

A Study of Distribution of Hair on the Phalanges of the Hand in Andhra Pradesh, India

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ABSTRACT

Introduction: The aim of the study was to observe the pattern of hair distribution on the phalanges of the hand in Andhra Pradesh by using a sample population.

Materials and Methods: 700 individuals who were aged between 18-35 years were randomly selected for the study. The pattern and the frequency of the hair distribution on the proximal, middle and the distal phalanges were studied. The observations were categorized into the gender and phalangeal hair patterns.

Observations: The results showed that the proximal phalangeal hair was present in 99.14% males and 98% females. The most common pattern of the hair distribution on the proximal phalanges was 1-2-3-4-5. The middle phalangeal hair was present in 46% males and in 38.85% females. The most common pattern of the hair on the middle phalanges was 3-4. Hair was absent on the distal phalanges.

Conclusion: This study has anthropological significance in dividing the race, nationalism and the sex. Hence, it has a medico legal importance too.

Key Words: Hair distribution, Phalanges, Anthropological

INTRODUCTION

The study of the distribution of hair is of anthropological interest. Hair is commonly present on the dorsal surface of the phalanges of the hand. But the distribution of hair on the phalanges of the hand shows wide variations in relation to the ethnic groups, race and nationality. The hair variants are genetically determined. Onyije et al [1] described that the presence of hair on the greater number of the fingers was a dominant feature over the presence of hair on the lesser number of the fingers and that this trait followed the Mendelian law in its mode of inheritance. Dutta [2] stated that the complete absence of the phalangeal hair was a recessive trait. The distribution of hair on the phalanges is influenced by certain factors such as genes and the environment, as was described by Williams et al [3]. Bernstein and Burks [4] stated that the distribution of the phalangeal hair was governed by a set of five alleles which had an increasing dominance in the phantasies, A_0 , A_1 , A_2 , A_3 and A_4 . The subscripts corresponded to the number of fingers which the alleles caused to be affected. Thus, a person without phalangeal hair would be known as having an A_0 phenotype, having A_0A_0 genotype.

The first study on the distribution of the phalangeal hair on the hands was carried out by Danforth [5]. Since then, many investigators have studied the distribution of the phalangeal hair to establish the racial differences - Saldanha and Guinsburg [6]; Dutta [7]; Brothwell and Mollenson [8]; Tiwari and Bhasin [9]; Singh [10]; Hatiboglu [11]; Vona and Porcella [12]; Mbajjorgu [13]; Olabiyi [14]; and Onyije [15].

The literature has revealed that there was little or no data which was available on the distribution of hair on the phalanges of the hand in the south Indian population, particularly in Andhra Pradesh. So, the present study was taken up, to evaluate the different patterns in the distribution of the phalangeal hair in Andhra Pradesh.

MATERIALS AND METHODS

This study was carried out in the Department of Anatomy, NRI Medical College, Chinakakani, Guntur district, Andhra Pradesh, India, from January 2011 to June 2011. 700 subjects who were aged between 16–35 years were randomly selected for the study. Of the 700, 350 were males and 350 were females. All the subjects were natives of Andhra Pradesh. Individuals with skin diseases or hand injuries were excluded from the study. The observations were made in the day light by using a hand lens. The name, age and sex of each subject were noted. The presence or absence of hair over each phalanx of both the hands was recorded. The data was analyzed statistically.

