

Distribution of Hair on the Phalanges of the Hand among Nigerians

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ABSTRACT

Hair distribution on the phalanges of the hand was determined in one thousand six hundred and three (1603) Marghi, Shuwa, Fulani and Hausa subjects of northeastern Nigeria. Of this number, 7.4% (approximately 3.7% males and 3.7% females) possessed hair on their middle phalanges, the incidence being highest in the Shueas and least among the Hausas. The frequency order of occurrence of mid-phalangeal hair was 4>3>2>5. thirteen patterns of hair distribution were observed, with the 4 (ring finger) finger pattern being the most frequent. There was exclusive presence of mid-phalangeal hair in all four fingers. Proximal phalangeal hair was present in 90.7% while hair on the distal phalanx was 1.8% of the sample population. There was a significant ($p < 0.05$) effect of age on phalangeal hair pattern but sex difference was not significant ($p > 0.05$) except in distal phalangeal hair. The implications of the results are discussed in relation to previous reports.

Keywords: Hair, Hand, Incidence, Phalanges.

INTRODUCTION

Hair is found in no other vertebrates than mammals. However, a number of mammals are almost devoid of hair, for example, cetaceans, sirenia, elephants, hippopotamus, rhinoceros, etc, although the embryos of some of these may possess a complete coat of hairs. In human population, hairs are distributed in varying density and in variable thickness and length on the whole surface of the skin, except on the palms and the soles, the sides and flexor aspects of the fingers and toes, the side surface of the feet below the ankle, the umbilicus, the mucocutaneous junctional zone of the lips, the glans penis, the prepuce, the clitoris, the labia minora, the internal surface of the labia majora,

and the forsum of the terminal phalanx of all the digits (and often of the middle phalanx of the four digits of the hands and feet). Furthermore, age and sex differences in the texture and distribution of hair are common features in humans. Apart from the pioneer work of Danforth [1] many other researchers have reported that mid-phalangeal hair distribution varies with age and sex, and are racially and genetically determined [2,3,4,5].

The incidence of individuals without mid-phalangeal hair varies from 21.6% to 90% [6,7,8,9], and such individuals are reported to carry two recessive genes. On the other hand,

individuals with mid-phalangeal hair pattern are known to possess autosomal dominant inheritance, with increasing dominance arising from gene combinations [2,3,6]. The phenomenon may be determined by as many as five allelic genes, which combine to form five phenotypes (A0, A1, A2, A3, A4), the subscripts represent the number of affected digits.

Studies on the trait of mid-phalangeal hair in Nigeria was first reported by Boroffice [10], in which he obtained a mean of 92.9% among the Yorubas and 98.8% among Edos (both of western Nigeria). Although these values gave higher minimum values than those reported elsewhere among black populations, the overall incidence percentage of 21.0 and 25.2 reported by Singh [11] and Mbajiorgu et al [12] respectively from the same country (Nigeria) were also among the least values obtained so far. This suggests that a wide variation exists in mid-phalangeal hair distribution which is based on geographical spread of different ethnic groups or populations. Thus because of factors such as racial, ethnic and cultural diversities which affect phalangeal hair pattern, there is a necessity for more studies in order to establish the specific distribution of mid-phalangeal hair among various populations. The present study therefore, aims to examine the distribution of phalangeal hair among four ethnic groups of Marghi, Shuwa, Fulani and Hausa, which interact closely within the same geopolitical zone, north-eastern Nigeria, and to compare the results with those of similar and different geographicals in Nigeria and other racial groups elsewhere.

