

Original Article**Superficial Veins in the Cubital Fossa Regions among the Nepalese and Indian Medical Students of a Medical College in Nepal: A Descriptive Cross-Sectional Study**

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Article Received: 20th March, 2024; Accepted: 27th April, 2024; Published: 30th June, 2024DOI: <https://doi.org/10.3126/jonmc.v13i1.68109>**Abstract****Background**

The veins in the upper limb are classified as superficial or deep, with deep veins, such as the venae comitantes and axillary vein, coming after the major arteries. The subcutaneous tissue contains the superficial veins, which link to the deep veins. These veins include the basilic, cephalic, median cubital, and median antebrachial veins. These superficial veins are clinically significant for phlebotomy, transfusion, and cardiac catheterization, and it joins the median cubital vein at the elbow. It is essential to comprehend the structure and patterns of cubital superficial veins in order to design dialysis access and minimise hazards.

Materials and Methods

Studying the superficial venous organisation in the cubital fossa of 192 MBBS preclinical sciences students, ages 18 to 24, was a cross-sectional observational study carried out at the Nobel Medical College Teaching Hospital in Nepal. A tourniquet and skin marker/tailor's chalk were used in the study to examine 384 anterior aspects of the arms. Six sets of veins were distinguished from the skin's veins. Tiny veins, cubital wounds, or thick tissue layers disqualified students.


Results

A study of 192 preclinical sciences students at Nobel Medical College Teaching Hospital in Biratnagar found that type II variant was the most common venous pattern in the cubital fossa region, followed by type I in 24.75%, and the lowest being the type VI pattern in 3.35%.

Conclusion

It was discovered that the patterns of superficial veins at the cubital fossa did not significantly alter based on the gender or nationality of the individual. Overall, the most common venous pattern was type II, though type I was more frequently seen in female subjects but the difference was statistically insignificant.

Keywords: *Arm, Axillary Vein, Forelimb, Phlebotomy, Subcutaneous tissue*

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Introduction

Veins of the upper limb are divided into deep and superficial groups. Deep veins comprise of axillary vein and the venae comitantes, which follow all major arteries [1].

Veins in the superficial fascia, which includes median cubital, median antebrachial, cephalic, and basilic veins, have varying behavior patterns and connect to deep veins [2].

The cephalic vein forms around the snuffbox, curved along the forearm's radial side. It ascends through superficial fascia and drains into the axillary vein in the infraclavicular fossa. The basilic vein, starting in the hand's dorsal venous network, ascends through superficial fascia and joins the brachial artery's venae comitantes [1, 3]. The median cubital vein connects the forearm to the elbow, forming the cubital fossa, a deep groove filled with fat, located anterior to the distal humerus and elbow joint [3].

Superficial veins, located in the superficial fascia, are essential for venipuncture, transfusion, and cardiac catheterization, often invisible in shock patients. Understanding their architecture is crucial for dialysis access planning. [1, 3]

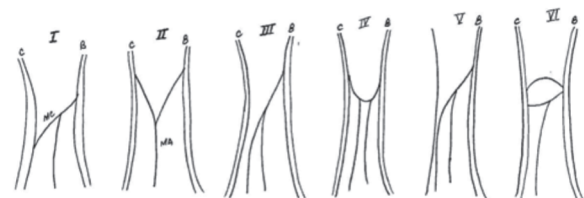
Understanding anatomical features of venipuncture sites is crucial to avoid complications. This study aimed to identify common venous patterns and changes in superficial vein distribution in healthy medical students due to their clinical significance.

Materials and Methods

This cross-sectional observational study was carried out at the anatomy department of the Nobel Medical College Teaching Hospital in Morang, Nepal. This study was carried out for a period of one year starting from November 2021 to June 2023. An ethical clearance certificate was obtained from the Institutional Review Committee before starting the study (Ref. no. 439/2021). Sample size calculation was done using the formula, $n = Z^2 p(1-p)/d^2$ where, n is the required sample size. Z is the Z-score corresponding to the desired confidence level (e.g., 1.96 for 95% confidence). p is the estimated prevalence of the condition, which is 36.7% prevalence of type I venous pattern [3]. d is the desired precision (margin of error). So, using the formula, $n = (1.96)^2 \times 36.7 \times 63.3/5^2 = 3.84 \times 36.7 \times 63.3/25 = 356.83$. Since the sample size should be a whole number, round up to the next whole number 357 cubital fossa, that is to say 179 individuals.

