

## The Study of Dermatoglyphic in Simian Crease Group (The Human Masukake-Gata) at Minangkabau Ethnic, West Sumatra, Indonesia

Muthiara Hidayah, Djong Hon Tjong\* and Dewi Imelda Roesma

Dept. of Biology, Faculty of Mathematics and Natural Sciences, University of Andalas, Padang, West Sumatra

\*Corresponding Author E-mail: [tjong20@yahoo.com](mailto:tjong20@yahoo.com)

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### ABSTRACT

The research on dermatoglyphic study based on finger print patterns, total finger ridge count, total number of triradius, a-b ridge count and atd angle in simian crease group (the human Masukake-gata) was conducted at Minangkabau ethnic. The study used a purposive sampling method for the simian crease group and random sampling for the normal group. Data processing used qualitative and quantitative descriptive method and it was carried out in the Laboratory of Genetics and Cell Biology, Department of Biology, Faculty of Mathematics and Natural Sciences, University of Andalas, Padang, West Sumatra. The results showed that the finger print pattern on the simian crease group was significantly different to the normal group. There was increased frequency of whorls in simian crease group. While the total finger ridge count, total number of triradius, a-b ridge count and atd angle on simian crease group were not significantly different to the normal group. The atd angle was recommended to be one of the other markers to predict rapidly trisomy 21 besides simian crease on palmar and proposed to no longer define the simian line just as characteristic of people with Down's syndrome.

**Key words:** dermatoglyphic, simian crease.

### INTRODUCTION

Dermatoglyphic is the scientific study of the skin ridge patterns on the fingers, toes, palms of hands and soles of feet all primates<sup>1</sup>. Dermatoglyphic is used as a tool for detection a number of diseases which have a strongly heredity basis and also to detect abnormality. Additionally, dermatoglyphic is also used in forensic of individual identification, physical anthropology, human genetics and medicine<sup>2,3</sup>.

A number of studies on dermatoglyphic showed the correlation between finger print patterns and palm crease with the disease and psychological characters of human<sup>3</sup>. However, a study on psychological trait which is associated to dermatoglyphic in human with simian line is very rare. Simian line or also called simian crease is the transversal lines on the palms which usually use as one of characteristic features in people with Down's syndrome. Naming of simian crease based on the line of palms which similar to primates<sup>4,5,6</sup>. Seven out of a hundred people in Japan have a simian crease and is often found in members of genius families. This group was called the *masukake-gata*. People with this type hand are strongly individualistic and emotionally irregular<sup>7</sup>.

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The simian crease is a familiar feature of Down's syndrome<sup>4</sup>. Down's syndrome is a genetic disorder with abnormalities of chromosome 21 which resulted in patients with the physical and mental retardation<sup>8,9</sup>. According to Global Down's Syndrome Foundation, the average IQ of a person with Down's syndrome usually has a very low level of intelligence<sup>10</sup>. However, based on our observation, the simian crease is also found in peoples with a normal until high level of intelligence without any disorder. Therefore, it is possible that the presence of simian crease in the palm of the hand can be considered not to be used as an identifiers patients with Down's syndrome in the future.

Dermatoglyphics as well as palm creases are helpful in revealing the anthropological characteristics of the populations of different ethnic origins<sup>6,11</sup>. In this study, we try to find the characteristic of dermatoglyphics in simian crease group at Minangkabau ethnic (West Sumatra). The results on this study are expected to be a reference to early detection of the tendency of the character or nature and level of intelligence of children with simian crease so that the existing potential in those children can be developed better.

### MATERIAL AND METHODS

The samples comprised of 30 students with simian crease on palmar (simian crease group) and 30 students without simian crease (normal group).

The dermatoglyphics taken consisted of fingerprint patterns and palms print. Right and left palmar and digital prints were obtained by ink procedure<sup>12</sup>. The prints were obtained on A4 plain papers, already marked right and left, and spaces provided for biographic information. A record of individual biographical data consist of name, age, place and date of birth, gender, ethnicity, blood type and medical history obtainable by interviews.