MATERIALS AND METHODS

A total of 1,603 individuals made up of 841 [52.46%] males and 762 [47.54%] females were examined for the presence or absence of

phalangeal hair on their hands. The subjects used in the study were randomly selected from three local government area (l.g.a) in Borno State of Nigeria to cover all the ethnic groups (Marghi, Shuwa, Fulani and Hausa). They included students of two primary and three junior and senior secondary schools in Maiduguri Metropolitan l.g.a., students of one primary and two junior and senior secondary schools in Askira-Uba l.g.a., students of one primary and two junior and senior secondary schools in Gamboru-Ngala l.g.a., students of two tertiary institutions in Maiduguri Metropolitan l.g.a., and lastly some randomly sampled members of the public who were residing in Maiduguri, Uba and Gamboru Ngala towns. The ages of the subjects ranged from 5 to 40 years. The fingers of both hands were examined in daylight as previously described by Mbajiorgu et al [12] while the phenotypes were recorded according to Bernstein's [3] classification as follows: 0: a person having hair on any digit; 2: a person having hair on the index finger; 3: a person having hair on the middle finger; 4: a person having hair on the ring finger; 5: a person having hair on the little finger; 2,3: a person having hair on the index and middle fingers; 2,4: a person having hair on the index and ring fingers; 3,4: a person having hair on the middle and ring fingers; 4,5: a person having hair on the ring and little fingers; 2,3,4: a person having hair on the index, middle and ring fingers; 2,4,5: a person having hair on the index, ring and little fingers; 3,4,5: a person having hair on the middle, ring and little fingers; 2,3,4,5: a person having hair on the index, middle, ring and little fingers.

The data was recorded on a pre-drawn format of the digits of both left and right hands and analyzed statistically using ANOVA test.

Table 1: Incidence of mid-phalangeal hair by ethnic groups and sex

Ethnic group	Marghi		Shuwa		Fulani		Hausa		Total	
	-	+	-	+	-	+	-	+	-	+
Incidence										
Male	181	12	182	32	181	11	237	5	781	60
%	11.3	0.8	11.4	2.0	11.3	0.7	14.8	0.3	49.0	3.7
Female	189	11	165	30	158	10	191	8	703	59
%	11.8	0.7	10.3	1.9	9.9	0.6	12.0	0.5	43.9	3.7
Total	370	23	347	62	339	21	428	13	184	119
%	23.1	1.4	21.7	3.9	21.2	1.3	26.7	0.8	92.6	7.4

(-)= absence of phalangeal hair; (+)= presence of phalangeal hair

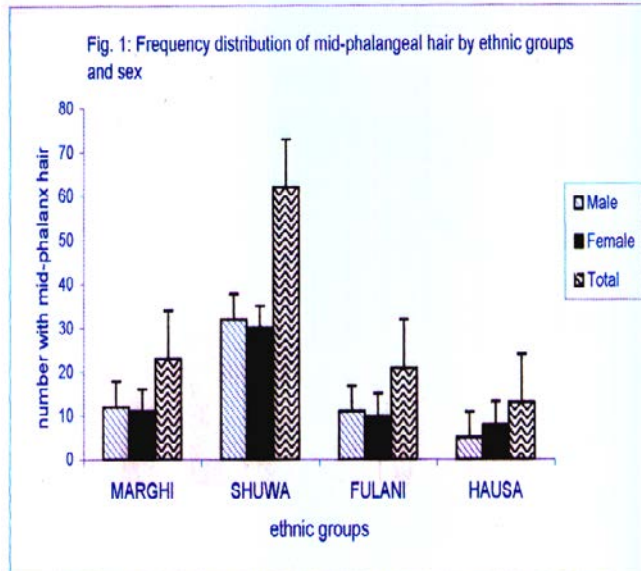
Table 2: Frequency distribution of mid-phalangeal hair by age group and sex

Age group	5-10yr		11-15yr		16-20yr		21-25yr		26-30yr		31-35yr		36-40yr		Total	
	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
Incidence																
Male, n	169	6	200	15	110	18	88	8	78	10	74	2	62	1	781	60
%of total																
Population	10.5	0.4	12.5	0.9	6.9	1.1	5.5	0.5	4.9	0.6	4.6	0.1	3.9	0.1	48.7	3.7
% of male																
Population	20.1	0.7	23.8	1.8	13.1	2.1	10.5	1.0	9.3	1.9	8.8	0.2	7.4	0.1	92.9	7.1
Female, n	127	14	142	26	117	15	101	2	86	2	76	0	54	0	703	59
%of total																
Population	7.9	0.9	8.9	1.6	7.3	0.9	6.3	0.1	5.4	0.1	4.7	0	3.4	0	43.9	3.7
%of female																
Population	16.7	1.8	18.6	3.4	15.4	2.0	13.3	0.3	11.3	0.3	10.0	0	7.1	0	92.3	7.7
Total	296	20	342	41	227	33	189	10	164	12	150	2	116	1	1484	119