OBSERVATIONS

The hair distribution over the proximal phalanges of the hands is shown in [Table/Fig-1]. Hair was present over the proximal phalanges in 99.1% males and 98% females. The common pattern of the proximal phalangeal hair was 1-2-3-4-5 [53.5%] and the least common patterns were 2-3 [0.07%] and 3 [0.07%]. In both the sexes, the common pattern of the proximal phalangeal hair was

Patterns	Males (350×2)	Females (350×2)	Total (700×2)
1-2-3-4-5	395 (56.4%)	355 (50.7%)	750 (53.5%)
2-3-4-5	274 (39.1%)	299 (42.7%)	573 (40.9%)
3-4-5	20 (2.8%)	22 (3.1%)	42 (3%)
2-3	1 (0.1%)	–	1 (0.07%)
2-3-4	3 (0.4%)	1 (0.1%)	4 (0.2%)
3	–	1 (0.1%)	1 (0.07%)
4-5	1 (0.1%)	2 (0.2%)	3 (0.2%)
3-4	–	6 (0.8%)	6 (0.4%)
Absent	6 (0.8%)	14 (2%)	20 (1.4%)

[Table/Fig-1]: Distribution of hair on the proximal phalanges of hand in males and females

	Right (700)			Left (700)		
	Males (350)	Females (350)	Total (700)	Males	Females	Total
1-2-3-4-5	194 (55.4%)	178 (50.8%)	372 (53.1%)	201 (57.4%)	177 (50.5%)	378 (54%)
2-3-4-5	136 (38.8%)	148 (42.2%)	284 (40.5%)	138 (39.4%)	151 (43.1%)	289 (41.2%)
3-4-5	13 (3.7%)	11 (3.1%)	24 (3.4%)	7 (2%)	11 (3.1%)	18 (2.5%)
2-3	1 (0.2%)	–	1 (0.1%)	–	–	–
2-3-4	2 (0.5%)	1 (0.2%)	3 (0.4%)	1 (0.2%)	–	1 (0.1%)
3	–	1 (0.2%)	1 (0.1%)	–	–	–
4-5	1 (0.2%)	1 (0.2%)	2 (0.2%)	–	1 (0.2%)	1 (0.1%)
3-4	–	3 (0.8%)	3 (0.4%)	–	3 (0.8%)	3 (0.4%)
Absent	3 (0.8%)	7 (2%)	10 (1.4%)	3 (0.8%)	7 (2%)	10 (1.4%)

[Table/Fig-2]: Comparative distribution of proximal phalangeal hair on right and left hands

Patterns	Males (350X2)	Females (350X2)	Total
3-4	97 (13.8%)	108 (15.4%)	205 (14.6%)
4	86 (12.2%)	85 (12.1%)	171 (12.2%)
3-4-5	84 (12%)	49 (7%)	133 (9.5%)
2-3-4-5	45 (6.4%)	12 (1.7%)	57 (4.0%)
4-5	7 (1%)	8 (1.1%)	15 (1.0%)
2-3-4	–	2 (0.2%)	2 (0.1%)
3	3 (0.4%)	8 (1.1%)	11 (0.7%)
3-5	1 (0.1%)	1 (0.1%)	2 (0.1%)
5	1 (0.1%)	1 (0.1%)	2 (0.1%)
Absent	376 (53.7%)	426 (60.8%)	802 (57.2%)

[Table/Fig-3]: Distribution of hair on middle phalanges in males and females

1-2-3-4-5. But the frequency of the distribution was slightly less in females [50.7%] as compared to the males [56.4%]. At the same time, the 2-3-4-5 pattern was more frequent in females [42.7%] as compared to the males [39.1%]. The patterns, 3 and 3-4 were not observed in males. The pattern, 2-3 was not observed in females.

[Table/Fig-2] shows the comparative distribution of the proximal phalangeal hair over the right and left hands.

[Table/Fig-3] shows the distribution of the hair over the middle phalanges of the hand. The middle phalangeal hair was absent in 57.2% individuals [53.7% males and 60.8% females]. The most common pattern of the middle phalangeal hair was 3-4 [14.6%], followed by 4 [12.2%]. The least common patterns were 2-3-4, 3-5 and 5. The patterns, 3-4-5 and 2-3-4-5 were more frequent in males [12%, 6.4%] as compared to those in the females [7%,