The study was carried among the 192 MBBS preclinical sciences students out of which 130 were Nepalese and 62 Indians, the pattern of

superficial venous organisation in the cubital fossa was examined in 384 anterior aspects of the arms. The study included all healthy Nepalese and Indian students, aged 18 to 24, who gave their written consent. Students who did not give their consent, had thick tissue layers, cubital wounds, or tiny veins measuring less than 1 mm were excluded from the study. The following tools were used to collect data: a tourniquet, and a skin marker/tailor's chalk. By actively moving the hand and applying a tourniquet around 10 cm in front of the elbow crease, the superficial veins of the cubital fossa were brought to light. The veins were identified on the skin, and each subject's hand's left and right vein patterns were separately marked using the tailor's chalk. The pattern of the veins was drawn in a sheet of paper. These patterns were thoroughly examined and evaluated and classified under the following six groups. Group I: The Median Cubital Vein that arises from the cephalic vein joins the basilic vein (N-type) Group II: The Median antebrachial veins bifurcate into two in the cubital fossa region and they join the cephalic and the basilic vein (M-type) Group III: The Cephalic and the basilic vein do not communicate with one another. Group IV: A proximally arching vein connects the cephalic and basilic vein. Group V: Only the Basilic vein is present in the cubital fossa region. Group VI: The cephalic and basilica veins are joined by two median cubital veins



Data collected was entered in Microsoft Office Excel 2021 and further analysed using SPSS version 20. The chi-square test was applied to compare the significant difference between the venous arrangements of superficial veins with gender. A p-value <0.05 was considered as significant.

Results

This study was carried out in 192 subjects (384 cubital fossa region) who were studying in their preclinical sciences at Nobel Medical College Teaching Hospital, Biratnagar. Out of the total participants 114 were males and 78 were females. 130 subjects who were included in the study were Nepalese whereas 62 subjects were from India.

We found that the most common type of venous pattern in the cubital fossa region was the type II



variant with 109 (28.4%) of cases followed by type I pattern in 95 (24.75%) subjects. The least common type of cubital venous pattern was found to be type VI with the lowest incidence of 13 (3.38%) cases. Various different venous pattern along with their frequencies on the right and left arm are shown in the Table 1.

Table 1: showing distribution of Venous pattern in the Cubital fossa of right and left side

Pattern	Total Percentage	On the Right Cubital fossa	On the Left Cubital fossa
I	24.75	27.6	21.9
II	28.4	21.4	35.4
III	19.8	20.8	18.8
IV	12	16.7	7.3
V	11.7	10.4	13
VI	3.35	3.1	3.6

In the current study we found that the most common venous pattern seen in Nepali students was type II whereas that among the Indian students was type I, though the difference was statistically insignificant as shown in Table 2 and Table 3.

Table 2: showing distribution of Venous pattern in the right Cubital fossa of Nepalese and Indian subjects

Nationality	I	II	III	IV	V	VI	Total	p-value
Nepali	33	34	26	22	12	3	130	0.2
Indian	20	7	14	10	8	3	62	
Total	53	41	40	32	20	6	192	

Table 3: showing distribution of Venous pattern in the left Cubital fossa of Nepalese and Indian subjects

Nationality	I	II	III	IV	V	VI	Total	p-value
Nepali	22	51	28	10	16	3	130	0.07
Indian	20	17	8	4	9	4	62	
Total	42	68	36	14	25	7	192	

In this study we found that the most common superficial venous pattern in the cubital fossa was type III for male subjects and type I for female subjects in the right arm whereas type II for both male and female subjects on their left arm as shown in the Table 4 and Table 5.

Table 4: showing distribution of Venous pattern in the right Cubital fossa of Male and Female subjects

Gender	I	II	III	IV	V	VI	Total	p-value
Male	20	30	32	22	10	0	114	0.00
Female	33	11	8	10	10	6	78	
Total	53	41	40	32	20	6	192	

Table 5: showing distribution of Venous pattern in the left Cubital fossa of Male and Female subjects

Gender	I	II	III	IV	V	VI	Total	p-value
Male	21	51	18	12	12	0	114	0.00
Female	21	17	18	2	13	7	78	
Total	42	68	36	14	25	7	192	

From the current study it was interesting to see that the superficial venous pattern of same subjects in the right arm and left arm showed significant difference (p-value 0.00) as shown in the Table 6.

Table 6: showing distribution of Venous pattern on the left and right Cubital fossa of the same subjects

		Left Cubital Fossa						p-value	
		I	II	III	IV	V	VI		Total
Right Cubital Fossa	I	31	14	4	2	2	0	53	0.00
	II	3	26	6	2	4	0	41	
	III	6	14	16	2	2	0	40	
	IV	0	14	8	6	4	0	32	
	V	2	0	2	2	13	1	20	
	VI	0	0	0	0	0	6	6	
	Total	42	68	36	14	25	7	192	

Discussion

From the current study we noticed that the influence of Nationality of the subject was not significant on the venous pattern present in the cubital fossa region of the superior extremities whereas the gender of subject had a statistically significant influence on the venous pattern present in the cubital fossa region. Also, the p-value (0.00) for the venous pattern on the right and the left cubital fossa of the same individual was found to be statistically significant showing that the same individual had a higher chance of having similar superficial venous pattern in his both arms.