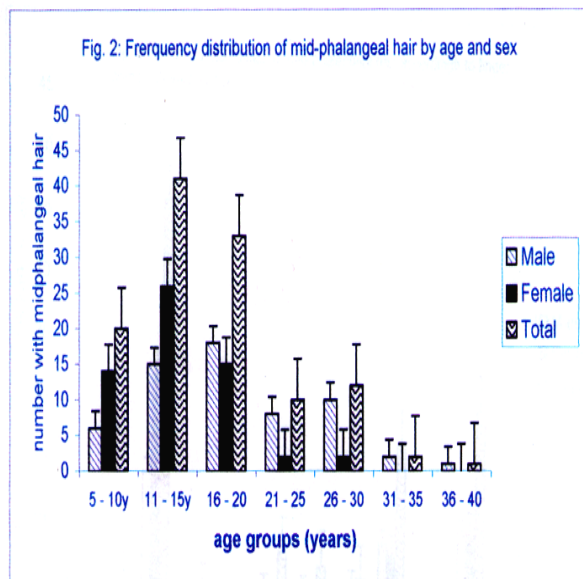
(-) = Absence of hair; (+) = presence of hair ; n = sample size

RESULTS

The results show that 60 [3.7%] of males and 59 [3.7%] of females of Marghis, Shuwas, Fulanis and Hausa possessed hair on the middle phalanges of their fingers, representing 7.4% of

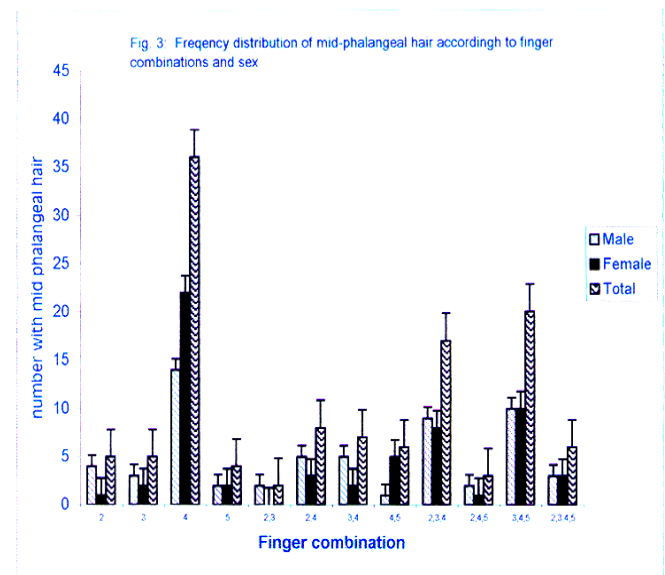


The vertical bars indicate the SE. The large SE for the Hausas is due to least frequency of mid-phalangeal hair among this group.



The vertical bars indicate the SE. The large SE for age groups 21 - 40 years is due to the low frequency of mid-phalangeal hair among these groups.

the sample population (Tables 1 and 2; Figs. 1 and 2). The remaining 92.6%, made up of 781 [48.7%] males and 703 [43.9%] females, had no hair on their middle phalanges. The percentage of the incidence of mid-phalangeal hair in both sexes of the four ethnic groups was highest among the Shuwas (3.9%), then the Marghis (1.4%), followed by the Fulanis (1.3%) and least among the Hausas (0.8%), (Table 1, Fig. 1). There was a significant ($p < 0.05$) effect of age on the incidence of mid-phalangeal hair on the fingers of the sample population, however, sex had no significant ($p \geq 0.05$) effect. The percentage of the incidence increased from the 5 - 10 years age group and peaked at the 11 - 15 years age group in the female or 16 - 20 years age group for the males, and thereafter decreased in both sexes (Table 2, Fig. 2). Mid-phalangeal hair was, however, present in a single male and none in all the female subjects above the age of 35 years.



