

Effectiveness of Aloe Vera Gel Application on Phlebitis

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ABSTRACT

Chemotherapy is a type of cancer treatment that uses drug (powerful chemicals) to kill cancer cells. Peripheral administration of some intravenous chemotherapy is venous irritation leading to phlebitis that resulting from the chemical effects of the drug on the vein wall. Aloe vera gel has both anti-microbial and anti-inflammatory effects. Aloe vera Gel is more effective than routine treatment in reducing pain and severity of inflammation. The main aim of the study was to evaluate the effectiveness of aloe vera gel application on phlebitis among patients who received chemotherapy at selected hospital, Coimbatore. Non-randomized quasi experimental pretest - posttest with control group design was adopted in the study. By using non-probability purposive sampling technique 40 study participants were selected based on inclusion and exclusion criteria, 20 were assigned to the experimental and control group respectively. Pretest assessment on demographic variables, clinical variables, and the level of phlebitis was assessed for both experimental and control groups by using visual infusion phlebitis (VIP) scale. After the pretest, the investigator applied fresh aloe vera gel extract of 1ml topically to the experimental group and gauze dressing over it. The intervention of aloe vera gel application over the site of thrombophlebitis for 15 minutes, morning and evening 2 times a day for 3 days. In the control group, patients received routine care. After the intervention, the post test was done on fourth day by using visual infusion phlebitis (VIP) scale for both experimental and control groups. It was identified that the mean score of phlebitis among patients with phlebitis who received chemotherapy in experimental group was 0.6 ± 0.75 and in control group was 3.05 ± 1.31 . The estimated unpaired 't' value was 3.36 which is highly significant at p value 0.001. Hence, it was concluded that the aloe vera gel was an effective in reducing the level of phlebitis.

KEYWORDS: Aloe vera gel

application, Thrombophlebitis, Chemotherapy.

I. INTRODUCTION:

Vascular system is a large network of blood vessels and lymph vessels that moves blood and lymph throughout the body. The blood vessels carry and transport the blood from the heart to the tissues and organs in the body. They also carry oxygen and other gases, nutrients, and hormones to the tissues and they help the tissues get rid of waste products. The lymph vessels carry lymph from tissues in various parts of the body to the bloodstream through a large vein near the heart. The vascular system helps to maintaining body fluid and protects it from infection and disease (NIH, 2023).¹

Peripheral vascular disease (PAD) is a chronic progressive atherosclerotic disease can result partial or total peripheral vascular occlusion. Peripheral vascular disease typically affects the abdominal aorta, iliac arteries, lower limbs, and occasionally it will be affect the upper extremities. Peripheral vascular disease affects nearly 200 million people worldwide with increasing global concerns due to longer life expectancy and prolonged risk factor exposure (Gul et al., 2022).²

Peripheral intravascular catheters (PIVCs) are the most commonly used invasive medical devices in the intensive care unit (ICU). According to Workman IV therapy has become a pervasive world wide as a routine therapy. Nurse frequently insert, use and monitor million of peripheral venous catheter (PVC). It leads to phlebitis, bacteremia and septicaemia. Intravenous therapy is a technical-scientific process greatly executed by the nursing staff in hospitals. The peripheral access is performed by inserting a catheter in a peripheral vein, mainly in the dorsal venous network of the hands and forearm (Urbanetto et al., 2018).³

Numerous factors can contribute the development of phlebitis which includes factors

related to the patient, catheter, infusion solution, nursing practices. Factors related to the patients such as age, immunodeficiency, diabetes mellitus, skin elasticity, vascular quality. Factors related to the catheter such as catheter type, stiffness, and size. Factors related to the infusion solution such as high osmolality solutions, potassium chloride, amiodarone, and some antibiotics. Factors related to the nursing practice such as poor aseptic technique, insertion site, first attempt success, type of dressing, duration of infusion can affect PVC-related complications (Ozger et al. 2021).⁴

According to National Cancer Institute (2015) Chemotherapy is a type of cancer treatment that uses drug (powerful chemicals) to kill cancer cells. Peripheral administration of some intravenous chemotherapy is venous irritation leading to phlebitis that resulting from the chemical effects of the drug on the vein wall (Nagata et al., 2012).⁵

