

## ORIGINAL ARTICLE

## DERMATOGLYPHICS ASSOCIATION WITH CRIMINAL INTENT

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**Background:** The researches carried out on various type of human behaviour showed that it has been impacted upon by genetic as well as environment components. The aggressive behaviour having intent of criminality is also governed by both environmental and genetic makeup. Here we have analysed and explored environmental factors. **Methods:** Samples from 100 convicted criminals and 100 from general population were taken with simple convenient sampling, after obtaining informed consent and maintaining strict confidentiality. Fingerprints of both left and right thumb were taken on ten print cards. The environmental element was checked by studying association of any specific fingerprint pattern with the criminal intent. Right thumb of offenders was compared with that of normal population. **Results:** It became cleared that number of loop pattern was high in normal population, i.e., 60% as compared to 44% of offenders. The arch pattern was 9% in general population and 2% in offenders. The whorls were high in offenders 54%, as compared to 32% in general population. The statistical analysis of right hand was performed by chi square test and the  $p=0.002$ , statistically significant. Left thumb showed no significant differences between the two groups. **Conclusion:** This study reveals the association of dermatoglyphics with criminal intent. The right hand can be a significant tool in scrutinizing criminals on large scale.

**Keywords:** Finger printing, criminals, fingerprint patterns, dermatoglyphics, criminal intent

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## INTRODUCTION

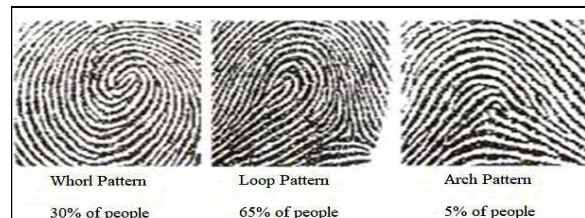
Crime is an unlawful act made punishable by law. Intent is the description of an act to be performed. Criminal intent is defined as a state of mind that must accompany certain crimes to constitute a violation.<sup>1</sup> The criminal intent is the result of associated with criminal behaviour, aggression is of prime importance.

Numerous studies have described increased prevalence of psychological and personality disorders in detainees, as compared to normal population<sup>2</sup> and multiple epidemiological studies performed in different territories showed that the incidence of increasing mental disorder is 5 to 10 times more than abnormal population.<sup>3</sup> Previously conducted studies demonstrated significance between aggression and premeditated murder correlations<sup>4</sup>, and between mental problems and committing a crime among prisoners<sup>5</sup>. In a follow-up study, it was concluded that pervasive anger persists in whole life of an offender and this is one of the four primary motivations among rapists.<sup>6</sup>

The scientific study of fingerprints (FP) is called dermatoglyphics (derma: skin, glyph: carvings).<sup>7</sup> Fingerprints are characterised by alternating strips of raised friction ridges (minutia) and grooves that form unique pattern. The FP pattern remains the same throughout life but they increase only in size till puberty. That is why FP are used widely as a means of identification worldwide in the field of forensic medicine, anthropology, ethnology and population genetics. No two individuals, even the identical twins

who share same DNA have same FP.<sup>8</sup> There is 1 in 64,000 million chance of FP being identical in two persons.<sup>9</sup>

Various studies have been carried out on dermatoglyphic variations in people globally.<sup>10-13</sup> These studies showed that there is a great variation in FP patterns indifferent regions of the world, yet loop is the most common, followed by whorl and arch. In the present study we look for any specific variation in the FP pattern of convicted criminals using three pattern system and check if there is any correlation with their criminal intent.



**Figure-1: Classification of Fingerprints**

(Source: Holt SB. Br Med Bull 1961;17:247-50)

## METHODOLOGY

This was a comparative study. The samples were acquired after taking informed consent, and confidentiality was maintained. Fingerprints of both left and right thumb were taken on 10 print cards. Samples were analysed at Department of Forensic Sciences, University of Health Sciences, Lahore. Sample size was calculated by adopting WHO recommended formula. Simple convenient sampling was done from two

different groups, each having 100 samples. Group 1 included convicted offenders of major crimes (murder, sexual assault and kidnapping), and Group 2 included general population without having a history of crime or psychiatric problem.

The fingerprints were observed through magnifying glass and were characterized in three main groups, i.e., loops, whorls and arches. Statistical analysis was performed on SPSS-20. The differences between the FP of general population and convicted offenders were evaluated with Chi-square test and Fisher Extract test. Distribution of pattern of samples was depicted on distribution curve, and  $p < 0.05$  was considered significant.

**RESULTS**

In total subjects combined, arch was seen in 18 (4.5%), loops in 227 (56.8%) and whorl in 155 (38.8%) subjects, (Table-1).

