups received post-test evaluations using the same scale.

Results: The mean posttest IV phlebitis score (3.07 ± 2.477) which was less than the mean pre-test score (9.40 ± 2.673) with a mean difference of 6.33 & t value ($t=8.250$ at $df=29$) was statistically significant at the $p < 0.05$ level in the experimental group. In the experimental group, a significant association was found between educational qualification and previous history of any chronic illness in patients with a pre-test level of IV phlebitis ($p < 0.05$).

Conclusion: It is concluded that Aloe Vera gel was effective in the treatment of intravenous phlebitis among patients receiving intravenous therapy and can be recommended for use in grade I and II phlebitis.

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Keywords: intravenous therapy, phlebitis, aloe vera gel, tertiary hospital

Introduction

Intravenous therapy is a medical technique that administers fluids, medications and nutrients directly into a person's vein. The intravenous route is the fastest way to deliver medications and fluid replacement throughout the body as they are introduced directly into the circulatory system and thus quickly distributed. Placement of an IV line may cause pain, as it necessarily involves piercing the skin. Infections and inflammation (phlebitis) are also both common side effects of an IV line. Longer dwelling time, antibiotics infusion, female gender, forearm insertion, infectious disease, and Teflon catheter are important risk factors for phlebitis development identified by the various studies [1].

Luyu Lv, Jiaqian Zhang (2020) [2], conducted a meta-analysis study to estimate the incidence of phlebitis with peripheral intravenous catheter use and to identify risk factors for phlebitis development. Literature survey was conducted in electronic

databases (CINAHL, Embase, Google Scholar, Ovid, and PubMed). The study concluded that the incidence of phlebitis with the use of peripheral intravenous catheters during infusion is 31%.

Severe phlebitis develops in 4% of all patients. Risk of phlebitis development can be reduced by adapting appropriate interventions [2].

Janete de Souza Urbanetto *et al.* (2017) [3] conducted a cohort study “To determine the incidence of phlebitis during and after the use of peripheral intravenous catheter (PIC), and analyze the association of this complications with risk factors” among 165 adult patients admitted to a university hospital in Porto Alegre, totaling 447 accesses, from December 2014 to February 2015. Data were collected on a daily basis and analyzed by means of descriptive and analytical statistics. The incidence of phlebitis during PIC was 7.15% and the incidence of post-infusion phlebitis was 22.9% [3].

Peripheral IV Catheterization is the most common invasive procedure performed on hospitalized patients. It requires manual dexterity and technical competence, knowledge of pharmaceutical therapy and familiarity with the anatomy and physiology of the vascular system. Because catheterization is done for different purposes and for different lengths of time, it represents a potential risk for a number of safety incidents including microbial growth. However, regardless of the generating factor, local complications take the form of bruises, infiltration, leakage, catheter obstruction and phlebitis.

Phlebitis is an inflammation of the vein and one of the most common complications associated with the insertion of a peripheral venous catheter. Among the different phlebitis assessment scales, the *Infusion Nurses Standards of Practice* recommends the use of the VIP scale (Visual Infusion Phlebitis score), developed by Andrew Jackson and based on 6 different scores (from 0 to 5) Grade 0: No Symptoms, Grade 1: Slight pain at IV Site or redness near IV site, Grade 2: Two of the following are evident: Pain at the IV Site, Erythema, Swelling, Grade 3: Pain along the path of the cannula, erythema, induration, Grade 4: Pain, erythema, induration, palpable venous cord, Grade 5: Pain, erythema, induration, palpable venous cord, pyrexia [4].

Aloe vera has been traditionally used to treat skin injuries (burns, cuts, insect bites, and eczemas) and digestive problems because its anti-inflammatory, antimicrobial, and wound healing properties [5].

The name Aloe vera derives from the Arabic word “Alloeh” meaning “shining bitter substance,” while “vera” in Latin means “true.” 2000 years ago, the Greek scientists regarded Aloe vera as the universal panacea. The Egyptians called Aloe “the plant of immortality.” Today, the Aloe vera plant has been used for various purposes in dermatology, National Institutes of Health Suggests [6].

Aloe vera grows in a clump. It has fleshy, gray-green leaves arranged in a rosette in the shape of a vase atop a short stem. The leaves are about 2 inches wide and grow up to 18 inches long and have small, soft gray teeth along the edges. The main rosette of an aloe plant grows to about 2 feet high. The plant continually grows offset rosettes; in the winter and spring it yields small yellow flowers in the shape of a tube on stalks that grow up to 3 feet tall [7].

