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Research Article

DIGITAL DERMATOGLYPHICS OF TEACHER TRAINEES

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ABSTRACT

Fingerprints are unique, permanent, have varied patterns, used for personal identification and also to teach polygenic trait in genetics. Present study is carried out among male (N=72) and female (N=191) teacher trainees of Regional Institute of Education (RIE), Mysore, India with the aim to find out predominant fingerprint pattern, sexual dimorphism, bilateral and geographical variation in pattern and association (if any) of pattern with ABO blood group and food habit. By following standard method fingerprints along with personal information were collected, analysed, pattern identified and data were statistically tested. Results show that loops are the predominant pattern in both male (57.9%) and female (60.5%) followed by whorl (18.0% & 20.0%), mixed (18.5% & 13.6%) and arch (5.1% & 5.8%). Tented arch was the least pattern among all and arches are not found in middle, ring and pinky fingers of male. It may be concluded from the study that, no sexual dimorphism, no bilateral and geographical variation (except arch) and no association of fingerprint pattern with ABO blood group and food habit of the studied subject.

Key words: Fingerprint pattern, sexual dimorphism, bilateral and geographical variation, ABO blood group and food habit.

INTRODUCTION

Dermatoglyphics is the scientific study of epidermal ridges present on surface of finger, palm, toes and soles. Epidermal ridges of digits leave impressions as fingerprints which are individualistic, having permanent patterns (loop, whorl and arch) and are used for personal identification. These ridges make their appearance at about ten weeks of fetal development [1]. The configuration of ridge pattern are determined partially by heredity and in part by accidental or environmental influence which creates stress and tension in their growth during fetal life [2]. Reference [3] reported that different patterns show preferences for different digits. Reference [4] described how polygenic trait of total fingerprint ridge count can be used as a laboratory experiment. Studies were also conducted to find out correlation between fingerprint and lip print [5]. Further, Forensic Anthropology details the dermoglyphic differences among endogamous groups based on race, religion, geography or caste [6]. Such variations in fingerprint pattern are usually employed for the study of ethnic variation, Genetic and Human Biology. In continuation of such studies, present study is performed with the aim to find out predominant fingerprint pattern of teacher trainees, sexual dimorphism, bilateral and geographical variation in pattern and association of fingerprint pattern with blood group and food habit of the subjects.

MATERIALS AND METHODS

With the permission of the authorities the study was conducted at Regional Institute of Education (RIE), Mysore during the year 2015 and the subjects are 18 to 22 years old male (N=72) and female (N=191) pre-service teacher trainees who are from various states of India. Ink pad, A4 sized 85 GSM drawing note book, pencil, pen, scale, hand lens and cleaning cloth are the materials used for the study. Tables having five columns (4 cm width each) and ten rows (3 cm width each) is made on right side of every pages to collect the fingerprints. On alternative left side table having 8 columns and ten rows are drawn to collect personal information. Running numbers are given to each row of the alternative right side table and corresponding numbers to the rows of the left side table.

Purpose and method of fingerprint collection was explained to each subject. The subjects were asked to wash their hands and press their left hand fingers (edge bulb) one by one on the ink pad. The fingerprints are transferred carefully to the table by gentle press starting with thumb on the first column and index, middle, ring and pinky fingers on 2^{nd}, 3^{rd}, 4^{th} and 5^{th} columns respectively [7-9]. Same method was repeated for right hand on the next page. For correct identification of the pattern each print was taken twice. However, total number of right and left hand fingerprints is not equal because, some students refused to give their right hand print. Similarly, some students do not know their blood group and their fingerprints are omitted (in blood group analysis). In addition to the fingerprint, personal information viz. name, gender, blood group, food habit and native state were also collected and the subjects were grouped based on it. Following the identification guideline given in the http://www.odec.ca/projects/2004/mcgo4s0/public_html/t5/fingerprints.html, all the fingerprint was analysed with hand lens, identified the pattern and the data were computed with SPSS.

