



A STUDY TO FIND ASSOCIATION BETWEEN CONTRIBUTING FACTORS AND DEVELOPMENT OF PHLEBITIS FOLLOWING PERIPHERAL INTRAVENOUS CANNULATION AMONG ADULT PATIENTS FROM A TERTIARY CARE HOSPITAL

Nursing

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ABSTRACT

Background: Peripheral intravenous cannulation is one of the most commonly performed invasive procedures in hospitalized adult patients. Despite its routine use, phlebitis remains a frequent complication leading to pain, interruption of therapy, and increased risk of infection. The development of phlebitis is influenced by multiple factors related to the patient, catheter, drugs administered, and nursing practices. Identifying these contributing factors is essential to improve patient safety and quality of care. **Objectives:** To find the association between contributing factor and development of phlebitis among adult patients following Peripheral Intravenous cannulation. **Methods:** An observational cross-sectional analytical study was conducted among 100 adult patients following Peripheral Intravenous cannulation at a tertiary care hospital in Maharashtra. Data were collected using a standardized assessment tool. The Visual Infusion Phlebitis (VIP) score, recommended by the Infusion Nurses Society (INS), was used to assess and grade phlebitis among patients with peripheral intravenous catheters. In addition, a structured questionnaire was employed to identify and analyse the association between contributing factors and the development of phlebitis following peripheral intravenous cannulation. Statistical analysis was performed using descriptive and inferential tests. **Results:** A total of 100 adult patients aged 18–60 years were included in the study. The majority of subjects belonged to the 31–40 years age group (37%), followed by 18–30 years (32%). Males constituted 54% of the study population, while females accounted for 46%. The incidence of phlebitis following peripheral intravenous cannulation was 59% (n = 59), whereas 41% (n = 41) of subjects did not develop phlebitis. Based on the Visual Infusion Phlebitis (VIP) scale, 41% of subjects had Grade 0 (no phlebitis), 15% had Grade 1, 31% had Grade 2, and 13% had Grade 3 phlebitis. No cases of Grade 4 or Grade 5 phlebitis were observed. A statistically significant association was observed between the duration of cannulation and the development of phlebitis ($\chi^2 = 100$, df = 5, $p < 0.001$). The highest number of phlebitis cases occurred among subjects whose cannula remained in situ for 61–72 hours. Cannulation site was significantly associated with phlebitis occurrence ($\chi^2 = 46.02$, df = 4, $p < 0.001$), with higher incidence noted at the wrist and forearm. Admission unit also showed a significant association ($\chi^2 = 19.44$, df = 3, $p < 0.001$), with increased phlebitis cases observed in surgical units and intensive care units. The type of intravenous fluid administered demonstrated a statistically significant association with phlebitis ($\chi^2 = 9.38$, df = 4, $p = 0.043$). Phlebitis was the primary reason for peripheral intravenous cannula removal in all affected subjects, showing a significant association between phlebitis occurrence and cannula removal ($\chi^2 = 100$, df = 4, $p < 0.001$). No statistically significant association was found between phlebitis and age ($\chi^2 = 1.37$, df = 3, $p = 0.71$), gender ($\chi^2 = 2.47$, df = 1, $p = 0.11$), cannula size ($\chi^2 = 4.09$, df = 2, $p = 0.12$), stabilization material ($\chi^2 = 0.11$, df = 2, $p = 0.94$), number of cannulations ($\chi^2 = 1.69$, df = 2, $p = 0.42$), or use of infusion pumps ($\chi^2 = 2.61$, df = 1, $p = 0.10$). **Conclusion:** Despite that the Visual Infusion Phlebitis (VIP) scale should remain a standard practice for the early detection and prevention of phlebitis. Vigilant monitoring of contributing risk factors, along with efficient nursing practices such as regular site assessment and timely intervention, is essential in reducing complications related to prolonged catheter use. These measures can enhance patient safety and minimize unnecessary catheter removals and replacements.

KEYWORDS

Phlebitis; Peripheral Intravenous Cannulation (PIVC); Visual Infusion Phlebitis (VIP) Scale; Contributing Factors; Adult Patients; Nursing Care; Tertiary Care Hospital

INTRODUCTION

Phlebitis is derived from the Latin term *phlebo*, meaning vein, and the suffix *-itis*, denoting inflammation, and refers to inflammation of the venous wall. The condition was first described in medical literature by John Hunter¹. When venous inflammation is accompanied by thrombus formation, it is termed thrombophlebitis. Phlebitis remains a common vascular complication in clinical practice, particularly in hospitalized patients. Its occurrence is closely associated with intravenous therapy and venous access devices².

Peripheral intravenous catheters are widely used in modern healthcare to administer continuous and intermittent therapies. Although the intravenous route ensures complete drug bioavailability, prolonged catheterization can lead to venous irritation and inflammation. Phlebitis typically presents with pain, redness, swelling, and warmth along the affected vein. It most commonly involves superficial veins and is frequently related to mechanical or chemical irritation from IV cannulation. Early identification and prevention are essential to minimize complications and improve patient outcomes³.

This study aimed to find association between contributing factors and development of phlebitis among adult patients receiving peripheral intravenous cannulation in a tertiary care hospital in Maharashtra.

Objectives

Primary Objective:

1. To find the association between contributing factor and development of phlebitis among adult patients following Peripheral Intravenous cannulation.