The vertical bars indicate the SE. The large SE in the 2,3 and 2,4,5 finger combination is due to the low frequency in these combinations.

Table 3: Frequency distribution of mid-phalangeal hair according to finger combination and sex

Finger combination	0	2	3	4	5	2,3	2,4	3,4,	4,5	2,3,4	2,4,5	3,4,5	2,3,4,5	With hair	Total
Male, n	781	4	3	14	2	2	5	5	1	9	2	10	3	60	841
% of total															
Population	48.7	0.2	0.2	0.9	0.1	0.1	0.3	0.3	0.1	0.6	0.1	0.6	0.2	3.7	52.5
% of male															
Population	92.9	0.5	0.4	1.7	0.2	0.2	0.6	0.6	0.1	1.1	0.2	1.2	0.4	7.1	100
Female, n	703	1	2	22	2	0	3	2	5	8	1	10	3	59	762
% of total															
Population	43.9	0.1	0.1	1.4	0.1	0	0.2	0.1	0.3	0.5	0.1	0.6	0.2	3.7	47.5
% of female															
Population	92.2	0.1	0.3	2.9	0.3	0	0.4	0.3	0.7	1.1	0.1	1.1	0.1	7.7	100
Total, n	1484	5	5	36	4	2	8	7	6	17	3	20	6	119	1603
%	92.6	0.3	0.3	2.3	0.2	0.1	0.5	0.4	0.4	1.1	0.2	1.3	0.4	7.4	100

Table 4: Frequency distribution of proximal phalangeal hair by age group and sex

Age Group	5	-10yrs	11	-15yr	16	- 20yr	21	- 25yr	26	- 30yr	31	- 35yr	36	- 40yr	Total	
Incidence	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
Male, n	0	175	15	200	11	117	20	76	8	80	10	66	8	55	72	769
% of total																
Population	0	10.9	0.9	12.5	0.7	7.3	1.3	4.7	0.5	5.0	0.6	4.1	0.5	3.4	4.5	84.0
Female, n	0	141	3	165	4	128	6	97	10	78	8	68	46	8	77	685
% of total																
Population	0	8.8	0.2	10.3	0.2	8.0	0.4	6.1	0.6	4.9	0.5	4.2	2.9	0.5	4.8	42.7
Total, n	0	318	18	365	15	248	26	173	18	158	18	134	55	63	149	1454
%	0	19.7	1.1	22.8	0.9	15.3	1.6	10.8	1.1	9.9	1.1	8.3	3.4	3.9	9.3	90.7

(-) = Absence of hair; (+) = presence of hair; n = sample size

Table 5: Frequency distribution of hair on the distal phalanx by age group and sex

Age group Incidence	5 – 10yr		11 – 15yr		16 – 20yr		21 – 25yr		26 – 30yr		31 – 35yr		36 – 40yr		Total	
	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
Male, n	175	0	215	0	124	4	85	11	83	5	69	7	63	0	814	27
% of total																
Population	10.9	0	13.4	0	7.7	0.3	5.3	0.7	5.2	0.3	4.3	0.4	3.9	0	50.8	1.7
Female, n	141	0	168	0	132	0	102	1	87	1	76	0	54	0	760	2
% of total																
Population	8.8	0	10.5	0	8.2	0	6.4	0.1	5.4	0.1	4.7	0	3.4	0	47.4	0.1
Total, n	316	0	383	0	256	4	187	12	170	6	145	7	117	0	1574	29
%	19.7	0	23.9	0	16.0	0.3	11.7	0.8	10.6	0.4	9.1	0.4	7.3	0	98.2	1.8

