

# Variation in Branching Pattern of Dorsalis Pedis Artery- A Cadaveric Study

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## Abstract

**Background:** The present study was conducted to assess the variation of the branching pattern of the dorsalis pedis artery. **Subjects and Methods** : The present cadaveric study was conducted on 46 lower limbs of both genders. Dorsalis pedis artery was identified and tracked down, the origin, branching pattern and the course were noted. **Results:** Out of 46 limbs, 26 were of males and 20 were of females. Type A was seen in 24, B in 8, C in 3, D in 3, E in 2, F in 1, G in 1, H in 1, I in 1 and J in 2 cases. The difference was significant ( $P < 0.05$ ). **Conclusion:** Authors found that the Dorsalis pedis artery has variations in branching patterns. The most common type identified was type A.

**Keywords:** Dorsalis pedis artery, Limb, Foot

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## Introduction

Dorsalis pedis artery is the main source of blood supply to the dorsum of the foot. Dorsalis pedis artery is an easily accessible artery for assessing pedal pulsations. [1] The most preferred site for palpation of dorsalis pedis artery is against the navicular bone, however it can be palpated from midpoint between the malleoli to the proximal end of the first intermetatarsal space. [2] The dorsalis pedis artery is also known as the dorsal artery of the foot and is the major arterial supply to the forefoot. It is a continuation of the anterior tibial artery at the talocrural joint just distal to the inferior extensor retinaculum. It runs to space between the first and second metatarsals and divides into the first dorsal metatarsal artery and the deep plantar artery, which contributes to the deep plantar arch. [3]

A diminished or absent dorsalis pedis pulse usually suggest vascular insufficiency. However, some healthy individuals may have a congenitally non-palpable dorsalis pedis pulse. In these cases there is a variation in the termination pattern of the anterior tibial artery. [4,5]

With changing lifestyles, and increasing stress, mankind is more liable for diseases like diabetes and hypertension. Diabetic neuropathy leads to foot infections and ischemia, leading to the risk of major amputations. In the efforts of salvaging the ischemic limb, DPA bypass acts as a major

role. [6] The dorsalis pedis artery (DPA) with its major branches is the preferentially used recipient vessel. The myocutaneous dorsalis pedis arterialised flap can be safely used as an island flap, to cover the ankle or heel and as a free flap for palm defects. [6] The present study was conducted to assess the variation of the branching pattern of the dorsalis pedis artery.

## Subjects and Methods

The present cadaveric study was conducted in the department of Anatomy. It comprised of 46 lower limbs of both genders. Ethical approval for the study was obtained before starting the study.

Limbs were dissected lower down from the level of the ankle joint on the dorsal aspect till the level of the webspace, the long Extensor tendons were severed, dorsalis pedis artery was identified and tracked down, the origin, branching pattern and the course were noted. Results were statistically analysed with a level of significance at 0.05.

## Results

[Table 1] shows that out of 46 limbs, 26 were of males and 20 were of females.

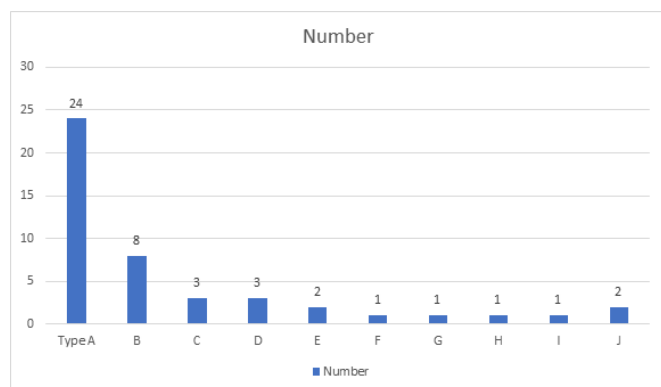
**Table 1: Gender wise distribution**

Total- 46		
Gender	Male	Female
Number	26	20

**Table 2: Branching in dorsalis pedis artery**

Branching	Number	P-value
Type A	24	0.02
B	8	
C	3	
D	3	
E	2	
F	1	
G	1	
H	1	
I	1	
J	2	

[Table 2, Figure 1] shows that type A was seen in 24, B in 8, C in 3, D in 3, E in 2, F in 1, G in 1, H in 1, I in 1 and J in 2 cases. The difference was significant ( $P < 0.05$ ).

