

## Investigating Role of Mechanical and Chemical Factors in the Creation of Peripheral vein in Flammarion in hospitalization Patients in hospital in zahedan , Iran

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**Abstract:** Application of Intera Vascular catheters has been doubled in over the last 20 years consequently it is expected that effects caused by them will increase. Phlebitis is one of the most prevalent intravenous therapy causing therapeutic costs and hospitalization period to increase never the less it is detectable and preventable present research has been contented with the aim of identifying the phlebitis incidence rate in peripheral veins among patients with catheter and its effective factors in zahedan medical- surgical wards. Present study is a descriptive one 300 patients. Having had catheter at least for 72 hours at the reception time hospitalized in medical- surgical wards of imam ali and khatamd anbia hospitals were included in the study by sampling method. All patients had no vascular diseases; taking no immune suppressive drugs with normal upper organs. Instruments used in this study were as follows: data registration paper containing demographic profile, medicine intake and its frequently, IV access site, cause and catheter removing time smoking, hospital period and society of specialist nurse's phlebitis scale checklist for vein injections. Scientific validity of instrument was estimated by contest validity and scientific validity was assessed by final scale method among observers and identification of correlation coefficient Data was analyzed by SPSS software and K2 descriptive statistics. Results showed that % 44 of units under investigation were afflicted with phlebitis and % 75 of cases had phlebitis type 2. The most occurred cases of phlebitis appeared in the first 40-49 hours. Among phlebitis incidence and personal factors age, schooling, drug consumption, hospitalization period and also chemical stimulation factors (type and frequency of intake antibiotic injection, type of injected liquid, and additives included in the serum) was observed. Statistical meaningful correlation with % 95 reliability coefficient. With regard to the relatively high prevalence of phlebitis, it is essential to implement effective and regular training program in order to promote knowledge and awareness level of nurses in terms of intravenous therapy.

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### 1. Introduction

What we are today known as intravenous therapy is a highly technical and specialized treatment which is not only for acute patients, but is also used for 80-90 percent of patients in wards <sup>[26]</sup>. The most common methods of attack – treatment in each hospital is placement of intravascular devices that is used to provide fluids, medications, blood transfusion and its compounds, preparation of blood samples and even advanced procedures such as angiography and etc. <sup>[25,19]</sup>. Although the extents of using the intravascular devices is unknown, But so it is estimated that annually more than 500 million intravenous catheter be placed for patients in the world <sup>[21]</sup>. That 150 million it in North America <sup>[19]</sup> and 24 million catheters in England placed <sup>[6]</sup>. Phlebitis is the most common complication of intravenous therapy which in this case there is inflammation with

pain along the vein <sup>[18]</sup>. Diagnosis of this complication is clinical and it is based on pain symptoms, redness, swelling, warmth and stiffness at the Vein <sup>[16,7,4]</sup>. Damage and irritation of vein endothelial cells caused release histamine, and serotonin and Cynin Brady that these chemical mediators caused pain, dilate blood vessels and increasing blood flow respectively. They also increase permeability and finally sensitivity occurs <sup>[22]</sup>. Phlebitis is diagnosed with continuous observing in primary stages <sup>[13]</sup>. Two groups of factors are involved in the creation of phlebitis, 1 - Chemical factors such as stimulants drugs and injecting fluids with high Osmolality. 2 - Mechanical factors such as size and diameter of catheter, catheter nature, the site of catheter placement, the duration of using it and craft in placement of catheter <sup>[25]</sup>.

Craft in placement catheter technique is the main factor in prevention of phlebitis [17]. Also select appropriate vein and catheter exit time [10]. Monitoring insert catheter location per 8 hours is other factor in prevention of phlebitis [8]. Macklin (2003) stated that a number of factors such as neutropenia, poor nutrition, receiving immunosuppressant's drugs and peripheral neuropathy, which impairs the patient's sense are caused to delay in phlebitis symptoms. Incidence of phlebitis is different in various countries. Zhang and colleagues (2003) have reported the incidence of this complication in Australia 2/3 percent and 7 percent in America. Also have been reported 22 percent in France and Germany 27/1 percent. (Barbut, 2003) & (Grune and colleague, 2004) and in Spanish 1.8 percent it has been reported [9]. Depending on hospital conditions, it is announced 27 to 70 percent in Iran. Therefore determining the incidence of phlebitis, we can be showed the current situation of complication that if the incidence is high, it will be able to find strategies to reduce it. And so will be create greater security for the patient. This study aims to estimate the incidence rate of phlebitis and involved factors that some experts considered them effective in phlebitis, presented an appropriate assessment of the situation in hospitals of Zahedan.