Phlebitis is the inflammation of a vein, accompanied by painful throbbing, and redness of the skin over the inflamed vessel and is a most common complication associated with the use of peripheral intravenous catheter caused by bacterial infection or local physical trauma (Kaur, 2019).⁶

Incidence rate of Peripheral vein phlebitis was 13–56% of hospitalized patients (Simin et al., 2019).⁷

In India, conducted a study by Mandal et al., (2019) has been reported 31.4%. The study results revealed that there was a increased incidence rate of phlebitis found among the female gender compare to male and age less than 60 years were mostly affected.⁸

Treatment and prevention of chemotherapy induced phlebitis, presently there is no proved and exact methods. Some preventative measures are proposed such as fast injection and diluting the chemotherapy, administration of topical corticosteroid, or anti-inflammatory drugs, immediate catheter removal, if superficial involvement of phlebitis then apply warm wet compress on the site and then, redetecting the vein (Shafipour et al., 2017).⁹

Many clients are seeking natural anti-inflammatory therapies such medicinal herbs as non-pharmacological therapy. Medicinal plants are natural and have fewer side effects. Likewise Aloe vera is also very much used in reducing pain and severity of inflammation (Ghorbani et al., 2016).¹⁰

Aloe vera gel has both anti-microbial and anti-inflammatory effects. Aloe vera Gel is more effective than routine treatment in reducing pain and severity of inflammation. The Aloe vera

contains 75 potentially active constituents which includes gibberlin reduce inflammation, lectins act as antioxidant and done purification, lignins provide penetrating power in skin and may act as a carrier for other components, glucose, mannose and glucuronic acid other polysaccharides including galctogalacturans and galctoglucoarabinomannas which effectively decrease inflammation and promoting healing. Aloe vera effectively reduces pain because it contains salicylic acid (Patel, 2019).¹¹

Need for the study

Peripheral intra venous catheter (PIVC) insertion is the most frequently performed procedure in hospital settings. Approximately 33–67% of hospitalized patients require at least one peripheral vein insertion. Peripheral vein catheters are required for administration of intravenous drugs, infusate solutions, blood products and parenteral feeding. It is as well necessary for access to vascular procedures (O'Grady et al., 2011).¹²

Infusion phlebitis has become one of the most common complications in patients with intravenous therapy. 80% of hospitalized patients receive intravenous therapy at some point during their admission. About 20% to 70% of patients receiving intravenous therapy develop phlebitis (Guanche-Sicilia et al., 2021).¹³

The Infusion Nurses Society (INS) (2021) indicates that the accepted phlebitis rate should be 5% or less. Currently the incidence rate of phlebitis incidence of 0.5% to 59.1% and it is estimated, with a prevalence of between 20 and 80% of patients following intravenous treatment.¹³

Australian Journal of Advanced Nursing (2015) revealed that Incidence of thrombophlebitis was 41.09 % at globally. In India, conducted a study by Patel R., (2019) to assess the effect of aloe vera gel in reducing pain and severity of inflammation among 40 thrombophlebitis patients. The study results revealed that in experimental group 42 % of them were developed inflammation whereas in control group 41% of them were developed inflammation.¹¹

Another study in India conducted by Tolpadi, A., et al. (2021) to assess the incidence of thrombophlebitis in peripheral venous cannulation among 11686 participants at Bharati Vidyapeeth (DTU) Medical College, and Hospital, Pune, Maharashtra, India. The study results found that 83.86% of them were developed grade 1 phlebitis, 15.04% of them were developed grade 2 phlebitis and 1.10% were developed grade 3 phlebitis.¹⁴

In Tamil Nadu, Chennai conducted a study by Pramila, B. S.P. (2012) on the level of

phlebitis among 30 patients with iv infusion therapy. The study results revealed that majority 80% of them were developed moderate level of phlebitis whereas only 20% of them were developed mild level of phlebitis.¹⁵