Prediction level of intelligence (IQ) was performed using a Windows-based computer application, are unique IQ tests were designed by Andrew Lankin (2000) and IQ test shots by Anders Ditlev Jensen and Mensa Danmark. Scores will be averaged from the results of the test.

### RESULTS

The average IQ scores obtained from normal group and simian crease group are shown in Table 1. The frequency of fingerprint patterns of the normal group and simian crease group and chi-square test are shown in Table 2. The percentage of fingerprint patterns on every both finger of each hand and sequences are available in Table 3. The average of total finger ridge count, total number of triradius, total a-b ridge count and atd angle with t-test on normal group and simian crease group are shown in Table 4. Figure 1 shows the percentage of allergy history that found in normal group and simian crease group.

**Table 1. The average IQ of normal group and simian crease group**

Group	Total	Ratio	Average
Normal	30	63,5-141,5	106,78
Simian Crease	30	93,5-150,5	113,72

**Table 2. The frequency of fingerprint patterns on right and left hand of the normal group and simian crease group and chi-square test**

Group	Total	Whorl		Ulnar Loop		Radial Loop		Arch		X <sup>2</sup> <sub>1</sub>	X <sup>2</sup> <sub>2</sub>
		n	%	n	%	n	%	N	%		
Normal	R	150	43	28,67	100	66,67	4	2,66	3	2,00	<b>0,272<sup>ns</sup></b>
	L	150	43	28,67	98	65,33	5	3,33	4	2,67	
Total	300	86	<b>28,67</b>	198	<b>66,00</b>	9	<b>3,00</b>	7	<b>2,33</b>		<b>13,156*</b>
Simian Crease	R	150	60	40,00	86	57,33	3	2,00	1	0,67	<b>6,96<sup>ns</sup></b>
	L	150	67	44,67	70	46,67	8	5,33	5	3,33	
Total	300	127	<b>42,33</b>	156	<b>52,00</b>	11	<b>3,67</b>	6	<b>2,00</b>		

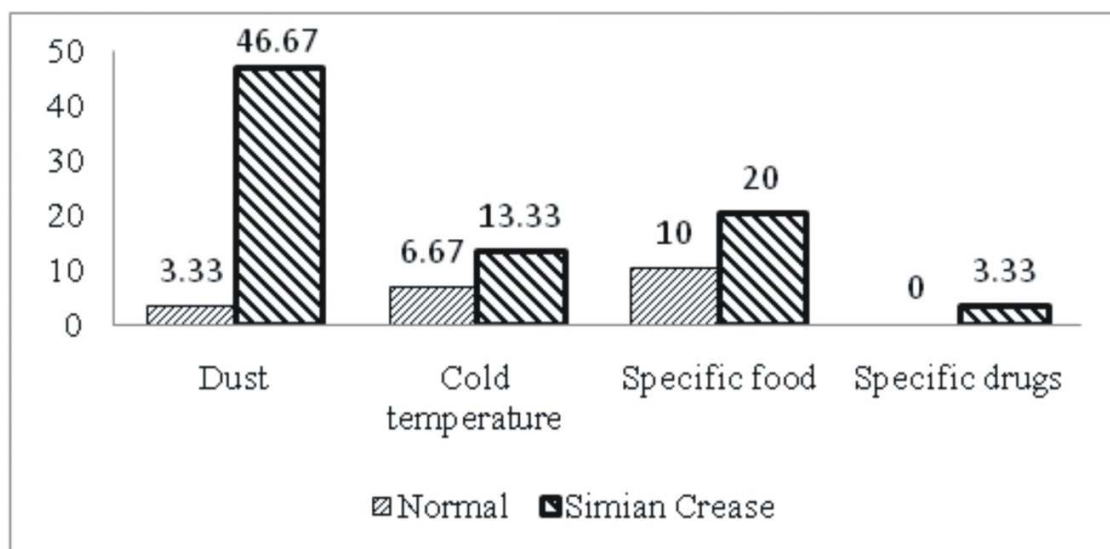
**Table 3. The percentage of fingerprint patterns on every both finger of each hand (I-V) and sequences**