## 2. Material and Methods

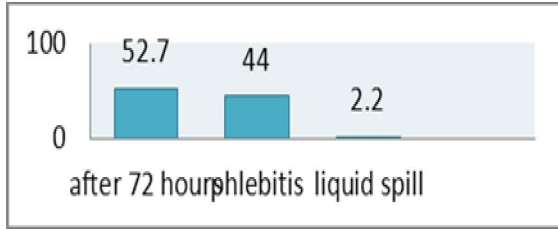
In this descriptive study, based on the formula of 300 patients admitted in different internal - Surgical wards of Imam Ali and Khatam hospital need to be treated intravenously at least 72 hours had over 18 years old and under 65 years, with normal limb upper and they hadn't underlying disease such as: leukemia, immune system deficiency, and dermatitis, and had full alertness and ability to participate for performing project and they researched by method of available and suitable sampling with number of beds in each wards. Raw data from data recording forms and symptoms of phlebitis check list had been collected that had different parts such as: (demographic data, medications, information about the catheter, placement location, cause and time of catheter removal, the number of days of hospitalization, smoking and symptoms of phlebitis Table ). Also to determine the severity of phlebitis was used from severity rating table (Deanly, 2000) which was similar to Nurses Association specialist table in intravenous injection (2007). For determining scientific validity of gathering tools were used from content validity index method and also for trust of scientific were used from reliability of scale between all observers and coefficients of correlation. It means that check list was seen and data recording form simultaneously complete by the researcher and

training supervisor on 20 patients admitted in different wards and review for 72 hours, the agreement between observers was calculated by using the inter categorical coefficient of correlation. So, the results were above 95 percent. The method of data collection was as follows that entering the desired wards, patients were selected who had catheter placement on the same day Dictionaries detailed dictionary between 0 - 12 early hours were eligible and research criterion, then their demographic and medical information record according to file and caudex and phlebitis scale which was based on the clinical symptoms were recorded every 12 hours for 72 hours by the researcher. Criteria for phlebitis was grades higher than 2 in phlebitis scale and for determining severity of phlebitis was used from Deanly (2000) severity rating table which follows we saw. Phlebitis zero class: No pain, swelling, redness and stiffness vein. First class of phlebitis: lack of swelling and stiffness vein, but the vein is painful and brief redness occurs. Second class of phlebitis: vein is swollen, red and sore, but vein is not stiff and palpable. Third class of phlebitis: vein is swollen, red and painful, and stiffness is felt about an inch (2.5 cm) above the injection site. Fourth class of Phlebitis: vein is swollen, red and painful, and stiffness is felt more than one inch above injection site and vein is palpable. During the study, sex and type of catheter was fixed. At first, data collected was encoded and then were examined with using S.P.S statistical software and descriptive statistics and K 2 tests.