Aloe vera contains numerous vitamins and minerals, enzymes, amino acids, natural sugars and agents which may be anti-inflammatory and anti-microbial. The part of the aloe

vera which is used is the leaves. The aloe is a mollient, purgative and vulnerary. It is also used for its antibacterial, anaesthetic and antiseptic properties, and is good to use as a tool for restoration of tissue. It is most commonly used on burns and minor cuts, especially good for sunburns, although it is being used for the treatment of skin cancer and is very useful on rashes [8].

From the various literatures, investigator has realized that there is high prevalence of phlebitis after intravenous therapy. The investigator during her clinical experience has observed many patients who were admitted in the hospital with intravenous cannula, developed the catheter related complications such as pain, redness and swelling and doctors are not prescribed to reduce the inflammation until and unless the level is 3 and above. Considering these factors, the investigator in this study intends to assess the effectiveness of aloe vera gel application on the treatment of intravenous phlebitis so that it may help to overcome this problem among the patients with intravenous phlebitis.

Methodology

Research design: Quasi experimental pre and post-test research design.

Variables

Independent variable: Aloe Vera gel application (Commercial)

Dependent variable: Level of intravenous phlebitis

Demographic Variables: Age, Gender, Educational qualification, Size of the cannula, Site of the cannulisation, Number of days IV cannula in-situ, History of phlebitis with previous hospitalization, Knowledge of IV phlebitis and its care and Any history of chronic illness.

Setting of the study: Central Referral Hospital (500 bedded) and New Sir Thutob Namgyal Memorial (1002) bedded Hospital of Sikkim based on the geographical proximity, feasibility and availability of the population.

Population: Patients with intravenous phlebitis admitted in the tertiary care hospitals of Gangtok, Sikkim.

Sample & Sampling technique: Purposive sampling technique - lottery method. A total 60 patients were selected who fulfill the inclusion criteria (30 patients in experimental 30 patients in control). The inclusion criteria were patients who have developed Grade 1 and 2 degrees of phlebitis due to intravenous therapy, both male and female patients, who are willing to participate. The exclusion criteria were patients who are less than 18 years, who falls in grade 0,3,4,5 of VIP score, having known allergy to aloe vera or its products, patients using alternative treatment for phlebitis.

Duration of the study: 5 weeks

Tools: Tool 1: Demographic proforma

Tool 2: Standardized VIPS (Visual Infusion Phlebitis scale) observational checklist recommended by INS (*Infusion Nurses Standards of Practice*). Grade 0: No Symptoms, Grade 1: Slight pain at IV Site or redness near IV site, Grade 2: Two of the following are evident: Pain at the IV Site, Erythema, Swelling, Grade 3: Pain along the path of the cannula, erythema, induration, Grade 4: Pain, erythema, induration, palpable venous cord, Grade 5: Pain, erythema, induration, palpable venous cord, pyrexia, Grading score given in the study: Grade 1(Score: 5-9); Grade 2(Score: 10-14).

The content validity of the tool-1 and face validity of tool-2 were subjected to seven subject experts from the field of

Medicine, Surgery and Dermatology Department. The patients who had grade 1 & 2 were selected for the study. Pretesting of the tool was done among 6 patients who had developed intravenous phlebitis at New STNM hospital Sikkim. The pretesting & reliability of the tool was done among 6 patients who had developed intravenous phlebitis at OBG ward of New STNM hospital Sikkim.

The pilot study was conducted among 6 Patients who had developed intravenous phlebitis to ensure the feasibility and practicability of the study at District Hospital Gyalshing, West Sikkim from 13th to 18th December 2021.

Data Collection procedure: The final data was collected after taking formal permission of administrative, institutional committee & Medical Superintendent of CRH and New STNM, Gangtok, East Sikkim from 07/02/22 to 13/03/22. Self-introduction and establishment of rapport with the ward in-charges of both hospitals was done to gain their co-operation. During the data collection 60 patients were allocated in to 30 experimental and 30 control groups. Informed written consent was taken from the participants after explaining the purpose of the study. Patients who received IV therapy were screened for Grade 1 and 2 phlebitis using Visual Infusion Phlebitis Scale. In control group no treatment for intravenous phlebitis was given. In experimental group, aloe vera gel was applied at the site of the phlebitis twice a day for 3 days intervention was carried out by the investigator by applying aloe vera gel at the site of phlebitis, twice daily for three days and post-test was done using the same scale on the fourth day.

Data analysis: Data analysis was based on the objectives and

used descriptive and inferential statistics to analyse the data.