	Right (700)			Left (700)		
	Males (350)	Females (350)	Total (700)	Males (350)	Females (350)	Total (700)
3-4	49 (14%)	53 (15.1%)	102 (14.5%)	48 (13.7%)	55 (15.7%)	103 (14.7%)
4	43 (12.2%)	41 (11.7%)	84 (12%)	43 (12.2%)	44 (12.5%)	87 (12.4%)
3-4-5	42 (12%)	27 (7.7%)	69 (9.8%)	42 (12%)	22 (6.2%)	64 (9.4%)
2-3-4-5	24 (6.8%)	5 (1.4%)	29 (4.1%)	21 (6%)	7 (2%)	28 (4%)
4-5	4 (1.1%)	5 (1.4%)	9 (1.3%)	3 (0.8%)	3 (0.8%)	6 (0.8%)
2-3-4	–	1 (0.2%)	1 (0.1%)	–	1 (0.2%)	1 (0.1%)
3	1 (0.2%)	4 (1.1%)	5 (0.7%)	2 (0.5%)	4 (1.1%)	6 (0.8%)
3-5	–	–	–	1 (0.2%)	1 (0.2%)	1 (0.1%)
5	–	–	–	1 (0.2%)	1 (0.2%)	2 (0.2%)
Absent	187 (53.4%)	214 (61.1%)	401 (57.2%)	189 (54%)	212 (60.5%)	401 (57.2%)

[Table/Fig-4]: Comparative distribution of middle phalangeal hair on right and left hands

Populations	Percentage with hair			Reference
	Males	Females	Total	
Nigeria	96%	95%	–	J D Singh (1982)
Turkey	99.8%	98.3%	–	Hatiboglu (1983)
Pakistan	98%	80%	–	Nasir (1995)
Nigeria	92%	92.4%	–	Mbajjorgu (1996)
Malaysia	99.3%	85.1%	–	Dharap (1996)
Korea	–	–	98.2%	Jung (2001)
Nigeria	–	–	98%	Olabiya (2008)
Nigeria	98.4%	100%	98%	Onyije (2011)
India	99.1%	98%	98.6%	Present study (2011)

[Table/Fig-5]: Comparative distribution of proximal phalangeal hair in different populations

1.7%] respectively. The pattern, 2-3-4 was not observed in males.

[Table/Fig-4] shows the comparative distribution of the middle phalangeal hair over the right and left hands.

The presence of hair over the distal phalanges was not observed.

DISCUSSION

Previous studies have revealed that most individuals tended to have hair on their proximal phalanges, but not on their distal phalanges. In the present study, a high percentage of hair distribution was observed on the proximal phalanges [99.1% males and

Combination	Males	Females	Total	Study
1-2-3-4-5	74% – 56.4	68% – 50.7%	71.6% 10% 53.5%	Hatiboglu, Turkey (1983) Onyije, Nigeria (2011) Present study, India (2011)
2-3-4-5	24% – 39.1%	26.4% – 42.7%	25.2% 65% 40.9%	Hatiboglu, Turkey (1983) Onyije, Nigeria (2011) Present study, India (2011)
3-4-5	1.6% – 2.8%	1.2% – 3.1%	1.4% 9% 3%	Hatiboglu, Turkey (1983) Onyije, Nigeria (2011) Present study, India (2011)
3-4	– – –	2.7% – 0.8%	1% 6% 0.4%	Hatiboglu, Turkey (1983) Onyije, Nigeria (2011) Present study, India (2011)
2-3-4	– – 0.4%	– – 0.1%	– 7% 0.2%	Hatiboglu, Turkey (1983) Onyije, Nigeria (2011) Present study, India (2011)
Absent	0.2% – 0.8%	1.7% – 2%	0.9% 1% 1.4%	Hatiboglu, Turkey (1983) Onyije, Nigeria (2011) Present study, India (2011)

[Table/Fig-6]: Comparative distribution of proximal phalangeal hair pattern in different populations