Finger	Group	W	UL	RL	A	Sequence
I	N	<b>41,67%</b>	56,67%	1,67%	0,00%	UL > W > RL > A
	SC	<b>55,00%</b>	45,00%	0,00%	0,00%	W > UL > RL > A
II	N	28,33%	51,67%	<b>11,67%</b>	<b>8,33%</b>	UL > W > RL > A
	SC	48,33%	35,00%	<b>8,33%</b>	<b>8,33%</b>	W > UL > RL = A
III	N	15,00%	<b>81,67%</b>	1,67%	1,67%	UL > W > RL = A
	SC	28,33%	<b>70,00%</b>	0,00%	1,67%	UL > W > A > RL
IV	N	<b>40,00%</b>	58,33%	0,00%	1,67%	UL > W > A > RL
	SC	<b>53,33%</b>	41,67%	5,00%	0,00%	W > UL > RL > A
V	N	18,33%	<b>81,67%</b>	0,00%	0,00%	UL > W > LR > A
	SC	26,67%	<b>68,33%</b>	5,00%	0,00%	UL > W > RL > A

Description: N= normal, SC= simian crease, I= thumb, II= index finger, III= middle finger, IV= ring finger, V= little finger, Bold numeral show the value of the highest frequency of the fingers.

**Table 4. The average of total finger ridge count, total number of triradius, total a-b ridge count and atd angle with t-test on normal group and simian crease group**

Group	Total finger ridge count		Total number of triradius		Total a-b ridge count		atd angle	
	$\bar{X} \pm SE$	t-test	$\bar{X} \pm SE$	t-test	$\bar{X} \pm SE$	t-test	$\bar{X} \pm SE$	t-test
Normal	128,40±8,11		12,63±0,55		35,13±1,07		39,20±0,70	
Simian Crease	137,50±7,61	0,94 <sup>ns</sup>	14,03±0,68	0,13 <sup>ns</sup>	35,53±0,88	0,39 <sup>ns</sup>	40,30±0,66	0,87 <sup>ns</sup>

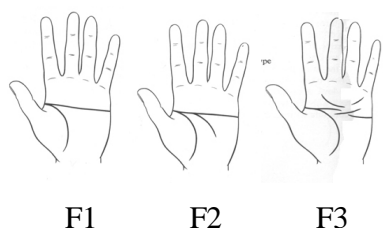
**Fig. 1: The percentage of allergy history that found in normal group and simian crease group**

## DISCUSSION

The average of IQ from simian crease group higher than normal group (Table 1). According to Asano<sup>7</sup> peoples with a simian crease are often found in the members of genius families. Classification by Wechsler in Nur'aeni<sup>14</sup> categorize the normal group included average class and the simian crease group in bright normal class<sup>14</sup>.

Asano<sup>7</sup> classified simian crease into three types, namely F1, F2 and F3 shown in Figure 2.

**Fig. 2: Three types of simian crease<sup>7</sup>**



**Table 5. Types of simian crease and the highest IQ scores in simian crease group**

No.	Type	Total	The highest IQ
1.	F1	1	137
2.	F2	29	150,50
3.	F3	0	0

Simian crease type F1 is often found in technicians, doctors (especially surgeons, radiologists, and dentists), engineers and scholars. People with it frequently have IQs of above 130 and usually have good powers of judgement and analytical thought. There is no information about the average of IQ in simian crease type F2 and F3<sup>7</sup>.