RESULT AND DISCUSSION

Frequency and percentage of various patterns were compared between subgroups of gender, blood group, food habit and native state as follows:

1. Comparison of fingerprint pattern between genders

It is observed from the table 1 that, the loop pattern has the highest percentage followed by whorl, mixed and arch both in male (57.9%, 18%, 18.5% and 5.1% respectively) and female (60.5 %, 20.0%, 13.6% and 5.8% respectively) subjects. These results were in agreement with results of other studies [3, 9-12]. Overall percentage of arch, loop and whorl did not show much difference between male and female indicating no sexual dimorphism. Similar observations were reported in Marathi subjects in Nagpur, India [8] Vidarbha Region, India [3] Southern Nigeria [13] and Delta State University, Nigeria [14]. On the other hand studies [10, 15] differed from the present study by reporting a significant difference in pattern between male and female. Further, percentage of double loop was higher in left hand of male (5.0%) than female (1.3%). similarly, male had higher level of pocket loop in right (3.0%) and left (5.5%) hand than female (1.5% and 2.4% respectively). Mixed pattern was slightly higher in male (18.5%) than female (13.6%). Tented arch was the least pattern among all and arches are not found in middle, ring and pinky fingers of male. Similarly, ulnar & radial loops are more than double & pocket loop.

2. Comparison of fingerprint pattern among ABO blood groups

In general no difference in fingerprint pattern was observed among the blood groups (table 2). In support, no significant association between fingerprint pattern and ABO blood group

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Table. 1. Comparison of fingerprint pattern between genders

Gender	Digits	f/%	ARCH				LOOP								WHORL		MIXED	
			Simple		Tented		Double		Ulnar		Pocket		Radial					
			RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH
Male (N: RH=64, LH=72)	T	f	7	3				8	1	30	1	1	30	3	11	5	14	22
		%	10.9	4.2				11.1	1.6	41.7	1.6	1.4	46.9	4.2	17.2	6.9	21.9	30.6
	I	f	2	4	6	2	4	3	3	27			17	5	18	19	14	12
		%	3.1	5.6	9.4	2.8	6.3	4.2	4.7	37.5			26.6	6.9	28.1	26.4	21.9	16.7
	M	f		4		2	2	4	2	40		2	39	2	9	9	10	9
		%		5.6		2.8	3.1	5.6	3.1	55.6		2.8	60.9	2.8	14.1	12.5	15.6	12.5
	R	f		3		1	2	2	2	22	2	10	18	1	22	22	18	11
		%		4.2		1.4	3.1	2.8	3.1	30.6	3.1	13.9	28.1	1.4	34.4	30.6	28.1	15.3
	P	f					4	1	1	51	7	7	41	1	6	1	5	11
		%					6.3	1.4	1.6	70.8	10.9	9.7	64.1	1.4	9.4	1.4	7.8	15.3
	TOTAL %		3.4	3.8	1.8	1.3	3.7	5.0	2.8	47.2	3.1	5.5	45.3	3.3	20.6	15.5	19.0	18.0
			5.1% (RH=5.2 LH=5.1)				**57.9 %** (RH=54.9, LH=61)								**18%**		**18.5%**	
Female (N: RH=167 LH=191)	T	f	6	13			8	8	3	104			97	3	24	15	29	48
		%	3.6	6.8			4.8	4.2	1.8	54.5			58.1	1.6	14.4	7.9	17.4	25.1
	I	f	14	12	4	10	5	4	4	72	4	3	67	15	41	48	28	27
		%	8.4	6.3	2.4	5.2	3.0	2.1	2.4	37.7	2.4	1.6	40.1	7.9	24.6	25.1	16.8	14.1
	M	f	6	13		6	1	1	3	111	3	4	114	3	16	41	24	12
		%	3.6	6.8		3.1	0.6	0.5	1.8	58.1	1.8	2.1	68.3	1.6	9.6	21.5	14.4	6.3
	R	f	3	7		2	2		2	74	4	7	69	2	61	75	26	24
		%	1.8	3.7		1.0	1.2		1.2	38.7	2.4	3.7	41.3	1.0	36.5	39.3	15.6	12.6
	P	f	5	4		2			2	134	2	9	127	2	18	26	13	14
		%	3.0	2.1		1.0			1.2	70.2	1.2	4.7	76.0	1.0	10.8	13.6	7.8	7.3
	TOTAL %		4.1	5.0	0.4	2.0	1.9	1.3	1.7	50.8	1.5	2.4	56.8	2.6	19.1	21.0	14.4	12.8
			5.8% (RH=4.5, LH=7)				**60.5 %** (RH=63.9, LH=57.1)								**20.0%**		**13.6%**	