**Figure 1: Branching in dorsalis pedis artery**

## Discussion

Variations in the blood vessels and their anomalous course can be attributed to their development.<sup>[7]</sup> Tiny blood vessels derived from the blood islands in the 3<sup>rd</sup> or 4<sup>th</sup> week of development, merge and form a continuous network, from which buds grow out, canalise and form new vessels.<sup>[8]</sup> New vessels of the neighbourhood areas form a closed network. Depending on the functional dominance, some vessels regress and others diverge in the mode of origin and course from the

principal vessel.<sup>[9]</sup> The dorsalis pedis artery is noted for its variations. A different pattern of dorsalis pedis artery is as follows-Type A: Normal branching pattern of dorsalis pedis artery. Type B: 2<sup>nd</sup> DMA directly arose from DPA and 3<sup>rd</sup> and 4<sup>th</sup> DMAs were given by LTA. Type C: 2<sup>nd</sup> DMA directly arose from plantar arch and 3<sup>rd</sup> and 4<sup>th</sup> DMAs were given by LTA. AA was absent. Type D: 2<sup>nd</sup> DMA directly arose from DPA and 3<sup>rd</sup> and 4<sup>th</sup> DMAs were given by plantar arch. AA was absent.<sup>[9]</sup> Type E: Arcuate artery arising higher at Cuneonavicular joint rather than its normal position at the tarsometatarsal joint. Type F: DPA took a lateral course and terminated into the 2<sup>nd</sup> and 3<sup>rd</sup> DMAs. FDMA and 4<sup>th</sup> DMA arose from the plantar arch. AA was absent. Type G: AA was absent and 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> DMA were given by plantar arch. Type H: AA were absent; 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> DMA were given by plantar arch. Type I: AA were absent; 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> DMA were given by plantar arch. Type J: DPA was hypoplastic, it terminated just below the ankle into two terminal branches; MTA and LTA. AA was absent and all DMA's were given by plantar arch.<sup>[10]</sup> The present study was conducted to assess the variation of the branching pattern of the dorsalis pedis artery.

In the present study, out of 46 limbs, 26 were males and 20 were females. Vijayalakshmi et al,<sup>[11]</sup> found that fifty free lower limbs were dissected and the origin, course and branching pattern of dorsalis pedis artery were studied. 50 free lower limbs were collected from the anatomy dissection hall. The dorsalis pedis artery was dissected and its origin, course and branching pattern were studied. Dorsalis pedis artery was found to have a normal course and branching pattern in 56%, variation in origin in 8%, variation in branching pattern in 16%, absence of the artery in 2% and duplication in 2% of the specimens studied. As variation in dorsalis pedis artery is not uncommon, it is essential to have a sound knowledge about the artery. It is advisable to have preoperative angiography for any abnormality, to prevent risks during surgical intervention.

We found that type A was seen in 24, B in 8, C in 3, D in 3, E in 2, F in 1, G in 1, H in 1, I in 1 and J in 2 cases. Mamatha et al,<sup>[12]</sup> found that in one specimen the dorsalis pedis artery was found to have a short straight course and divided into medial and lateral branches. The medial branch continued as the first dorsal metatarsal artery and joined the plantar arch. The lateral branch coursed obliquely towards the head of the other metatarsal bones and gave off the second, third and fourth metatarsal arteries which coursed in the inter-metatarsal spaces.

## Conclusion

Authors found that Dorsalis pedis artery have variations in branching patterns. The most common type identified was type A.

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