There was association between these patterns and the criminal intent. Thumb impressions of both right and left thumb were taken from convicted offenders and general population. On comparison of the right thumb of convicted criminals with that of normal population, it appeared that number of loops was high in non-convicted people. Contrary to loops, which were higher in general population, whorls were more in number in the right hand of convicted offenders. Chi-square test was applied for both right and left hand fingerprint patterns of general total population and total offenders. Chi-square test revealed significant differences when fingerprints of both hands taken together were analysed ( $p=0.012$ ) (Table-2).

**Table-1: Combined frequency and percentage of FP of both groups**

Fingerprint	Frequency	%
Arch	18	4.5
Loop	227	56.8
Whorl	155	38.8

**Table-2: Group fingerprint hand cross tabulation**

Group	Fingerprint			Total	p
	Arch	Loop	Whorl		
<b>Right hand</b>					
General population	n	9	59	32	0.002* a
	%	9	59	32	
Offenders	n	2	44	54	
	%	2	44	54	
Total	n	11	103	86	
	%	5.5	51.5	43	
<b>Left hand</b>					
General population	n	4	63	33	0.812 b
	%	4	63	33	
Offenders	n	3	61	36	
	%	3	61	36	
Total	n	7	124	69	
	%	3.5	62	34.5	
<b>Total</b>					
General population	n	13	122	65	0.012* a
	%	6.5	61	32.5	
Offenders	n	5	105	90	
	%	2.5	52.5	45	
Total	n	18	227	155	
	%	4.5	56.8	38.8	

a=Chi-square, b=Fisher's Exact test, \*Significant

**DISCUSSION**

This study reveals the association of dermatoglyphics with criminal intent. There are more than ten million prisoners all around the world and nearly one million prisoners<sup>14</sup>, in each decade are added to the world's prison population.<sup>2</sup> One out of seven people being incarcerated worldwide suffers from severe mental ailments.<sup>15</sup> Prisoners mostly suffer from poor physical and mental health during their detention.<sup>16</sup> On comparison of the right thumb of convicted criminals with that of normal population, it became clear that number of loops were high in normal.

Of 100 samples of general population, 59 loops were there, whereas in offenders, out of 100 samples, only 44 were loops. The percentage of loops was higher in general population. On counting whorls, 54 were found in offenders' right hand while 32 were found in right hand of general population. Number of whorl pattern was higher in convicted offenders. On analyzing arch, 9 arch patterns were counted in general population group as compared to only 2 presents in group of convicted offenders. Results of Chi-square test show significant differences in FP patterns of rights hand of general population and the convicted offenders. This result shows that right hand can be a significant tool in scrutinizing criminals on large scale.

When we examined the left thumb, it was found that the number of loop pattern was almost equal in the two groups (63 and 61 in normal population and offenders respectively). The number of whorl pattern was also almost equal in both the groups that was 33 in general population as compared to 36 in offenders. No significant differences were found in arch patterns as they were only 4 in normal and 3 in group of convicted offenders. It was assumed to be statistically insignificant. When the Fisher Exact was performed on the frequency and percentages of left hand the differences were non-significant.

After scanning thumbs of both sides separately, they were analysed together. We divided these prints as a whole in two groups viz one group of offenders and another of general population. On examination of 400 thumbs, taken together, loop pattern was found in 227 individuals, out of which 105 were found in offenders and 122 were found in general population. Both the groups showed percentages of 61% and 52.5% respectively. In case of whorls, altogether 155 whorls were present. Of these whorls, 65 were present in general population in comparison of 90 in offenders. The percentages were 32.5 and 45 percent in general population and offenders respectively. Arch pattern was collectively 18 in number of which 13 were of general population and 5 were of offenders. When we studied both thumbs together, the loop pattern was 61% and 52.5%, the whorl was 32.5% and 45%, and arch was

6.5% and 2.5% respectively. Statistical analysis of both hands taken together was performed by applying Chi-square test,  $p=0.012$  was obtained, which being less than 0.05 and was again statistically significant. Normal distribution graph has also been drawn which showed that in general population, there were almost equal percentages of these patterns in both right and left hand. Loop were 59 in right hand and 63 were present in left hand of general population. Likewise, whorls were 32 in right hand and 33 in left thumb. In the same way arches were 9 in right thumb and 4 in left thumb. The collective percentages of these patterns were found to be 61%, 32.5%, and 6.5% of the loops, whorls and arches respectively.

## OUTCOME AND UTILIZATION

Environment contributes to criminal behaviour. This study may be helpful in reshaping medico legal framework globally by making separate legislation bodies for genetically or socially deviant individuals; this may include lesser punishment, rehabilitation centres and providing medical care for such individuals.

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**AI:** Data collection/sample collection, write-up

**NA:** Data analysis

**SQ:** Sample collection

**ZA:** Sample collection

**RAR:** Data analysis

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