Note: f- frequency, N-Number, RH - Right Hand, LH - Left Hand, T - Thumb, I - Index, M - Middle, R - Ring, P - Pinky.

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Table. 2. Comparison of fingerprint pattern among ABO blood groups

Blood group	Digits	f/%	ARCH				LOOP								WHORL		MIXED	
			Simple		Tented		Double		Ulnar		Pocket		Radial					
			RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH
A (N: RH=47, LH=50)	T	f	2	3				3	1	23	1	1	27	1	4	4	12	15
		%	4.3	60.				6.0	2.1	46.0	2.1	2.0	57.4	2.0	8.5	8.0	25.5	30.0
	I	f	3	2	4	3	1		1	18	1	2	15	5	12	14	10	4
		%	6.4	4.0	8.5	6.0	2.1		2.1	36.0	2.1	4.0	31.9	10.0	25.5	28.0	21.3	8.0
	M	f	1	1		4	1	1		32		1	30		6	11	9	
		%	2.1	2.0		8.0	2.1	2.0		64.0		2.0	63.8		12.8	22.0	19.1	
	R	f		1					1	22		5	19		16	20	11	2
		%		2.0					2.1	44.0		10.0	40.4		34.0	40.0	23.4	4.0
	P	f	1	1						35	1	1	35		6	7	4	6
		%	2.1	2.0						70.0	2.1	2.0	74.5		12.8	14.0	8.5	12.0
	TOTAL %		3.0	3.2	1.7	2.8	0.8	1.6	1.2	52.0	1.2	4.0	53.6	2.4	18.7	22.4	19.6	10.8
			5.35% (RH=4.7, LH=6)				**58.4 %** (RH=56.8, LH=60.0)								**20.5%**		**15.2%**	
AB (N: RH=11, LH=14)	T	f		1				1	1	11			6		3		1	1
		%		7.1				7.1	9.1	78.6			54.5		27.3		9.1	7.1
	I	f		2		1			2	5	1		3	1	3	3	2	2
		%		14.3		7.1			18.2	35.7	9.1		27.3	7.1	27.3	21.4	18.2	14.3
	M	f		1					1	11			7	1	1	1	2	
		%		7.1					9.1	78.6			63.6	7.1	9.1	7.1	18.2	
	R	f		1					1	6	1	1	3	1	4	4	2	1
		%		7.1					9.1	42.9	9.1	7.1	27.3	7.1	36.4	28.6	18.2	7.1
	P	f		1				1	1	9	1	1	6		1	1	2	1
		%		7.1				7.1	9.1	64.3	9.1	7.1	54.5		9.1	7.1	18.2	7.1
	TOTAL %			8.6		1.4		2.8	11.0	60.0	5.4	2.8	45.4	4.3	21.8	12.8	16.3	7.1
			5% (RH=0, LH=10)				**65.8 %** (RH=61.8, LH=69.9)								**17.3%**		**11.7%**	
B (N:	T	f		4			3	2	2	38			39	3	13	8	11	25
		%		5.0			4.4	2.5	2.9	47.5			57.4	3.8	19.1	10.0	16.2	31.3
	I	f	4	6	1	4	3	2	2	30			23	5	18	24	17	9

