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Congenital Limb Anomalies in Bangladesh: A Focus on Polydactyly Incidence of Upper Limb

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Abstract

Polydactyly is a frequent congenital hereditary anomaly characterized by the presence of supernumerary digits affecting the hands and/or feet. Owing to its wide spectrum of phenotypic presentations and underlying genetic causes, it represents an informative model for studying clinical variability and genetic heterogeneity. A cross-sectional, descriptive study was conducted in the Department of Orthopaedic Surgery of Mymensingh Medical College Hospital, Bangladesh, between July 2022 and June 2023, to determine the incidence of polydactyly in a Bangladeshi population. Polydactyly was observed exclusively in the upper limbs during this study. A total of 385 (200 male and 185 female) patients were enrolled in this study selected from Orthopaedic Surgery Outpatient Department (OPD) of Mymensingh Medical College Hospital. We recorded the data in the case record form. The overall incidence of polydactyly was 8(2.08%) across the total sample population. Polydactyly was observed in 3.0% of males and 1.08% of females representing 6 and 2 cases respectively. The findings regarding the incidence of polydactyly in the Bangladeshi population provide a valuable reference for clinical anatomists, orthopaedic surgeons, anthropologists, forensic expert and archaeologists.

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Introduction

Polydactyly is a congenital limb malformation characterized by the presence of accessory digits. Anatomically, these extra digits are classified based on their location: postaxial (ulnar or fibular), preaxial (radial or tibial), or central (mesoaxial).[1,2] Epidemiological data indicate a higher prevalence in Black populations compared to White populations, with a documented predilection for male infants over females.[3] The condition is primarily characterized by an autosomal dominant inheritance pattern, exhibiting both variable expressivity and incomplete penetrance.[4] Due to mutations occurring across diverse loci, the disorder demonstrates significant genetic heterogeneity.[5-7] While often hereditary, sporadic cases frequently arise in the absence of familial history or concurrent congenital anomalies. The reported incidence remains relatively low, ranging from 0.3 to 3.6 per 1,000 live births.[8] Clinical manifestation typically occurs during the neonatal period or within the first few months of life; however, delayed presentation in adolescence or adulthood is documented. Primary indications for seeking medical consultation include anaesthetic concerns, localized pain, and functional limitations of the affected extremity. Furthermore, delayed surgical intervention may lead to significant psychological sequelae stemming from the malformation.[9] The standard of care remains the surgical excision of the supernumerary digit. In the context of polydactyly surgery, a nerve block is widely considered essential, not just as a "backup" but as a primary pillar of the surgical plan. It serves two critical functions: surgical anaesthesia (numbing the area for the operation) and post-operative analgesia (long-term pain relief).[10] The objective of the current study was to determine the incidence of human polydactyly within the study population and to perform an exhaustive comparative analysis with existing global epidemiological data.

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Methods

This cross-sectional, descriptive study was conducted between July 2022 and June 2023, in the Department of Orthopaedic Surgery of Mymensingh Medical College Hospital, Bangladesh. A total of 385 participants (200 male and 185 female) were recruited from the Orthopaedic Surgery Outpatient Department (OPD) using a simple random sampling technique. Observations in this study were limited to upper limb polydactyly, with no instances of extra digits identified in the lower extremities. We recorded the data in the case record form. Data included demographic characteristics, family history, polydactyly record including photographs (Fig. 1–3) and mobility/function difficulty.

Data was expressed as frequency and percentage. Data was analysed using MS-Excel sheet in the computer.

The study was approved by the Institutional Review Board (IRB) of Mymensingh Medical College, Mymensingh, Bangladesh.

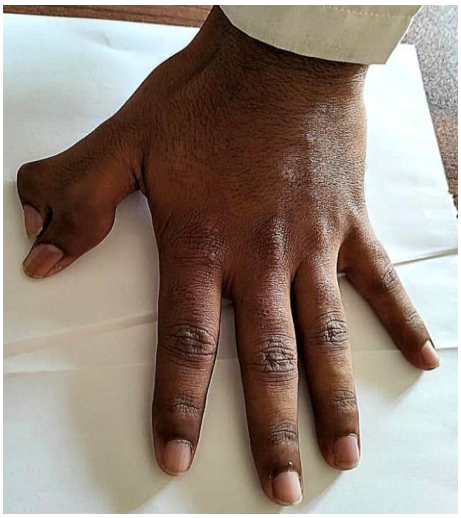

Fig.1: Photograph showing polydactyly in the left upper limb of a male.

Fig. 2: Photograph showing polydactyly in the right upper limb of a male.

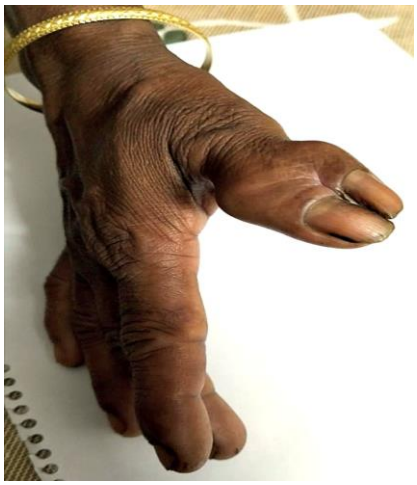

Fig. 3: Photograph showing polydactyly in the right upper limb of a female.

Results

Clinical assessment of the study population revealed the presence of polydactyly, localized to the upper extremities. The overall incidence of polydactyly within the study population was 8(2.08%). A higher prevalence was noted among male participants at 6(3.0%) compared to 2(1.08%) in female (Table-I).

Table-I: Incidence of polydactyly (upper limbs) among study participants (N=385)

Polydactyly	Frequency	Percentage
Total	8	2.08
Male (n=200)	6	3.0
Female (n=185)	2	1.08

Discussion

The observed incidence of upper limb polydactyly in the current study was 2.07%. This frequency aligns closely with the findings of Malik (2014),[2] who reported a prevalence of 3.6%. Conversely, our results indicate a markedly higher incidence compared to the 0.12% reported by Bubshait (2022).[11] In this study, incidence of polydactyly demonstrated a sex-based variance, occurring in 3% of male subjects compared to 1.08% in female subjects. The incidence rates observed in the current study exceeded those previously reported by Mellin (1963)[12] and Castilla *et al.* (1973)[13] – both identified a lower frequency of polydactyly. Surgical treatment is directed towards achieving a functional limb with an acceptable cosmesis. Surgical goals include thumb reconstruction and selective ablation of supranumery digits.[10] During reconstruction, balancing of intrinsic muscles and tendon transfers are necessary for preserving thumb function. Any relevant surgery needs to address the aesthetic and functional aspect of limb reconstruction in polydactyly patients. Careful consideration and planning of surgical treatment individualized to each patient is required to obtain the best possible outcome.[10]

Conclusion

The male predominance observed in this study aligns with global trends, though the elevated incidence rates suggest that regional genetic factors or improved diagnostic reporting may be at play. While often presenting as an isolated sporadic occurrence, the identification of an extra digit necessitates a thorough clinical investigation to distinguish between non-syndromic cases and those associated with complex multisystem disorders.

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