Numerous methods of pharmacological and non-pharmacological agents are available for relief of Pain and Inflammation. The effects of routine treatments such as external application of 75% alcohol or 50% to 75% magnesium sulphate (MgSO₄) are unsatisfactory. The cost and side effect are comparatively high in modern medicine. Therefore, there is an urgent need to develop new methods to prevent and alleviate infusion phlebitis (Zheng et al., 2014).¹⁶

New method of alternative non pharmacological therapy to cure phlebitis by applying aloe vera compress over it. Aloe vera is useful because it has low electrolyte concentrate, so it will not cause extravation (Irman et al., 2019).¹⁷

Phlebitis is the most common complication of intravenous Chemotherapy. It is one of the major concerns in the hospitalized patients who received chemotherapy. So the investigator during her clinical posting visited oncology ward and found many of them developed phlebitis. The investigator felt nurse's knowledge on proper management of phlebitis and early recognition of risk factors can reduce the phlebitis complications and it is the major responsibility of the nurse to find out the best method of intervention for this condition. So the investigator interest to intervene to reduce and prevent the level of phlebitis and its associated complications.

Statement of the problem

A study to evaluate the effectiveness of aloe vera gel application on phlebitis among patients who received chemotherapy at selected hospital, Coimbatore.

Objectives of the study

The main aim of the objectives was

1. To assess the level of phlebitis among patients who received chemotherapy.
2. To evaluate the effectiveness of aloe vera gel application on phlebitis among patients who received chemotherapy.
3. To find out the association between level of phlebitis and selected variables among patients who received chemotherapy

Hypotheses

H₁ : There is a significant difference in the level of phlebitis before and after aloe vera gel application in the experimental group.

H₂ : There is a significant difference in the level of phlebitis after aloe vera gel application between the experimental and control group.

H₃ : There is a significant association between the level of phlebitis with selected variables among patients who received chemotherapy.

Research Methodology

Quasi-experimental-pretest and posttest control group design was adopted in this study. The duration of the study from Dec 2021- Jan 2022 patients who received chemotherapy at Ashwin hospital, Coimbatore. The study was conducted with the approval from the principal, hospital authority, and the institutional ethics committee. Participants were explained clearly about the purpose of the study and a written informed consent was obtained from all the participants before conducting the study. Confidentiality of the responses were taken and maintained throughout the study. The present study was conducted among 40 chemotherapy patients who fulfilled the inclusion criteria and were recruited by using purposive sampling technique and were allocated to experimental (20) and control (20) group.

Data Collection

The data collection was carried out for one month. The formal written permission was obtained from the Principal, Ashwin Hospital Authority and college correspondence at PPG College of nursing, Coimbatore. The Institutional Ethics Committee for students gave the approval to conduct the study. A sample of 40 (20 in experimental group and 20 in control group) chemotherapy patients who had developed phlebitis were selected using the purposive sampling technique based on inclusion and exclusion criteria. The purposes of the study and their right to participate or withdraw from the study was explained to the patients for obtaining the written informed consent.

Aloevera gel (homemade gel) application is an alternative non-pharmacological treatment, alovera in a mashed form covered by gauze over the site of phlebitis for 15 minutes twice a day for 3 consecutive days.

Baseline data on demographic variables were collected using interview technique and other dependent variable level of phlebitis were checked by standard visual infusion phlebitis scale by maintaining privacy. The other clinical variables from the patient's case sheet were also recorded before the intervention. Ethical principles were adhered too throughout the study. Assessment on the level of phlebitis was done for both groups experimental and control by using visual infusion

phlebitis (VIP) scale. After the pretest the investigator applied fresh aloe vera gel extract of 1ml topically to the Experimental group and gauze dressing over it. The intervention of aloe vera gel application over the site of thrombophlebitis for 15 minutes, morning and evening 2 times a day for 3 days. In the control group, patients were received routine care. After the intervention, the post test was done on fourth day by using visual infusion phlebitis (VIP) Scale. The present study found that, the mean score of phlebitis among patients with phlebitis who received chemotherapy in experimental group was 0.6 ± 0.75 and in control group was 3.05 ± 1.31 . The estimated unpaired 't' value was 3.36 which is highly significant at p value 0.001. which indicates the aloe vera gel was very effective to reducing the phlebitis.