(-) = Absence of hair; (+) = presence of hair; n = sample size

Table 6: Frequency distribution of hair on the first digit by age group and sex

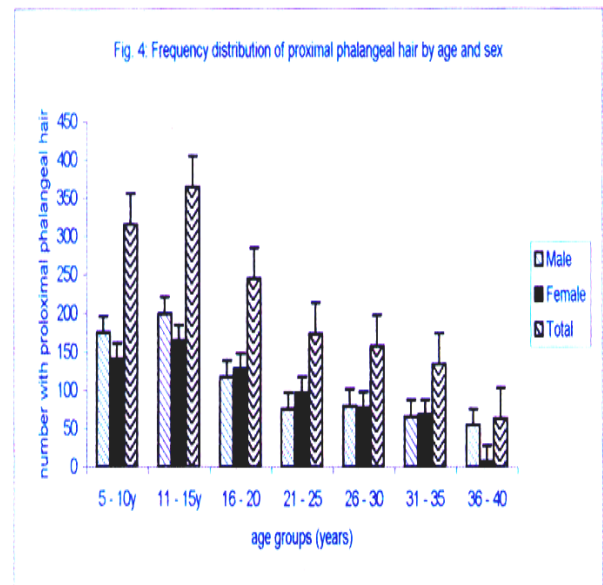
Age group Incidence	5 – 10yr		11 – 15yr		16 – 20yr		21 – 25yr		26 – 30yr		31 – 35yr		36 – 40yr		Total	
	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
Male, n	175	0	213	2	125	3	85	11	75	15	46	30	63	0	770	61
% of total																
Population	10.9	0	13.3	0.1	13.4	0.2	5.3	0.7	4.6	0.9	2.9	1.9	3.9	0	48.0	3.8
Female, n	141	0	165	3	127	5	85	18	75	13	57	19	55	0	704	58
% of total																
Population	8.8	0	10.3	0.2	7.9	0.3	5.3	1.1	4.8	0.8	3.6	1.2	3.4	0	43.9	3.6
Total, n	316	0	378	5	252	8	170	29	148	28	103	49	117	0	1484	119
%	19.7	0	23.6	0.3	15.7	0.5	10.6	1.8	9.2	1.8	6.4	3.1	7.3	0	92.6	7.4

(-) = Absence of hair; (+) = presence of hair; n = sample size

Table 7: Incidence and distribution of mid-phalangeal hair in different populations

S/N	Population	Overall Incidence %	Incidence by digit, %				Reference
			2 nd	3 rd	4 th	5 th	
1	Americans	70.4	3.6	30.8	44.3	21.3	Danforth (1921)
2	Arabs	61.6	-	-	-	-	Boyd and Boyd (1941)
3	Swedes	67.5	-	-	-	-	Beckman & Book (1959)
4	Ethiopians	25.6	0.0	31.1	46.1	19.3	Bat-Miriam (1962)
5	American Negros	16.3-28	-	-	-	-	Setty (1966)
6	Tibetans	44.3	6.5	33.6	43.9	15.9	Tiwari and Bhasin (1969)
7	Melanesians	58.3	-	-	-	-	Hindley and Damon (1973)
8	Nigerians	21.0	0.0	15.0	18.0	7.5	Singh (1982)
9	Turks	49.3	-	-	-	-	Hatiboglu (1983)
10	Malaysia	33.6	-	-	-	-	Dharap et al (1994)
11	Malaysia	40.5	-	-	-	-	Dharap et al (1995)
12	Nigerians	25.2	6.8	20.5	23.2	12.1	Mbajiorgu et al (1996)
13	Nigerians	7.4	2.6	3.6	6.6	2.5	Present study

The incidence of mid-phalangeal hair was associated with thirteen out of the sixteen possible finger combinations. It was found to be highest in the 4, 3,4,5 and 2,3,4 finger combinations, and least in the 2,3 and 2,4,5, finger combinations (Table 3, Fig. 3). There were more female (1.4%) than male (0.9%) subjects who possessed hair on the middle phalange of their ring, 4, fingers, while the incidence for the 3,4,5 finger combination was 0.6% in males and 0.6% in females. The incidence for the 2,3,4 finger combination was 0.6% in males 0.5% in females.



The vertical bars indicate the SE. The large SE in the 36 - 40 years age group is due to the low frequency of proximal phalangeal hair in this group.

This suggests an ulna shift in the distribution of mid-phalangeal hair on the fingers among the study population.