Descriptive statistics

- Calculation of frequency and percentage of Selected Variables and the level of intravenous phlebitis.
- Mean and standard deviation to describe the intravenous phlebitis.

Inferential statistics

- The paired “t” test was used to assess the effectiveness of aloe vera gel application within experimental group and independent “t” test was used to compare the effectiveness between the experimental and control group
- Chi square test was used to find the association of the pre-test degree of intravenous phlebitis among patients receiving intravenous therapy with their selected demographic variables in the experimental group.

Ethical Considerations

- Administrative approval taken from the Principal, Sikkim Manipal College of Nursing to conduct the study
- Permission letter from SMIMS institutional ethics committee was taken.
- Formal permission from the Medical superintendents of Central Referral Hospital and New STNM Hospital were taken.
- Written Informed consent from the participants were taken before the data collection after explaining the purpose of the study.
- Confidentiality was maintained throughout the study.

Results

Section I: Findings related to the description of the demographic variables of the patients with intravenous phlebitis

Table 1: Distribution of frequency and percentage of demographic variables of the patients with intravenous phlebitis N= 60 (30+30)

S. No	Selected Variables	Experimental group		Control group	
		Frequency	Percentage	Frequency	Percentage
1	Age in years				
	a. 18-28 year	10	33.3	5	16.7
	b. 29-39 years	16	53.3	8	26.7
	c. 40-50 years	2	6.7	10	33.3
	d. Above 50 years	2	6.7	7	23.3
2	Gender				
	a. Male	10	33.3	17	56.7
	b. Female	20	66.7	13	43.3
3	Educational Qualification				
	a. No formal education	5	16.7	15	50
	b. Primary	5	16.7	2	6.6
	c. Secondary	10	33.3	5	16.7
	d. Senior secondary	6	20	3	10
	e. Graduate and above	4	13.3	5	16.7
4	Size of cannula				
	a. 16 G	0	0	0	0
	b. 18 G	0	0	0	0
	c. 20 G	12	40	9	30
	d. 22 G	18	60	21	70
5	Site of cannula				
	a. Radial vein	8	26.7	17	56.7
	b. Cephalic vein	6	20	9	30
	c. Median cubital vein	1	3.3	0	0
	d. Dorsal venous arch	11	36.7	0	0
	e. Basilic vein	4	13.3	4	13.3
6	Number of days IV cannula in SITU				
	a. 1 day	0	0	2	6.7

	b. 2 days	4	13.3	7	23.3
	c. ≥ 3 days	26	86.7	21	70
Knowledge on IV phlebitis and its care					
7	a. Yes	9	30	18	60
	b. No	21	70	12	40
History of IV phlebitis with previous hospitalization\					
8	a. Yes	11	36.7	16	53.3
	b. No	19	63.3	14	46.7
Patient’s history of any chronic illnesses					
9	a. No chronic illness	27	90	18	60
	b. Diabetes mellitus	0	0	5	16.7
	c. Hypertension	0	0	4	13.3
	d. Both DM and HTN	3	10	3	10
	e. Kidney disease	0	0	0	0
	f. Dermatology disease	0	0	0	0
	g. Blood related disease	0	0	0	0

Table 1, depicts that in experimental group, majority 16(53.3%) of patients were in age group of 29-39 years and in control group 10(33.3%) of patients were in age group of 40-50 years. In experimental group majority 20(66.7%) of patients were female and in control group majority 17(56.7%) of patients were female. In experimental group 10(33.3%) of patients had secondary education, where as in control group 15(50%) of patients had no formal education. In experimental group majority 18(60%) of patients were used 22 G size of cannula where as in control group 21(70%) size were used. In experimental group, most 11(36.7%) of patients site of cannula was dorsal venous arch but in control group majority 17(56.7%) was radial vein. In experimental group majority 26(86.7%) and in control group 21 majority (70%) of patients IV cannula in SITU was for ≥ 3 days respectively. In experimental group majority 21(70%) of patients had no previous knowledge on IV phlebitis and its care whereas in control group majority 18(60%) of patients had previous knowledge on IV phlebitis and its care. In experimental group majority 19(63.3%) of patients had no history of IV phlebitis with previous hospitalization and in control group majority

16(53.3%) of patients had history of IV phlebitis with previous hospitalization. In both experimental group majority 27(90%) and in control group 18(60%) of patients had no chronic illness respectively.