II. RESULTS

The study samples comprised of 40 chemotherapy patients (15 in experimental group and 15 in control group) with phlebitis. Out of 40 patients, in experimental group majority 13 (65%) were females and 10 (50%) of them were belonged to the age group between 36]-50 years whereas in control group, majority 11 (55%) of them were female and 8 (40%) of them were belonged to the age group between 36-50 years. The demographic variables represented in Table 1. Regarding Arm of cannulation, in experimental and control group, majority 13 (65%) & 14 (70%) had cannulated in left arm. The other clinical variables is shown in Table 2. The present study showed that, in experimental group during pre test, majority 8 (40%) had developed grade 2 phlebitis whereas after intervention majority 11 (55%) had no phlebitis symptoms. In control group, during pretest majority 7 (35%) had grade 2 phlebitis whereas after intervention, majority 7 (35%) had grade 2 phlebitis and 6 (30%) had grade 4 phlebitis. The level of phlebitis showed in Table 3 & 4. There was a mean difference noted between the pretest and post test level of phlebitis in both experimental and control groups. Comparison of mean and standard deviation between pretest and post test scores in both experimental and control groups was showed in Table 5 & 6. The experimental and control group posttest mean and standard deviation scores was 0.6 ± 0.75 & 3.05 ± 1.31 , respectively. The comparison of experimental and control group posttest scores was shown in Table 7.

III. DISCUSSION

The study samples comprised of 40 patients (20 in experimental group and 20 in control group) with phlebitis.

The present study found that during pre test, in experimental group, during pretest majority 8(40%) had grade 2 phlebitis, 5 (25%) had grade 4 phlebitis, 3 (15%) had grade 3 and grade 5 phlebitis, 1(5%) had very mild level of phlebitis and none of them have no sign of phlebitis whereas in posttest majority 11 (55%) had grade 0 phlebitis, 6 (30%) had grade 1 phlebitis and 3 (15%) had grade 2 phlebitis. In control group, during pretest majority 7 (35%) had grade 2 phlebitis, 5 (25%) had grade 4 phlebitis, 4 (20%) had grade 3 phlebitis, 2 (10%) had grade 1 and grade 5 phlebitis whereas in posttest majority 7 (35%) had grade 2 phlebitis, 6 (30%) had grade 4 phlebitis, 3 (15%) had grade 5 phlebitis 2 (10%) had grade 1 and grade 4 phlebitis and none of them have grade 1 phlebitis.

The study findings were supported by the study of Sharon Sumi, P. (2014) to assess the effectiveness of aloe vera extract application in reducing pain among 60 phlebitis patients (30 in experimental group and 30 in control group) in selected hospitals. The study results revealed that before intervention, majority 19(63.33%) had moderate level of pain, 11(36.67%) had severe pain whereas in control group, 17(56.67%) had moderate level of pain and 13(43.33%) had severe pain. After intervention In experimental group, 12(40%) had absence of pain, 18(60%) had mild pain and no one had moderate and severe pain. Whereas in control group, 2(6.67%) of the phlebitis patients had absence of pain, 18(60%) had mild pain and 10(33.37%) had moderate pain and no one had severe pain.¹⁸

The present study found that in both study and control groups, there was a significant mean difference noted in the mean scores (2.5 & 0.15) of the level of phlebitis between pretest and posttest at p value 0.001 & 0.50 respectively. In experimental group the estimated paired 't' value was 12.25 which is statistically significant at p value 0.001. It shows that Aloe Vera Gel Application was very effective in reducing the level of phlebitis among patients with Phlebitis who received Chemotherapy. In control group the estimated paired 't' value was 0.68 which is statistically non significant at p value 0.50. It shows that comparing to Aloe Vera Gel Application and routine care treatment, Aloe Vera Gel Application was best treatment to reducing the level of phlebitis among patients with Phlebitis who received Chemotherapy.