Simian crease type F1 was also found in one of our samples who is a medical student with 137 IQ score. However, the highest score (150,50) was found from an engineering student who has a simian crease type F2. Simian crease type F2 found among 29 out of 30 samples. Simian crease type F3 was not found in our research. According to Asano<sup>7</sup> the simian crease type F3 is very rare (1: 100) and is usually found in people with congenital disorders.

In childhood and youth, peoples with simian crease type F2 are often physically frail and especially afflicted with bronchial and cardiac ailments, but they have good artistic sense and perception and are frequently people of genius. The simian crease type F2 is easily transmitted genetically and has a high likelihood of appearing in twins<sup>7</sup>. Based on this study, peoples with simian crease type F2 did not have a history of heart disease or throat. However, we found a history of some allergies more higher in simian crease group than normal group (Figure 1).

The frequency of finger print pattern on the right and left hand in normal group and simian crease group was not significantly different ( $p < 0,05$ , Table 2). Frequency of finger print pattern on the right hand and left hand in both groups expressed a balanced, thus the frequency of attendance of each fingerprint pattern on the right hand will be equal to the left hand of each group.

The frequency of fingerprint pattern between the normal group and the simian crease group was significantly different ( $p > 0,05$ , Table 2). Ulnar loop patterns in normal group (66,00%) higher than simian crease group (52,00%). Whorl patterns in normal group (28,67%) smaller than simian crease group (42,33%).

In general, the proportion of the loop patterns on hand ranged between 60-70%, while the whorl patterns between 25-35%<sup>3,13</sup>. Thus, it can be stated that there was increased frequency of whorl patterns in simian crease group. For the frequency of radial loop and arch patterns in both groups were almost equal.

According to Table 3, the highest frequency of whorl patterns were found on the same finger in normal group and simian crease group (the fingers I and IV). The highest frequency of ulnar loop patterns were found on the same finger in both groups (the fingers III and V). The highest frequency of arch patterns were also found on the same finger in both groups (the second finger/index finger). According to Bener & Erk<sup>15</sup>, in general the type of whorl patterns often appear on the fingertips I and IV, then the type

of loop patterns often appear on the fingertips III and V, the type of arch patterns often appear on the fingertips II at right and left hand in both men and women were influenced by genetic factors.

The highest frequency of radial loop patterns were found on the same finger in normal group and simian crease group (index finger/the second finger). Radial loop patterns commonly found on the second finger. However, in simian crease group, radial loop patterns were also found on the fingers IV and V of 5.00%, while the normal group of 0.00% (Table 3). The presence of radial loop patterns on the fingers IV and V are very rare and can be used as a marker of a simian crease group.

The average amount of total finger ridge count, total number of triradius, a-b ridge count and atd angle on simian crease group were not significantly different to the normal group (Table 4).

Medical experts always using simian crease as a marker in Down's syndrome. These patients have significantly different atd angle<sup>3</sup>. The atd angle of Down's syndrome more larger than both groups of this study, between 70<sup>0</sup>-85<sup>0</sup> in Andalas Medical Magazine (2002). Therefore, the atd angle was recommended to be one of the other markers to predict rapidly trisomy 21 besides simian crease on palmar. Based on our research, it was estimated that if a child has a simian crease on the palms and the atd angle almost equal to the normal people (33<sup>0</sup>-51<sup>0</sup>), it can be foreseeable that the child does not have the genetic disorder Down's syndrome, but has a high degree of intelligence. However, if the child has a simian crease on the palms and the atd angles very different from normal people (70<sup>0</sup>-85<sup>0</sup>), it can be foreseeable that the child has a genetic disorder Down's syndrome.

### CONCLUSION

The finger print pattern on the simian crease group was significantly different to the normal group. There was increased frequency of whorls in simian crease group, while the total finger ridge count, total number of triradius, a-b ridge count and atd angle on simian crease group were not significantly different to the normal group. The atd angle was recommended to be one of the other markers to predict rapidly trisomy 21 besides simian crease on palmar and proposed to no longer define the simian line just as characteristic of people with Down's syndrome.

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