Pattern of Fingerprints and Its Association with Gender among Medical Students of Peshawar Medical College

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**INTRODUCTION**

Dactylography is the scientific investigation of fingerprints for identification. The theory holds that the skin on the balls of the fingers and thumbs has unique ridges that remain consistent throughout life. No two hands have the same pattern. Identification refers to the determination of a person's individuality. There are two sorts of individuality: complete and incomplete. Complete refers to an emphasis on distinct characteristics. Partial or partial identification involves determination of only little information about a person [1]. Extensive research has been conducted on the patterns and characteristics of fingerprints, highlighting their potential as indicators of individual traits and attributes. One particular area of interest is the investigation of the relationship between fingerprint patterns and sex, which has garnered significant attention among researchers. Understanding the association between sex and fingerprint patterns holds practical implications in forensic investigations, criminal profiling, and biometric systems [2]. The convenience, low cost, and high efficacy of fingerprints make them an ideal identification tool. A fingerprint is an imprint made by the flat of one or more fingers, and the pattern formed by these impressions is known as a fingerprint pattern [3]. A fingerprint is indicative of many different things.
METHODS

From 1st December 2021 to 1st June 2022, a total of 300 students were included in this cross-sectional descriptive study at Peshawar Medical College, Peshawar by obtaining data collection permission letter with Reference No: PMC/PGMDE/369.

Sample size was calculated by using formula for finite population i.e \( n = \frac{Z^2 \times p \times (1-p)}{e^2} \) (CI=95%, p=0.5%, e=0.05, N=population size that varies).

Five equal clusters were made for the professional years of MBBS and in each cluster simple random sampling technique was applied. For randomization students roll numbers were taken. Research randomizer online was applied to select the sample randomly. Those students, who deny giving consent after being selected by randomizer, skipped and next available student was enrolled. Students of any age and gender from all professional years of Peshawar Medical College, Peshawar were included in our study. While Students with any hand deformity like permanent scars on fingers, any skin disease like leprosy, worn fingerprints and extra fingers were excluded. Fingerprints were taken on white paper using a stamp pad after the students’ informed written agreement had been obtained. The paper already bore the students’ names, ages, sexes, and professional years. Using a powerful hand lens (TAG3™ magnifying glass 50 Mm double reading glass optical graded lens with 5x and 10x magnifying capacity), primary patterns (loops, whorl, arches and composite) after fingerprints were procured. Each finger in the finger print slip was assigned a number, ex: The 1st number was assigned to the right thumb and 10th to left little finger based on the presence of ridge lines according to classification of Henry, s system (Henry’s Ten Digit Classification). To conduct statistical analysis, the statistical package SPSS version 25.0 was utilized. When necessary, descriptive and inferential statistics were applied. For each possible association between gender and fingerprint pattern, we applied a chi-square test to see whether there was a statistically significant relationship (p < 0.05).

RESULTS

Our study included 300 students, with an average age of 21.54 ± 2.33 years. The gender ratio in the sample of 300 students was 180 (60%) males and 120 (40%) females. The table 1 shows that most common fingerprint pattern was loop pattern 164 (54.66%), followed by whorl pattern 91 (30.33%) and arch 28 (9.33%). In our study least common fingerprint pattern observed was composite 17(5.66%).

<table>
<thead>
<tr>
<th>Fingerprint Pattern</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop</td>
<td>164 (54.66%)</td>
</tr>
<tr>
<td>Whorl</td>
<td>91 (30.33%)</td>
</tr>
<tr>
<td>Arch</td>
<td>28 (9.33%)</td>
</tr>
<tr>
<td>Composite</td>
<td>17 (5.66%)</td>
</tr>
<tr>
<td>Total</td>
<td>300 (100%)</td>
</tr>
</tbody>
</table>
The table 2 showed that loop pattern was most common in both sexes, followed by whorl, arch and composite respectively. There was no statistically significant association between fingerprint pattern and gender with a P value of more than 0.05.

Table 2: A Comparison of the Distribution of Fingerprint Patterns among Sexes and their Association with Gender

<table>
<thead>
<tr>
<th>Fingerprint Pattern</th>
<th>Male</th>
<th>Female</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop</td>
<td>99</td>
<td>65</td>
<td>&lt;0.288</td>
</tr>
<tr>
<td>Whorl</td>
<td>55</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Arch</td>
<td>18</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Composite</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION**

Loop Fingerprint pattern was seen in 54.66 percent of the student's fingers, according to the study. Following that, 30.33 percent of the study's participants underwent a whorl fingerprint analysis. The average age of the participants in the study was 21.54 ± 2.33 years, and there were 1.5 times as many males as females. While there was no statistically significant correlation observed among gender and fingerprint patterns. Based on research carried out in Egypt 60 adults from Egypt and 60 from Malaysia were included in the study, with an average age of 22.37 ± 1.79 years, which is slightly older than the average age in the current research [11]. In a similar way another study conducted in Nigeria on a sample of 400 students mean age was recorded to be 21.86 ± 3.37 years, which is very close to what has been recorded in this study [12]. The participants' ages ranged from 18 to 25 years old, in contrast to a previous study in Lahore that included 150 students with ages ranging from 19 to 21 [13]. There is a 60% male prevalence in the results. Among 490 participants in a Nigerian study on gender predisposition, 51.8% were male, indicating a preponderance of males [14]. In another study conducted in Korea on 193 different participants, results revealed male dominance at 51.9% again similar to what has been reported in this study [15]. In contrast to the findings of this study, research conducted in Pakistan found that 70% of the students surveyed were female. The sample size was 100 individuals from Avicenna Medical College Lahore [13]. 62% of the male population was recorded in local research conducted in Abbottabad, which is nearly identical to the findings of this study According to the results, 54.66% of students had a loop fingerprint pattern, whereas 30.33% had a whorl print. [16]. Different studies worldwide have reported different numbers, in a study conducted in Nepal on a sample of 1860 participants, loop fingerprint was found to be most prevalent with 52.71%, followed by the Whorl type of fingerprint (27.38%) as reported in this study [17]. This research's findings are consistent with those of another Egyptian study in which 305 Libyan medical students ranked loop fingerprints highest (50.5% vs. 35.1%), which is statistically significant [18]. The results of yet another Nepalese investigation on 300 people showed that 51.13% of fingerprints were loops and 43% were whorls [19]. Similar to this study, another one published in the Journal of Ayub Medical College, Abbottabad similarly found that the most common fingerprint pattern in the city of Abbottabad was the loop pattern [16]. The research proved without a doubt that Loop is the most common fingerprint pattern. Our study found no significant association among fingerprints and gender. Similarly, another study found the same results [20-21].

**CONCLUSIONS**

Among medical students, the study found that loop fingerprints were more common than other fingerprints pattern. There was no statistically significant association between gender and fingerprints when looking at relationship statistics.

**Authors Contribution**

Conceptualization: FI
Methodology: NA, RSY
Formal analysis: AK
Writing-review and editing: NF, AA

All authors have read and agreed to the published version of the manuscript.

**Conflicts of Interest**

The authors declare no conflict of interest.

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**REFERENCES**


