

Relationship Of Age, Gender, Location Insertion And Catheter Size Of Incidence PhlebitisPaul Joae Brett Nito¹, Setiawati², Murtiningsih²¹STIKES Sari Mulia Banjarmasin²STIKES Ahmad Yani, Cimahi

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ABSTRACT

Background: Children is a hope of future that must be protected and cared for as well as possible. Children are at risk of having health problems, one of them phlebitis. Phlebitis is an inflammation or irritation of the vein walls caused by mechanical, chemical, bacterial or internal factors. Phlebitis incidence in Indonesia in 2013 is about 50,11% for Government Hospital and 32,70% Private Hospital. **Objective:** This study aims to determine the relationship of age, gender, location insertion and catheter size that cause phlebitis in the ward of children Ulin Hospital Banjarmasin. **Methods:** An observational analytic study with a cohort approach. Sampling technique used is consecutive sampling. Data were collected using respondent's observation sheet and Visual Infusion Phlebitis Scale (VIP Scale). Data analysis using chi-square test. The sample of this study were children who received intravenous therapy with 80 children. **Results:** The results showed that age, sex, location insertion and catheter size no significant relationship with phlebitis incidence ($p > 0.05$). **Conclusion:** These findings suggest that nurses have to improve the ability to determining the risk of phlebitis occurrence in patients.

Keyword: children, risk factors, phlebitis, Visual Infusion Phlebitis Scale

BACKGROUND

Children are highly vulnerable individuals experiencing health problems due to immature system and immunity.^{1,2} This causes the child to be hospitalized for treatment and invasive treatment during the healing process.^{3,4} One of the therapies obtained is therapy intravenously. Intravenous therapy is the administration of fluids or drugs into the venous blood vessels in a certain amount and time through the installation of infusion or vein catheter.⁵ Intravenous therapy will certainly cause physical distress (pain^{1,6}) for children and complications of thrombophlebitis, embolism, local infection, edema lung, circulatory overload⁷, extravasation, ecchymosis, hematoma, nerve trauma, venous spasm, infiltration and phlebitis.^{5, 8, 9}

Phlebitis is one of the most frequent complications of intravenous therapy.^{7,9,10} Overview of the literature suggests that 5-70% of patients receiving intravenous therapy experience phlebitis.¹¹ The phlebitis occurrence reported in the Nagpal et al (2015) study revolves around 2, 3 - 67%¹², whereas according to Oliveira et al (2010) and Salgueiro Oliveira A et al (2013) phlebitis incidence ranged from 3.7 to 67.24%.^{13,14} The incidence of phlebitis in Indonesia according to the Ministry of Health of Indonesia in 2013 was amounted to 50.11% for Government Hospital, while Private Hospital was 32.70%.¹⁵

Phlebitis is a condition in which the vein is inflamed, characterized by pain in the area of stabbing, tenderness, swelling, erythema, redness and a hard palpable vein¹⁶. Many factors are involved in the incidence of phlebitis, among others: internal factors (age^{17,18,19}, nutritional status, stress, venous condition, patient disease conditions such as DM) and external factors (mechanical factors, chemical factors, bacterial factors).^{5,20,21,22,23,24,25,26}

Known risk factors can be used as a reference in preventing phlebitis. Betty Neuman mentioned that in the effort to maintain the defense system in dealing with stressor there are three prevention efforts as nursing interventions that can be done, namely primary, secondary and tertiary. Efforts to reduce the risk of phlebitis is one of the primary 'preventive measures' by Neuman in preventing stressors from deeper into the defensive line.²⁷

METHOD

Researchers used an observational analytic research design with a cohort study. This research data was collected from May 24 to June 27, 2017. Observations made to the research sample is by assessing the degree of phlebitis using VIP Scale. Observation of the research sample was conducted for 24 hours by researcher/ research assistant who had previously done inter-rater reliability test (kappa coefficient value of 0.894). Sampling using consecutive sampling with inclusion criteria that

have been determined by the number of samples as much as 80.

RESEARCH ETHICS

This research has been tested by Ethics Committee of High School of Health Sciences Achmad Yani Cimahi, and the ethics committee of Ulin Banjarmasin Regional General Hospital.