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RH=68, LH=80)		%	5.9	7.5	1.5	5.0	4.4	2.5	2.9	37.5			33.8	6.3	26.5	30.0	25.0	11.3
	M	f	2	6				1	3	48	2	3	42	3	6	12	13	7
		%	2.9	7.5				1.3	4.4	60.0	2.9	3.8	61.8	3.8	8.8	15.0	19.1	8.8
	R	f	1	3			3	1	2	32	2	4	24	2	25	27	11	11
		%	1.5	3.8			4.4	1.3	2.9	40.0	2.9	5.0	35.3	2.5	36.8	33.8	16.2	13.8
	P	f					1		2	58	2	8	53	3	6	7	4	4
		%					1.5		2.9	72.5	2.9	10.0	77.9	3.8	8.8	8.8	5.9	5.0
	TOTAL %		2.0	4.7	0.3	1.0	2.9	1.5	3.2	51.5	1.7	3.7	53.2	4.0	20.0	19.5	16.5	14.0
			4% (RH=2.3, LH=5.7)				**60.8%** (RH=61.0, LH=60.7)								**19.7%**		**15.2%**	
O (N: RH=84, LH=92)	T	f	4	5			10	8		51			44		11	5	15	23
		%	4.8	5.4			11.9	8.7		55.4			52.4		13.1	5.4	17.9	25.0
	I	f	7	4	4	4	4	2	1	36	2	1	37	6	22	19	7	20
		%	8.3	4.3	4.8	4.3	4.8	2.2	1.2	39.1	2.4	1.1	44.0	6.5	26.2	20.7	8.3	21.7
	M	f	3	6		4	1	1		48	1	2	63		9	18	7	13
		%	3.6	6.5		4.3	1.2	1.1		52.2	1.2	2.2	75.0		10.7	19.6	8.3	14.1
	R	f	2	4		2				30	3	5	36		27	34	16	17
		%	2.4	4.3		2.2				32.6	3.6	5.4	42.9		32.1	37.0	19.0	18.5
	P	f	4	2		2	2			66	4	4	59		9	7	6	11
		%	4.8	2.2		2.2	2.4			71.7	4.8	4.3	70.2		10.7	7.6	7.1	12.0
	TOTAL %		4.7	4.5	0.9	2.6	4.0	2.4	0.2	50.2	2.4	2.6	56.9	1.3	18.6	18.0	12.1	18.2
			6.4% (RH=5.6, LH=7.1)				**60.0%** (RH=63.5, LH=56.5)								**18.3%**		**15.1%**	

Note: f- frequency, N-Number, RH - Right Hand, LH - Left Hand, T - Thumb, I - Index, M - Middle, R - Ring, P - Pinky.

Table. 3. Comparison of fingerprint pattern between vegetarians and non - vegetarians

Food habit	Digits	f/%	**ARCH**				**LOOP**								**WHORL**		**MIXED**	
			Simple		Tented		Double		Ulnar		Pocket		Radial					
			RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH
Vegetarian (N: RH=38, LH=42)	T	f	1	3			1	1		24			20		5	3	11	11
		%	2.6	7.1			2.6	2.4		57.1			52.6		13.2	7.1	28.9	26.2
	I	f	5	3	2	2	1			15	1		16	5	10	7	3	10
		%	13.2	7.1	5.3	4.8	2.6			35.7	2.6		42.1	11.9	26.3	16.7	7.9	23.8
	M	f	1	2		1				28			29		3	8	5	3