98% females]. This finding was consistent with those of various previous studies. The comparative distribution of the proximal phalangeal hair in different populations is shown in [Table/Fig-5]. In the present study, the order of the frequency of the presence or absence of the proximal phalangeal hair was 3>4>5>2>1. This observation was similar to the observations of Jung [15] and Nasir [16]. The comparison of the combination of the fingers with the proximal phalangeal hair is shown in [Table/Fig-6]. The common pattern of the proximal phalangeal hair in the present study was 1-2-3-4-5 [53.5%], followed by 2-3-4-5 [40.9%]. This observation was similar to the findings of Hatiboglu [11], but it differed from that of Onyije [1]. In the present study, there was no significant difference in the distribution of the proximal phalangeal hair on the right and left hands.

In the present study, the middle phalangeal hair was absent in 57.2% individuals [53.7% males and 60.8% females]. This observation was consistent with the observations of Dutta [7], Parmar [17], Tiwari and Bhasin [9] and Hatiboglu [11]. [Table/Fig-7] shows the comparison of the middle phalangeal hair in different populations. The order of frequency of the presence or absence of the middle phalangeal hair in the present study was 4>3>5>2. This observation was similar to the observations of previous studies which were done in different populations. The observations of the present study with respect to the distribution of the middle phalangeal hair was similar to those which were observed in the

populations of Tibet, Bengal (India) and Turkey, which belonged to Asia. The frequency of the presence of the middle phalangeal hair was lowest in the African race, it was highest in the white race and and it was intermediate in the Asian and other races.

In the present study, the common pattern of the middle phalangeal hair was 3-4 [14.6%], followed by 4 [12.2%] and 3-4-5 [9.5%]. This observation was similar to the observation of Hatiboglu [11], but it differed from the findings of Mbajorgu [13], who stated that the 3-4-5 pattern was more common.

In the present study, the 3-4-5 and the 2-3-4-5 patterns of the middle phalangeal hair was more frequent in males [12% and 6.4%] as compared to those in females [7% and 1.7%]. The 3-4 pattern was more frequent in females. These findings were consistent with those of Hatiboglu [11]. There was no significant difference in the distribution of the middle phalangeal hair over the right and left hands in the present study. The presence of hair on the distal phalanges was not observed in any population, including the population of the present study.

CONCLUSION

The distribution of hair on the phalanges was investigated in Andhra Pradesh, India, among 700 individuals [350 males and 350 females]. Hair was present over the proximal phalanges in 99.1% males and 98% females, with a common pattern of 1-2-3-4-5. The middle phalangeal hair was present in 46.3% males and 39.2% females, with a common pattern of 3-4. Hair was not observed over the distal phalanges. Such studies may be useful because of their anthropological significance in deciding the race, nationalism and the sex. Hence, it has medico legal importance too.

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Population	% without MPH	% with MPH	Percentage of distribution				Study
			2	3	4	5	
America	–	70.4	3.6	30.8	44.3	21.3	Danforth (1921)
America (whites)	22	–	–	–	–	–	Bernstein & Burks (1942)
Japan	–	36.8	2.1	33.8	49.4	14.7	Matsunaga (1956)
Ethiopia	–	25.6	0	31.1	46.7	19.3	Batmirian (1962)
Bengal (India)	51	49	3.5	30.2	52.3	14	Dutta (1963)
Britan	29	70.2	3.4	32	42.6	23	Borthwell & Mollenson (1965)
Japan	56	–	–	–	–	–	Parmar (1968)
Nepal	66	–	–	–	–	–	Parmar (1968)
Tibet	55.7	44.3	6.5	33.6	43.9	15.9	Tiwari & Bhasin (1969)
Nigeria	79	21	0	15	18	7.5	Singh (1982)
Turkey	50.7	49	6	35	48	20	Hatiboglu (1983)
Nigeria	89.1	–	–	–	–	–	Onyije (2011)
AndhraPradesh (India)	57.2	42.8	2.8	25.6	37.6	11.7	Present study (2011)

[Table/Fig-7]: Comparison of middle phalangeal hair in different populations

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