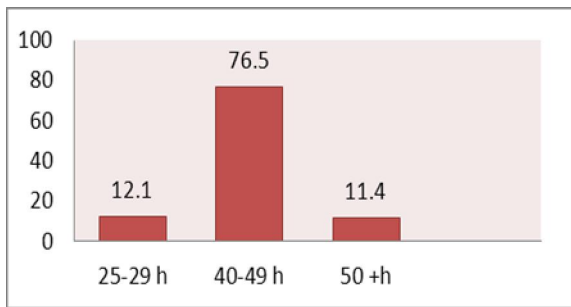
## 3. Results

Results showed that 52 percent of studied units were men and 48 percent were women. The highest percentages (43.7 percent) of units were above 40 years old and mean and standard deviation of studied units were 38.41 and 13.46 years, respectively. The highest percentages (71.7 percent) of units were admitted less than 5 days in the ads. The catheter No. 20 had the most common frequency catheter size (72 percent) in the samples. Site of the catheter placement in (6 percent) cases was on the right hand of units and the most common areas of catheter placement (28.3 percent) were on the back of hand anatomically. The highest percentage (43.7 percent) of type of intake antibiotic was ceftriaxone in the units. Also, the most common frequency of serum and additives materials of serum was sugary - salty serum (54.6 percent) and heparin (10/3 percent), respectively. Incidence of phlebitis of studied units was 44 percent. (0.39-49 =0.95) (Chart 1). 15.9 percent of phlebitis is the first class type, 75.80 percent are the second class type, 6.1 percent are the

third class and 2.2 percent are in the fourth class. In 56.5 percent of studied units, phlebitis was created in back of hand, 47.8 percent in the wrist, 25 percent in



front of the forearm and 44.6 percent of phlebitis in elbow (Antekobital space). Most times the incidence of phlebitis (76 / 5 percent) in the studied units was among 40-49 hours (Chart 2).



**Chart 1:** Distribution of relative frequency of studied units in terms of catheter removal factor

**Chart 2:** Distribution of relative frequency of studied units in terms of creation time of phlebitis after catheter placement (according to time)

Highest percentage (50.4) of phlebitis was in patients older than 41 years. Using the K 2 test was seen meaningful correlation between age and incidence of phlebitis. ( $X^2=8.046$ ,  $df=2$ ,  $P=0.018$ ). The highest frequency of phlebitis (77.4 percent) was related to smoker patients which was seen meaningful correlation by using K 2 test. ( $X^2=29.07$ ,  $df=1$ ,  $P=0.00$ ). Highest percentage incidence of phlebitis (81.2 percent) was related to the units that of their hospitalization were 5 – 10 days and the lowest incidence of phlebitis (29.3) was observed in units that were hospitalized less than 5 days and K 2 test means the significant correlation. ( $X^2=66.52$ ,  $df=1$ ,  $P=0.00$ ). Percentage of phlebitis in women was 49.3 percent and in men was 39.1 percent, so that women almost 1.25 times as much were at risk of phlebitis than men (Odds Ratio =1.25). But K 2 test showed no significant correlation between the incidences of phlebitis sex ( $X^2=3.16$ ,  $df=1$ ,  $P=0.075$ ). Other findings of this study were a significant correlation between phlebitis and chemical stimulation factor.

(Type and number of antibiotics, serum, and additive material of serum) (Table 1)

Variables	Number Of samples	The number of Patients with phlebitis	the incidence of phlebitis (Percentage)	Amounts Of P test	K 2 test
<b>Type of antibiotic</b>					
Penicillin G	33	29	87/9	P =0/00	28/97
Ceftriaxone	131	76	58	P =0/00	18/53
Klindomysin	13	12	92/3	P =0/00	12/87
Vancomycin	4	3	75	P =0/227	14/92
<b>Type of serum</b>					
Sugary (D/W)	37	32	86/5	P =0/00	37/11
Sugary-Salty	179	73	43		
Ringer	5	2	40		
No serum	79	25	31/6		
<b>Additives into serum</b>					
Hypertonic glucose	2	2	100		
Potassium chloride	12	11	91/7	P =0/00	24/4
Aminophilin	11	8	72/7		
Dilantin	14	9	64/3		
Heparin	31	8	25/8		
Hadn't	230	94	40/9		

Finally, among intake antibiotics in wards, clindamycin, penicillin G. and Ceftriaxone has the highest percentage occurrence of phlebitis and according to type of serum, sugary serum showed the highest incidence of phlebitis? Hypertonic glucose and potassium chloride compared to other additives into the serum, showed more phlebitis. Variables such as size of catheter and capacity of serum had no significant statistical correlation.