The above findings were supported by the study of Wahyuningsi, B. D., & Akbar, A. (2016) to assess the effect of Aloe Vera Gel application on Phlebitis among 19 patients with phlebitis were

selected from Wahidin Sudiro Husodo Hospital, Mojokerto, East Java. The study results revealed that before and after intervention the Phlebitis mean score decreased significantly from 3.60 to 1.20 and there was a significant mean difference

(2.4) noted between before and after aloe vera treatment at p value 0.001. They conclude Aloe vera treatment was very effective to reduce phlebitis.¹⁹

Table. 1 : Demographic variables of patients with phlebitis who received chemotherapy
n=40

S.No	Demographic variables	Number of patients				Chi-square value	P value
		Experimental group (n=20)		Control group (n=20)			
		Frequency	Percentage (%)	Frequency	Percentage (%)		
1	Age in years a. 21- 35 b. 36- 50 c. 51 – 65 d. Above 65	3 10 4 3	15 50 20 15	1 8 6 5	5 40 30 25	14.64	0.47 (NS)
2	Gender a. Male b. Female	7 13	35 65	9 11	45 55	1.93	0.85 (NS)
3	Marital status a. Married b. Single c. Widower d. Separated	13 2 3 2	65 10 15 10	14 1 4 1	70 5 20 5	8.43	0.90 (NS)
4	Dietary pattern a. Vegetarian b. Mixed	6 14	30 70	5 15	25 75	4.18	0.52 (NS)
5	Habits a. No b. Yes	12 8	60 40	8 12	40 60	10.86*	0.05 (S)

Table.2 : Clinical variables of patients with phlebitis who received chemotherapy
n=40

S. No	Clinical variables	Number of patients				Chi-square Value	P value
		Experimental group (n=20)		Control group (n=20)			
		Frequency	Percentage (%)	Frequency	Percentage (%)		
1	Arm of cannulation a. Right Arm b. Left Arm	7 13	35 65	6 14	30 70	8.92	0.11 (NS)
2	Cannula lumen a. 20 Gauge b. 22 Gauge	8 12	40 60	9 11	45 55	9.53	0.08 (NS)
3	Site of intravenous cannula a. Cephalic vein b. Basilic vein c. Metacarpal vein	3 6 11	15 30 55	3 4 13	15 20 65	10.32	0.41 (NS)

4	Duration of cannulation	2	10	2	10	12.79	0.61 (NS)
	a. < 24 Hours	5	25	6	30		
	b. 25- 48 Hours	12	60	10	50		
	c. 49 -72 Hours	1	5	2	10		
	d. >73 Hours						
5	Intravenous type of infusion	5	25	8	40	10.59	0.39 (NS)
	a. Continuous	4	20	2	10		
	b. Intermittent	11	55	10	50		
	c. Both						
6	Infusion method	2	10	2	10	14.77	0.46 (NS)
	a. Bolus	5	25	6	30		
	b. Gravitational	2	10	2	10		
	c. Infusion pump	11	55	10	50		
	d. Bolus and Gravitational						
7	Form of medication	11	55	8	40	14.4	0.15 (NS)
	a. Liquid form	1	5	1	5		
	b. Powder form	8	40	11	55		
	c. Both						
8	History of previous vascular disease	19	95	18	90	1.12	0.95 (NS)
	a. No	1	5	2	10		
	b. Yes						

**Table 3 : Pretest level of phlebitis among patients with phlebitis who received chemotherapy in experimental and control group
n=40**

S.No	Level of Phlebitis	Number of patients			
		Experimental group (n=20)		Control group (n=20)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1	Grade 0	0	0	0	0
2	Grade 1	1	5	2	10
3	Grade 2	8	40	7	35
4	Grade 3	3	15	4	20
5	Grade 4	5	25	5	25
6	Grade 5	3	15	2	10

**Table 4: Posttest level of phlebitis among patients with phlebitis who received chemotherapy in experimental and control group
n=40**

S.No	Level of Phlebitis	Number of patients			
		Experimental group (n=20)		Control group (n=20)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1	Grade 0	11	55	0	0
2	Grade 1	6	30	2	10
3	Grade 2	3	15	7	35
4	Grade 3	0	0	2	10
5	Grade 4	0	0	6	30