Section II: Findings related to level of intravenous phlebitis among patients receiving intravenous therapy

Table 2: Distribution of frequency and percentage level of intravenous phlebitis among patients receiving intravenous therapy N=60 (30+30)

Grade of phlebitis	Experimental group		Control group	
	f	%	f	%
Grade 1	12	40	9	30
Grade 2	18	60	17	56.7

Table 2: depicts that in experimental group pre-test 12(40%) had grade 1 phlebitis and 18(60%) of patients had grade 2 phlebitis while in control group 13(43.3%) had grade 1 phlebitis and 17(56.7%) of patients had grade 2 phlebitis.

Section III: Effectiveness of aloe Vera gel application on treatment of intravenous phlebitis among patients receiving intravenous therapy.

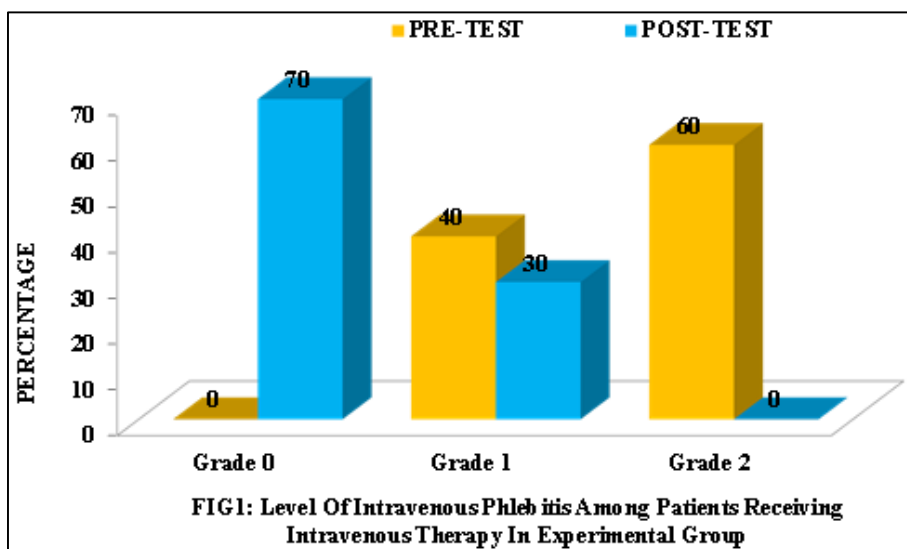


Fig 1: Distribution of frequency and percentage of pre and post-test aloe vera-gel application on treatment of intravenous phlebitis among patients receiving intravenous therapy. N=60 (30+30)

Section IV: Description of mean score of pre-test and post-test level of intravenous phlebitis among patients receiving intravenous therapy in experimental and control group

Table 3: Distribution of mean score of pre-test and post-test level of intravenous phlebitis among patients in experimental and control group N=60 (30+30)

Variables		Mean	SD	Mean D	t value	df	P value
Experimental Group	Pre-test	9.40	2.673	6.33	8.250	29	0.001*
	Post-test	3.07	2.477				
Control Group	Pre-test	8.83	2.167	0.50	0.782	29	0.440 ^{NS}
	Post-test	8.33	3.273				

*p<0.05 level of significance NS-Non significant

Table 3: depicts that in experimental group, the mean post-test intravenous phlebitis score was 3.07 ± 2.477 i.e lesser than mean pre-test intravenous phlebitis score 9.40 ± 2.673 with mean difference of 6.33 with obtained t value ($t=8.250$ at $df=29$) was statistically significant at $p<0.05$ level.

In control group, mean pretest intravenous phlebitis score was 8.83 ± 2.167 and mean posttest intravenous phlebitis score 8.33 ± 3.273 with mean difference of 0.50 with obtained t value ($t=0.782$ at $df=29$) was statistically non-significant at $p<0.05$ level.

Section V: Comparison of post-test level of intravenous phlebitis among patients receiving intravenous therapy between experimental and control group after aloe vera gel application.

Table 4: Comparison of post-test level of intravenous phlebitis among patients receiving intravenous therapy between experimental and control group after aloe vera gel application. N=60 (30+30)

Post-test Comparison	Mean	SD	Mean D	t value	df	P value
Experimental group	3.07	2.477	5.27	7.028	58	0.001*
Control group	8.33	3.273				

*p<0.05 level of significance

Table 4, illustrates that in experimental group, mean post-test intravenous phlebitis score was 3.07 ± 2.477 and in control group mean posttest intravenous phlebitis score was

8.33 ± 3.273 with mean difference of 5.27 with obtained t value ($t=7.028$ at $df=29$) was statistically significant at $p<0.05$ level.