#### 4. Discussions

The results of this study showed that the incidence of phlebitis was 44 percent, while the incidence of phlebitis in other research was including Brooz and colleagues (2004) in Malayer, 37.5 percent, Seraji (2002) in Khomein 18.5 percent, Aslani (2000) in Shahr Kord 36.1 percent, Zhang and colleagues (2003) have been reported the incidence of phlebitis in America 7 percent and in Australia 2.3 percent. Comparison of results of similar research in Iran and elsewhere of world suggests that the percentage of phlebitis in presented research is more than above research and it has distance with acceptable incidence of phlebitis that in view of Nursing Association of the intravenous injection is 5 percent. In this study, the time of causing phlebitis in

majority of studied units was 40 – 49 early hours that the other investigations, such as Grune and colleagues (2004), Gonzalez Lopez and colleagues (2009) show that the incidence of phlebitis increases with remaining catheter in the vein over 72 hours, which not match with the study's findings. And this difference could be related to following factors. Such as: placement techniques, research environment and quality of cares. In this study, the correlation between the locations of catheter placement based on right (dominant) or left (non dominant) hand and the anatomic site was significant with phlebitis rate. Since, catheter placement in majority of units (62 percent) was on the right hand (dominant). So we can say that everyday activities in their care according to the catheter placement site could be involved a mechanical factor in the incidence of phlebitis. Other findings include the significant correlation between individual characteristics (age, education and smoking and duration of hospitalization) and the rate of phlebitis. This means that the age could be a risk factor for phlebitis. Other investigations such as Barbut (2003) and Macklin (2003) also shown that increasing age have correlated with the incidence of phlebitis. According to significant correlation between education and phlebitis, we can see it because of related to better quality education of literacy person than illiterate persons in care of intravenous lines. Considering that with increasing hospitalization duration, the percentage of nosocomial infection rises, increasing of incidence phlebitis will be expected with increasing duration of hospitalization Asteraceae was the dominant family in pine forest because most of the species of the family are primary successional and have different types of growth forms. This family showed basal as well as erect forms in which basal forms emerged near the ground-level with well-developed petioles and formed a short-umbrella (Mehrotra, 1998). They can tolerate cool temperatures to high irradiances with low density of herb cover. However, erect forms are less able to capitalize on the spring window of light than any other form. This showed that the different growth forms reflect a mixed type of forest response (harsh dry to mesic). Moreover, basal forms of Violaceae showed affinity to medic and cold conditions under the oak forest. Few species are able to tolerate the entire spectrum of environment and range throughout the gradient (Brown, 2001).

Our study showed that perennials gained dominance over annuals in oak forest as well as pine forest (Figure 1). Perennial have ability to conserve soil and with their extensive root systems of perennial grasses they also add more organic matter to the soil than annuals which can be more favorable for plant growth. Singh and Singh (1987) observed

that annuals colonize and dominate the early stages of succession. Annuals to perennials species ratio are higher at primary successional site than climax stage. Species richness generally increases during secondary succession when environmental and edaphic conditions are favorable with low fluctuations. The above results indicate that the oak forest makes climax stage for succession. The evenness and  $\beta$ -diversity showed similar values in sub-sites of oak as well as pine forests. The high values of beta-diversity indicate that the species composition varied from one stand to another. Equitability/evenness varied in pine forest with respect to sub-site from 27.3 (HB) to 31.4 (HT) (Table 3). This was because of the conditional presence or absence of functional relationship of species. Comparatively higher value of equitability in pine forest with respect to oak forest indicated that the individual herb species distribution is higher. This may perhaps due to intermediate level of disturbance.

The allocation of species in the Kumaun Central Himalaya is mainly governed by moisture and temperature gradients that incorporate the effect of many physical factors. Moustafa (1990) found that the association of community types is the result of the performance of the species in response to the environmental conditions that prevail in a particular forest type. Tewari (1982) assumed that the temperature gradient is the net product of elevation and aspect; while moisture gradient is a function of slope degree, soil texture and nature of soil surface. In addition to that, hierarchical diversity concerns taxonomic differences at other than the species level. Pielou (1975) and Magurran (1998) suggested that hierarchical (taxonomic) diversity would be higher in an area in which the species are divided amongst many genera as opposed to one in which most species belong to the same genus, and still higher as these genera are divided amongst many families as opposed to few. The families, genera and species ratio was observed maximum in the pine forest as compared to the oak forest in the present study (Table 4), indicating diverse taxonomic vegetation in the pine forest.

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