VALIDITY AND RELIABILITY

Phlebitis status uses VIP Scale. VIP Scale has validated, interrater reliability, and clinically feasible. Nekuzad (2012) has confirmed the validity and reliability with correlation coefficient value of 0.93.^{28,29,30,31,32}

Result

Table 1.Frequency Distribution of Respondents by Age and

Gender			
No	Variables	Frequency	%
Age			
1	Adolescent	6	7,5
2	School-age	20	25
3	Pre School	11	13,8
4	Toodler	23	28,8
5	Infant	20	25
Gender			
1	Male	43	53,8
2	Female	37	46,2

Table 2 Frequency Distribution of Respondents by Location of Insertion, Catheter Size, and Phlebitis

No	Variables	Frequency	%
Location of Insertion			
1	Antecubital	22	27,5
2	Dorsum	58	72,5
Catheter Size			
1	26 G	17	21,3
2	24 G	63	78,7
Phlebitis			
1	No	68	85
2	Yes	12	15

The distribution of respondents (Table 1) most at the time of the study were children with toddler age as many as 23 people (28.8%) and male gender 43 people (53.8%). A number of

respondents (table 2) location insert IV most dorsum area 58 people (72.5%). Catheter size using size 24G 63 people (78,7%). The incidence of phlebitis is 12 people (15%).

Table 3 The relationship of research variables with phlebitis occurrence

Variables	Phlebitis		p-Value
	Yes (n=12) f (%)	No (n=68) f (%)	
Age			
Adolescent	1 (16,7)	5 (83,3)	0,183 ^a
School-age	0 (0)	20 (100)	
Pre School	1 (9,1)	10 (90,9)	
Toodler	5 (21,7)	18 (78,3)	
Infant	5 (25)	15 (75)	
Gender			
Male	6 (14)	37 (86)	1,000 ^b
Female	6 (16,2)	31 (83,8)	
Location of Insertion			
Antecubital	1 (4,5)	21 (95,5)	0,164 ^c
Dorsum	11 (19)	47 (81)	
Catheter Size			
26 G	5 (29,4)	12 (80,6)	0,118 ^c
24 G	7 (11,1)	56 (88,9)	

^a Pearson Chi-Square, ^b Continuity Correction, ^c Fisher's Exact Test

Based on bivariate test results obtained a p-value of variable age, gender, insertion location and catheter size are > 0.05 this means there is no relationship between age, sex, location insertion and catheter size against the incidence of phlebitis.

DISCUSSION

a. Age

Based on the results of bivariate analysis found that age has no significant relationship with the incidence of phlebitis (p value $> 0,05$). Nevertheless, the results showed that infant age (0-12 months) was the highest sample with phlebitis (25%) compared with the age of only 1 person (16.7%). A very young age causes the physiological condition of blood vessels susceptible to irritation or

trauma. A very young age causes the condition of the immature blood vessels to be optimal and the still venous integrity³³.

Research Wallis MC et al (2014) states that very young age has a greater risk of developing phlebitis. Very young age is very susceptible to health problems, one of them phlebitis.^{1,2,21,23,25,29,33,34,35,36,37}

The results of this study are in line with the results of research conducted by Endorgan BC & Denat Y (2016), Jacinto AKL et al (2014), Tertuliano et al (2014), Salgueiro-Oliveira A et al (2013), Rego Furtado (2011) Uslusoy E & Mete S (2008), Nassaji-Zavareh M & Ghorbani R (2007) and Malasch T et al (2006) concluded that there was no significant association between age and phlebitis occurrence.^{38,39,40,41,42}

In contrast to results of research conducted by Laundenbach N et al (2014) and Wallis MC et al (2014) concluded that age has a significant relationship with phlebitis occurrence.

Infants have different blood vessel anatomy with adults, very small veins that are prone to phlebitis. Characteristic blood vessels that babies have the elasticity that is more rigid, very thin, fragile and higher capillary permeability so it is easier to fluid shift from intravascular space to extravascular space. Baby's skin is very susceptible to tissue damage because its structure is still immature, very thin, the epidermis and dermis are not interrelated or loose.^{43,44,45,46}

b. Gender

Based on the results of bivariate analysis found that gender does not have a significant relationship with the incidence of phlebitis (p value > 0,05). The result of the research (bivariate) showed that phlebitis samples with male gender were 6 people (14%) while in female gender there were 6 people (16,2%). There is not much explanation as to why gender influences the phlebitis incidence in a person. However, phlebitis occurs more frequently in female due to smaller female blood vessels, large fat deposits and female hormones (estrogen and progesterone) that affect the integrity of blood vessels, whereas in male blood vessels fewer fat deposits result from high activity not too risky in phlebitis.^{47,48,49}