Apart from the ring finger which ranked highest among the finger combinations with incidence of mid-phalangeal hair, there were exclusive presence of mid-phalangeal hair on the index, middle and little fingers (Table 3). It occurred in 5 (0.3%), 5 (0.3%) and 4 (0.2%) of the total sample population respectively. The frequency order of the presence of mid-phalangeal hair by digits was therefore 4>3>2>5 (Table 7).

Proximal phalangeal Hair

The incidence of proximal phalangeal hair was 769 (48.0%) in males and 685 (42.7%) in females giving an overall frequency of 90.7% of the sample population (Table 4, Fig. 4). The percentage of the incidence increased from the age of 5 years and peaked at the age of 15 years and therefore showed a steady decline with advancing age in both sexes (Table 4, Fig. 4). All children below the age of age 10 years had proximal phalangeal hair on their fingers.

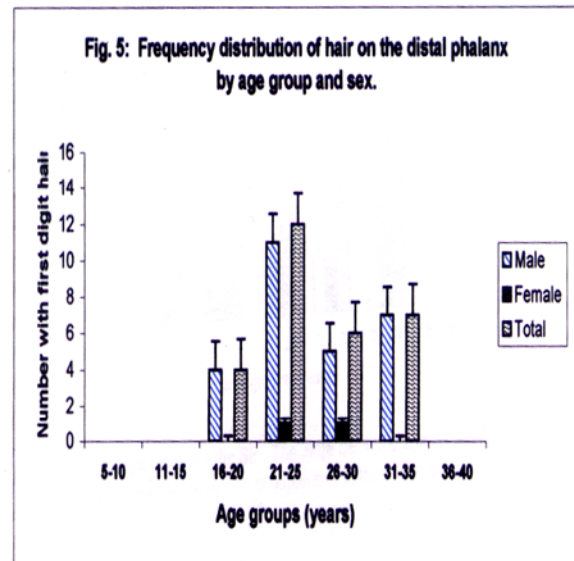
Distal Phalangeal Hair

Distal phalangeal hair was present in 29 (1.8%) of the total sample population. Out of these, 27 (1.7%) were males and 2 (0.1%) were females with peak value observed in the males between the ages of 21 – 25 years (Table 5). The higher incidence of distal phalangeal hair in males was statistically significant ($p < 0.5$) when compared with the incidence in females. There was no distal phalangeal hair below 16 years and above 36 years of age in both sexes.

First Digit Phalangeal Hair

The presence of hair on the first digit was observed in 119 (7.4%) of the sample population. Out of these 61 (3.8%) were males

and 58 (3.6%) were females (Table 6). However, all children below the age of 10 years and adults above the age 36 years lacked hair on their first digits. Age and sex relationships were not significant ($p \geq 0.05$).



The vertical bars indicate the SE.

DISCUSSION

The overall incidence of 7.4% of the presence of hair on the middle phalanx of the digits in the sample population is at variance with the observations of Mbajiorgu et al [12] among the Kanuris and Baburs/Buras of the same geographical area (northeastern Nigeria), where an incidence of 25.2% was reported. Among the study population, ethnic differences also exist in the incidence of mid-phalangeal hair (Marghis 1.4%, Shuwas 3.9%, Fulanis 1.3%, Hausas 0.8%). The Marghis are believed to have lived in this region since the fourteenth century [13], and occupy mainly Uba district of Borno State. The Shuwas are immigrants from the middle east and are said to have arrived Borno early in seventeenth century [14]. They are located in Ngala district among other places. The Fulanis first came to Borno in early