Section VI: Findings related to the association between pre-test levels of intravenous phlebitis among patients receiving intravenous therapy with their selected variables in the experimental group.

Table 5: Association between pre-test levels of intravenous phlebitis among patients receiving intravenous therapy with their selected variables in experimental group. n=30

S. No	Demographic Variables	Experimental group		χ^2 value	df	P value
		Grade 1	Grade 2			
1	Age in years					
	a. 18-28 year	2	8			
	b. 29-39 years	7	9	4.844	2	0.184 ^{NS}
	c. 40-50 years	2	-			
	d. Above 50 years	1	1			
2	Gender					
	a. Male	2	8	2.500	1	0.114 ^{NS}
	b. Female	10	10			
3	Educational Qualification					
	a. No formal education	4	1			
	b. Primary	3	2			
	c. Secondary	5	5	11.25	4	0.024*
	d. Senior secondary	-	6			
	e. Graduate and above	-	4			
4	Size of cannula					
	a. 16 G	-	-			
	b. 18 G	-	-			
	c. 20 G	5	7	0.023	1	0.879 ^{NS}
	d. 22 G	7	11			
5	Site of cannula					
	a. Radial vein	5	3			
	b. Cephalic vein	1	5			
	c. Median cubital vein	1	-	7.352	4	0.118 ^{NS}
	d. Dorsal venous arch	5	6			
	e. Basilica vein	-	4			
6	Number of days IV cannula in SITU					

	a. 1 day	-	-			
	b. 2 days	2	2	0.192	1	0.661 ^{NS}
	c. ≥ 3 days	10	16			
7	History of IV phlebitis with previous hospitalization					
	a. Yes	3	8	1.172	1	0.279 ^{NS}
	b. No	9	10			
8	Patient's history of any chronic illnesses					
	a. No chronic illness	9	18			
	b. Diabetes mellitus	-	-			
	c. Hypertension	-	-			
	d. Both DM and HTN	3	-	5.000	1	0.025*
	e. Kidney disease	-	-			
	f. Dermatology disease	-	-			
	g. Blood related disease	-	-			

*P<0.05 level of significance NS- Non significant

Table 5: shows that the educational qualification and previous history of any chronic illness of patients receiving intravenous therapy was found statistically significant association at p<0.05 with pre-test level of intravenous phlebitis.

Results and discussion

The findings of the study revealed that in experimental group pre-test 18(60%) of patients had grade 2 phlebitis, and 12(40%) had grade 1 phlebitis while in post-test majority 21(70%) had grade 0 phlebitis and 9(30%) had grade 1 phlebitis, which shows the effectiveness of aloe vera gel application on intravenous phlebitis. The mean post-test phlebitis score in experimental group was 3.07±2.477 which is lesser than mean pretest phlebitis score 9.40±2.673 with mean difference of 6.33 with obtained t value (t=8.250 at df=29) was statistically significant at p<0.05 level. This finding is supported by a study conducted by Ridhdi Patel (2019) ^[9] in Gujarat showed the experimental group mean inflammation score was 0.65 and control group inflammation mean score was 1.7. The post-test Inflammation score was significantly lower than pre-test inflammation score.

The present study finding is contradictory with the study conducted by Chandrapal Yadav & *et.al* (2016) ^[10] to assess the effectiveness of aloe vera, glycerin and cold application on superficial thrombophlebitis among 90 patients admitted in selected private hospital which results like cold application was more effective as compared with aloe vera and glycerin. The present study result shows significant association between the pretest level of intravenous phlebitis in experimental group and educational qualification and previous history of any chronic illness of patients which is contradictory with the study finding of Ridhdi Patel (2019) ^[9] where the pre test level of phlebitis was found significant association with cannula lumen among experimental group.

Limitation: Only patients with Grade 1 and 2 were taken for the study.

Conclusion: From the findings of the present study it can be concluded that in addition to its use as ailments for various conditions, Aloe Vera gel is also effective for grade I and grade II intravenous phlebitis, nurses can cooperate this finding as a non-pharmacological intervention into routine care of patient with intravenous phlebitis.

Recommendation

- A similar study can be replicated by increasing the size of the sample.

- A study can be conducted to assess the knowledge, attitude and practice of nursing staff regarding management of phlebitis.
- Comparative study can be conducted to assess the effectiveness of Aloe vera gel with other alternative treatment among patients with intravenous phlebitis.

Conflict of interests: Nil

Source of funding: Nil

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