From our study we found that the most common type of venous pattern in the cubital fossa region was the type II variant where the median antebrachial vein bifurcates to join the cephalic and basilic vein. This pattern of superficial veins is also well known as the M-type. We found that 28.4% of the subjects presented with this particular venous pattern. The results were very much similar with those from the study of JasinkiRand Poradnik E (32.5%), Sah et al (30.6%), Ukoha et al (27.8%), Melaku et al (25.7%), Hamzah et al (24%) [3-7]. In contrast to this study Vasudha TK reported that this particular venous pattern was found in 88% of the subjects which was very high in comparison to the findings of this study [8].



Also, Bekal et al reported 58.5% of subjects with this type of venous pattern which was supported by the findings of Vucinic et al (52.4%) and Lee et al (46.7%) [9-11]. Also several authors reported very low incidence of this venous pattern in their studies (0.78% Mikuni et al; 16.2% Dharap and Shaharuddin; 17.4% AlBustami et al; 10% Tripathi R [12-15].

In this study we found that the second most common type of venous pattern was type I pattern (24.75%). This pattern is also N-type. The results were comparable to that of the studies carried out by several other authors whose findings were 28.2%, 33.65%, 37%, 38.7% respectively [3, 5, 7, 10]. In contrast to the findings of the current study various studies suggest higher incidence of this venous pattern as high as 82%, 68%, 57%, 50.1%, 48.45% and 43.7% respectively [4, 11-15]. Also, a very low incidence of this venous pattern was reported by Vasudha TK (4%), and Bekal et al (18.6%) respectively [8, 9].

The third most common pattern that we noticed was the one where there was no communication between the cephalic and the basilic veins (19.8%). This was quite similar with the findings of Sah et al (15.3%), Bekalet al (14%) and AlBustami (13.2%) but higher than the findings of Vasudha TK (4%), Ukohaet al (4.1%), Vucinic et al (5%), Mikuni et al (7%), Dharap and Shaharuddin (8.3%) and Melaku et al (10.1%) respectively [3, 5, 8-14].

We found that the type VI venous pattern was the one with the lowest incidence (3.35%). The findings were similar with the findings of AlBustami F, Vucinic et al and Dharap and Shaharuddin [10, 13-14]. Sah et al also reported a low incidence of this pattern (5.9%) but the lowest being the type V pattern with the incidence of 4.2% [3].

From this study we found that the type II venous pattern was very common in the Nepalese subjects (32.69%) followed by type I (21.15%) and type III (20.77%) whereas in the Indian subjects the most common venous pattern was type I (32.26%) followed by type II (19.35%) and type III (17.75%) respectively. The findings of venous pattern of Indian subjects were similar to that reported by Hamja et al who found that in Indian subjects the commonest venous pattern was type I (38.5%) followed by type II (27.5%) and type III (21.5%) [7].

From this piece of work we also found that the most common venous pattern in male subjects were type II (35.53%) followed by type III (21.93%), type I (17.98%), type IV (14.95%) and

type V (9.6%) respectively. No male subjects were noted with type VI venous patterns. In case of female subjects the most common venous pattern was type I (34.61%) followed by type II (17.95%), type III (16.67%), type V (14.74%), type VI (8.33%) and type IV (7.69%) respectively. To determine the different patterns of superficial cubital veins among undergraduate medical students studying preclinical sciences, we employed a non-invasive technique. Further dissection of cadavers will be necessary to gain further insight into the diversity of cubital veins. Gaining greater knowledge about the many sorts of vein patterns found in various ethnic groups may increase people's awareness of these odd cubital vein patterns and enable safer medical operations.

It is crucial to comprehend the common anatomy and the patterns of superficial vein anastomosis at the cubital fossa region. Understanding the variations of superficial veins at the cubital fossa would be beneficial for several medical procedures, including venous blood sample, transfusion, infusion, intravenous therapy, and placement of dialysis access. The textbooks have discussed few common patterns, but this piece of work has uncovered some unusual patterns as well.

Conclusion

It was discovered that the patterns of superficial veins at the cubital fossa did not significantly alter based on the gender or the nationality of the individual. Overall, the most common venous pattern was type II, though type I was more frequently seen in female subjects but the difference was statistically insignificant.

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Conflicts of interest: None

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