6	Grade 5	0	0	3	15
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Table 5: Analysis on the effect of Aloe vera gel application on phlebitis among patients with phlebitis who received chemotherapy in experimental group

n=40

Group	Level of phlebitis	Mean	Standard deviation	Mean Difference	Paired 't' test & p value
Experimental Group	Pretest	3.05	1.23	2.45	t= 12.25*** P=0.001
	Posttest	0.6	0.75		

***p<0.001

Table 6: Analysis on the effect of aloe vera gel application on phlebitis among patients with phlebitis who received chemotherapy in control group

n=40

Group	Level of phlebitis	Mean	Standard deviation	Mean difference	Paired 't' test & p value
Control group	Pretest	2.9	1.20	0.15	t= 0.68 P=0.50 (NS)
	Posttest	3.05	1.31		

p>0.05 Non significant

Table 7: Analysis on the effect of aloe vera gel application on post test level of phlebitis among patients with phlebitis who received chemotherapy

n=40

Level of Phlebitis	Mean	Standard deviation	Mean difference	Unpaired 't' test & p value
Experimental group	0.6	0.75	2.45	t = 3.36*** P=0.001
Control group	3.05	1.31		

***P<0.001

A similar study conducted by Lalithambigai, R. (2018) to assess the effectiveness of topical application of fresh aloe vera versus glycerine magnesium sulphate among 60 participants (30 in intervention group I & 30 in intervention group II) with phlebitis at government rajaji hospital, madurai. The study results revealed

that in intervention group I (Alo vera Gel), the pretest and posttest mean and standard deviation score of phlebitis was 2.70 ± 1.12 and 1.70 ± 1.36 respectively which was significant at p value 0.001.²⁰

The present study found that, there was a significant mean difference noted in the mean

scores (2.45) of posttest phlebitis score between experimental group and control group at p value <0.001. The estimated unpaired 't' value was 3.36 which is highly statistically significant at p value <0.001. It shows that Aloe Vera Gel Application was very effective to reducing the level of phlebitis among patients with Phlebitis who received Chemotherapy.

The above findings were supported by the study of Suhardono, S., et al., (2020) to assess the effect of aloe vera compress on phlebitis among 60 participants (30 in experimental group & 30 in control group) in local government hospital in Indonesia. The study results revealed that phlebitis incidence after intervention in experimental group was 6 (20%) while the control group was 13(43%). The number of phlebitis incidence in control group was higher than the experimental group at p value 0.004 or <0.05.²¹

The present study found that, there was a statistical significant association noted between level of phlebitis and habits at p value 0.05. Except habits other demographic and clinical variables not found significant association with the level of phlebitis at p value >0.05.

A similar study conducted by Vidhya, S. (2017) to assess the Effectiveness of aloe vera gel application versus magnesium sulphate application on reduction of intravenous phlebitis among adult patients in Annammal Hospital, Kuzhithurai. The study results revealed that there was no association found between the degree of phlebitis and selected demographic and clinical variables at p value >0.05.²²

Limitation

- Adult both male and female patients admitting one hospital were included.
- Study results may not generalizable to all age group of chemotherapy iv infusion induced phlebitis patients

Recommendations for further study

- A similar study can be conducted with a larger sample size.
- A cross sectional study can be conducted to identify the risk factors of phlebitis who received chemotherapy with IV infusion.
- Comparative studies can be conducted between two different interventions among patients with phlebitis.
- A similar study can be conducted two different setting with same intervention.
- An experimental study can be conducted in different age group of people with same facilities.

- Comparative study can be conducted to assess the effectiveness of aloe vera gel application and magnesium sulphate application on phlebitis among patients received chemotherapy infusion.
- A study can be conducted in two different settings with same intervention
- The study can be replicated with large number of samples which would facilitate generalization of findings.

IV. CONCLUSION

Phlebitis was found in chemotherapy patients. The presence of phlebitis was treated by . Aloe vera gel application. It is an alternative treatment method. Because Aloe vera gel have both anti-microbial and anti-inflammatory effects. The Aloe vera contains 75 potentially active constituents which effectively decrease inflammation and promoting healing. Aloe vera effectively reduces pain because it contains salicylic acid. Applying of the aloe vera externally, it helps to reduce inflammation, pain and it promote healing. Thus they expressed a greater level of healing with no pain.

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