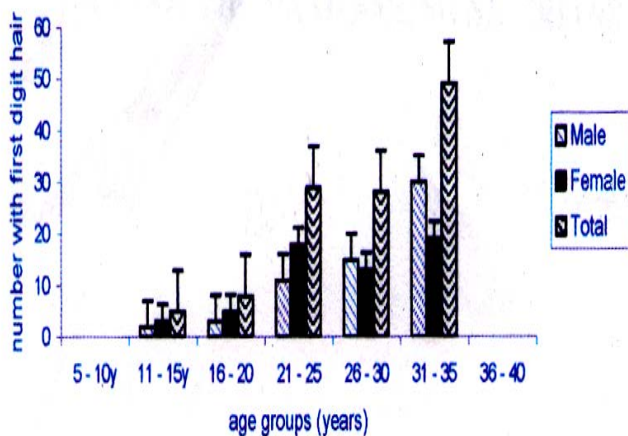
fifteenth century from the border between Mauritania and Mali [15] and are known to live a nomadic life. The Husas are settled in the whole of northern Nigeria from Sokoto to Borno, but the majority of them in Borno are immigrants from neighboring Niger Republic [14,16]. Furthermore, Mbajiorgu et al [12] have reported that the Kanuris are immigrants from the East and have intermarried with the Baburs/Buras over several years. From the above, it can be deduced that racial/ethnic/tribal influences are implicated in the distribution of phalangeal hair pattern.

Racial/ethnic factors also account for the wide differences in percentage incidence of 21.0% in Ibibios and Efiks of southeastern Nigeria [11], 92.9% and 98.8% among Yorubas and Edos western Nigeria [10]. Similarly, Setty [17] had reported an incidence of 16.3% - 28% in American Negroes, while Bhasin [18] and Hindley and Damon [19] reported percentage incidences of 44.3% among Tibetans and 58.3% in Melanesians, respectively.

In a related study, Garn [20] had implicated hormonal influences as contributing to the sex differences observed in the distribution of phalangeal hair pattern. This may explain the higher incidence of phalangeal hair in males when compared with the incidence in females, although it was not statistically significant except for distal phalangeal hair. However, significant sex differences were reported by Singh [11] in southeastern Nigeria and Sethuraman et al [21] in southern India.

Age was another factor which affected phalangeal hair distribution pattern. There was significant age differences in the incidence of mid-phalangeal hair among the four ethnic groups observed, which was similar to that reported by Mbajiorgu et al [12] among the Kanuris and Baburs/Buras. There was an increased incidence of presence of mid-phalangeal hair from the age of 5 years which peaked at 15 years, followed by a decline with further advance in age. However, there was no significant age factor in the incidence on mid-phalangeal hair among southwestern Nigerians [10] and Indians [22].

Fig. 6: Frequency distribution of hair on the first digit by age group and sex



The vertical bars indicate the SE. The large SE in the age groups 11 - 20 years is due to the low frequency of first digital hair in these age groups.

Contrary to previous reports of eight finger combinations by Singh [11] in southeastern Nigeria and Mbajiorgu et al [12] in the same northeastern Nigeria, the present study observed thirteen out of Danforth's [1] sixteen possible combinations. This was only two less than the fifteen patterns reported by Dharap et al [23] among the Malay people. Such a wide margin of finger combinations in mid-phalangeal hair pattern (even among ethnic groups which interact closely within the same geographical region of Nigeria), suggests the contribution of another factor, genetic, which was earlier reported by Beckman and Book [4]. Furthermore, there was exclusive presence of mid-phalangeal hair on the index -2, middle -3, ring -4 and little -5 fingers among the sample population, which differed from the report of Mbajiorgu et al [12] and Sinha et al [25]. The frequency order of the presence of mid-

phalangeal hair by digit in the population of Marghis, Shuwas, Fulanis and Hausas (4>3>2>5) is similar to other reports (11, 12, 23, 26).

The incidence of proximal phalangeal hair in the sample population (90.7%) is the highest so far reported in Nigeria. It was higher than the 84.4% reported by Mbajiorgu et al [12], and was significantly different among the age groups. On the other hand, distal phalangeal hair was present only in 1.8% of the total sample population with a significant ($p<0.05$) incidence reported by Mbajiorgu et al [12]. However, the incidence of hair on the phalanges of the first digit (7.4%) observed in this study was slightly higher than the report of 7.0% by Mbajiorgu et al [12] but greatly less than that reported by Setty [17] among white males (88.3%) and Negro males (34.6%).

In our view, it may still be necessary to further study the factors which have been discussed as affecting phalangeal hair distribution pattern because we have not fully understood the mechanism by which some of these factors operate. For example, which genes and how they influence the growth and distribution of hair on the phalangeal of the hand.

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