The results of this study are in line with the results of research conducted by Erdogan BC & Denat Y (2016), Chiu PC et al (2015), Salgueiro Oliveira A et al (2013), Rego Furtado (2011), Uslusoy E & Mete S (2008) which showed no significant relationship between gender and phlebitis occurrence.^{13,19,26,34,40} However, the study conducted by Lakdawala YA et al (2016), Abolfotouh MA et al (2014) and Lanbeck et al (2003) concluded that gender had a significant association with phlebitis incidence and was a risk factor for the occurrence of phlebitis in which female gender had a greater risk than men.^{50,51,52}

c. Insertion Location

Based on the result of the bivariate analysis, insertion location did not have a significant relationship with phlebitis occurrence (p value > 0,05). The results of the study (bivariate) showed that there were 1 (4.5%) of phlebitis in the antecubital area, while in the dorsum area there were 11 people (19%). Location of insertion of area IV catheters more often causes phlebitis, for example on the dorsum. When the limb is moved the IV catheter is attached to move and cause trauma to the vein wall.⁵³ This is because the dorsum of the hand is an easy part to move, when the patient moves can follow the movement of the IV catheter so that there is friction and injure the blood vessel walls and the cause of trauma to the blood vessel wall due to the friction of the IV catheter with blood vessel wall.^{26,40,54,55} The results of this study are in line with the results of research conducted by Enes SMS *et al* (2016), Salgueiro Oliveira A *et al* (2013), Fang L *et al* (2011), Regueiro Pose M *et al* (2005) between insertion sites and the incidence of phlebitis.^{13,56,57,58} However, the insertion sites in the Cicoline *et al* (2009 and 2014) and O'Grady *et al* (2011) studies showed a significant association with the incidence of phlebitis.^{22,24, 59} Cicoline G *et al* (2009) mentioned the location of the insertion on the dorsum of the hand has a greater risk of fluctuation⁵⁹ and the Cicoline G *et al* (2014) study showed the location of IV catheter infestation in the antecubital

section reduced the risk of phlebitis occurrence.²²

During the observation of the researcher, the location of insertion of the IV catheter chosen by the nurse was the dorsum area of the hand. The dorsum area of the hand is a very easy area to see blood vessels, especially in infants. However, the anatomical blood vessels on the dorsum of the hands of many branches, have a small size and easy to move and thin subcutaneous layer.⁶⁰

In addition, most of the samples obtained using the right-hand dorsum as the insertion location. The nurse who performed the correct IV infusion/ catheter because the right-hand position was chosen because of the location of IV catheter insertion. Moving/ rotating the location of IV catheter insertion is a phlebitis prevention measure.

d. Catheter Size

Based on the result of the bivariate analysis, it was found that catheter size had no significant relationship with phlebitis incidence (p value > 0,05). The results showed that phlebitis samples on the use of catheter size 26 G were 5 people (29.4%) while the size was 24 G 7 people (11.1%). The size of the IV catheter is too large compared to the size of the vein, inadequate cannula fixation, excessive system ambulation and uncontrolled limb movements can lead to phlebitis. The small size of the IV catheter decreases the

likelihood of traumatic distress caused by a catheter with a wall of blood vessels. The size of the IV catheter should fit the vein size, and be well fixed. Improper use of IV catheters may increase the occurrence of trauma to the blood vessel wall.^{24,29,35}

The results of this study are in line with the results of research conducted by Enes SMS et al (2016), Tertuliano AC et al (2014), Salgueiro Oliveira A et al (2013), Fang L et al (2011), Uslusoy E & Mete S (2008), Nassán-Zavareh M & Ghorbani R (2007), Abbas S et al (2007), Ferreira LR et al (2007), Regueiro Pose M et al (2005), Rivas Doblado J et al (2004) there was no significant relationship between the size of the catheter and the incidence of phlebitis.^{54,56,57,58,61,62}

Nevertheless, some researchers highlight the advantages of using a catheter with a small size. This is because the small size of the IV catheter reduces the likelihood of traumatic arising from the friction of the IV catheter with the blood vessel wall. According to research Gorski L et al (2016), Helm RE et al (2015), O'Grady et al (2011), Cicolini G et al (2009) and Rego Furtado (2011) concluded that improper use of IV catheters may increase phlebitis events.

During the observation of the researcher, when the IV catheter was installed, the nurse chose the 24G catheter more. The room nurse says that for the first baby to use is a

24G measure, this is a procedural act that all nurses have done. However, in case of difficulties caused by certain conditions (small or hard-to-find veins) the 26G size will be used. The use of a 26G size IV catheter is commonly used in intensive care for infants and children.

24G size is actually allowed for children, catheter size for children can use size 22-26G and for babies use size 24-26G. However, if the patient's blood vessels are difficult to identify (especially infants) then smaller sizes are recommended to adjust to the size of the blood vessels.^{60,63}

CONCLUSION

Nurses should be able to analyze the possible risk of phlebitis occurrence to patients.

LIMITATION

Limitations experienced by researchers include the fulfillment of the number of samples. Although it meets the required number of samples of the study (80 samples), however, judging by age characteristics the number of samples is not appropriate. Researchers argue that the number of samples that have been used by researchers is still small, considering this research is a cohort study, of course, require a larger sample and longer research time.

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