Secondary Objectives:

1. To assess the incidence of Phlebitis among adult patients admitted in Medical Surgical Units following peripheral intravenous cannulation.
2. To assess the grade of phlebitis among adult patient following Peripheral Intravenous cannulation.

MATERIALS AND METHODS

Study Design & Setting: A descriptive, quantitative study was conducted at a tertiary care hospital in Maharashtra.

Sample: 100 adult patients following peripheral intravenous cannulation were from selected tertiary care hospital by Non-Probability Purposive sampling method.

Inclusion Criteria: Subjects who did not develop phlebitis up to 18 hours of peripheral intravenous cannulation were included in the study.

Exclusion Criteria: Subjects with pre-existing phlebitis prior to IV cannulation.

Tool: A structured and validated questionnaire was used to collect demographic data and to identify the contributing factors responsible for the development of phlebitis. The Visual Infusion Phlebitis (VIP) scale was used to assess the presence and severity of phlebitis and to determine its association with the identified contributing factors.

Data Collection: Ethical clearance was obtained from the institutional ethics committee, and informed consent was taken from all subjects. Data were collected using a structured, validated questionnaire to gather demographic variables and identify contributing factors, along with the Visual Infusion Phlebitis (VIP) scale to assess the presence

and severity of phlebitis.

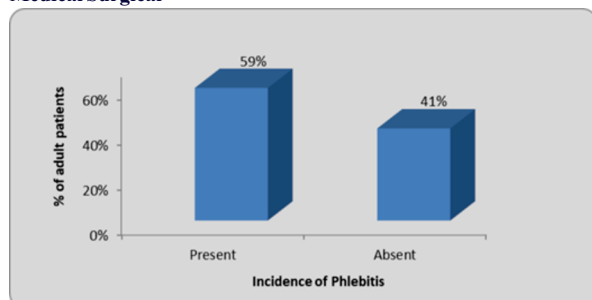
Analysis: Descriptive statistics (frequency, mean, SD) and inferential tests (Pearson's correlation, chi-square) were applied using SPSS.

RESULTS

Section A: Percentage Wise Distribution Of Subjects According To Their Demographic Characteristics.

Demographic Variables	No. of subjects (f)	Percentage (%)
Age in years		
18-30 yrs	32	32 %
31-40 yrs	37	37%
41-50 yrs	17	17%
51-60 yrs	14	14%
Gender		
Male	54	54%
Female	46	46%

Section B: Assessment Of Incidence Of Phlebitis Among Subjects Following Peripheral Intravenous Cannulation Admitted In Medical Surgical



Section C: Assessment Of Grades Of Phlebitis Among Subjects Following Peripheral Intravenous Cannulation

Grade of Phlebitis	Score Range	Percentage
Grade 0	41	41%
Grade 1	15	15%
Grade 2	31	31%
Grade 3	13	13%
Grade 4	-	-
Grade 5	-	-
Total	100	100%

Section D: Association Of Contributing Factors And Development Of Phlebitis Among Subjects Following Peripheral Intravenous Cannulation

Demographic Variables: No significant association was found between phlebitis and age or gender.

Associated Contributing Factors: Development of phlebitis was significantly associated with duration of cannulation, site of cannulation, type of intravenous fluid administered, and admission unit.

Non-associated Factors: Cannula size, stabilization material, number of cannulations, and use of infusion pumps did not show a significant association with the development of phlebitis.

DISCUSSION

The present study identified a high incidence of phlebitis among adult patients following peripheral intravenous cannulation, indicating that phlebitis remains a common complication in tertiary care settings. A significant association was observed between phlebitis development and duration of cannulation, with increased risk noted when cannulas were retained for prolonged periods. This finding supports existing evidence that extended catheter dwell time contributes to venous irritation and inflammation, emphasizing the importance of regular assessment and timely cannula replacement.

Cannulation site, type of intravenous fluid administered, and admission unit were also significantly associated with phlebitis occurrence. Higher rates were observed with cannulation at the wrist and forearm, possibly due to increased movement and mechanical irritation. Certain intravenous fluids, such as Ringer Lactate and 5% dextrose, were associated with greater phlebitis incidence, likely

related to their chemical properties. Additionally, patients admitted to surgical units and intensive care units demonstrated a higher risk, which may be attributed to prolonged intravenous therapy and increased clinical interventions in these settings.

In contrast, demographic variables including age and gender, as well as factors such as cannula size, stabilization material, number of cannulations, and use of infusion pumps, showed no significant association with phlebitis. The effective use of the Visual Infusion Phlebitis (VIP) scale enabled early detection and timely intervention, preventing progression to severe grades. These findings highlight the importance of vigilant nursing practices, routine monitoring, and adherence to intravenous therapy protocols to minimize phlebitis and enhance patient safety.

CONCLUSION

Based on the findings it was interpreted that VIP (Visual Infusion Phlebitis) scale should remain a standard practice to help reduce the incidence of phlebitis. The need for vigilant monitoring of contributing factors that may increase the risk of complications. Efficient nursing practices, including proper site assessment and timely intervention, play a crucial role in preventing issues related to prolonged catheter use. By focusing on these strategies, patient safety can be improved while minimizing unnecessary catheter removals and replacements.

Limitations

- The study was conducted in a single tertiary care hospital, limiting the generalizability of the findings.
- The observation period was limited to 72 hours, which may not capture late-onset phlebitis.

Recommendations

- Large-scale, multi-centre studies to validate findings.
- Monitoring patients beyond 72 hours, including follow-up after catheter removal, could help identify post-infusion phlebitis.

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