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		%	2.6	4.8		2.4				66.7			76.3		7.9	19.0	13.2	7.1
	R	f		1						17		2	16		15	16	7	6
		%		2.4						40.5		4.8	42.1		39.5	38.1	18.4	14.3
	P	f		1						29	2	1	30		3	8	3	3
		%		2.4						69.0	5.3	2.4	18.9		7.9	19.0	7.9	7.1
	TOTAL %		3.7	4.7	1.0	1.4	1.0	0.4		53.8	1.6	2.4	58.4	2.4	18.9	20.0	15.2	15.7
			5.4% (RH=4.7, LH=6.1)				**60.0%** (RH=61.0, LH=59.0)								**19.4%**		**15.4%**	
Non-vegetarian (N: RH=193, LH=221)	T	f	5	13			14	15	4	110	1	1	107	6	30	17	32	59
		%	2.6	5.9			7.3	6.8	2.1	49.8	0.5	0.5	55.4	2.7	15.5	7.7	16.6	26.7
	I	f	11	13	8	10	8	7	7	84	3	3	68	15	49	60	39	29
		%	5.7	5.9	4.1	4.5	4.1	3.2	3.6	38.0	1.6	1.4	35.2	6.8	25.4	27.1	20.2	13.1
	M	f	7	15		7	3	5	5	123	3	6	124	5	22	42	29	18
		%	3.6	6.8		3.2	1.6	2.3	2.6	55.7	1.6	2.7	64.2	2.3	11.4	19.0	15.0	8.1
	R	f	3	9		3	4	2	4	79	6	15	71	3	68	81	37	29
		%	1.6	4.1		1.4	2.1	0.9	2.1	35.7	3.1	6.8	36.8	1.4	35.2	36.7	19.2	13.1
	P	f	5	3		2	4	1	3	156	7	15	138	3	21	19	15	22
		%	2.6	1.4		0.9	2.0	0.5	1.6	70.6	3.6	6.8	71.5	1.4	10.9	8.6	7.8	10.0
	TOTAL %		3.2	4.8	0.8	2.0	3.4	2.7	2.4	50.0	2.1	3.6	52.6	2.9	19.7	19.8	15.7	14.2
			5.4% (RH=4.0, LH=6.8)				**59.8%** (RH=60.5, LH=59.2)								**19.7%**		**14.9%**	

Note: f- frequency, N-Number, RH - Right Hand, LH - Left Hand, T - Thumb, I - Index, M - Middle, R - Ring, P - Pinky.

Table. 4. Comparison of fingerprint pattern among States of India

State	Digits	f/%	ARCH				LOOP								WHORL		MIXED	
			Simple		Tented		Double		Ulnar		Pocket		Radial					
			RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH	RH	LH
(formerly) (N: RH=79,	T	f	1	4			7	10		39	1		39	3	9	4	10	19
		%	1.5	5.1			10.4	12.7		49.4	1.5		58.2	3.8	13.4	5.1	14.9	24.1
	I	f	4	5	2	1	3	2	2	30	1	1	23	7	19	17	13	16
		%	6.0	6.3	3.0	1.3	4.5	2.5	3.0	38.0	1.5	1.3	34.3	8.9	28.4	21.5	19.4	20.3
	M	f		4		2	1	5	1	43	1	2	47	1	6	14	11	8
		%		5.1		2.5	1.5	6.3	1.5	54.4	1.5	2.5	70.1	1.3	9.0	17.7	16.4	10.1
	R	f	1	2		1		2		20	2	4	21	1	26	28	17	21

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		%	1.5	2.5		1.3		2.5		25.3	3.0	5.1	31.3	1.3	38.8	35.4	25.4	26.6
	P	f	1				1	1		54	4	4	47	1	6	7	8	12
		%	1.5				1.5	1.3		68.4	6.0	5.1	70.1	1.3	9.0	8.9	11.9	15.2
	TOTAL %		2.1	3.8	0.6	1.0	3.6	5.1	0.9	47.1	2.7	2.8	52.8	3.3	19.7	17.7	18.5	19.7
			3.7% (RH=2.7, LH=4.8)				**59.1%** (RH=60.0, LH=58.3)								**18.7%**		**19.1%**	
Karnataka (N: RH=71, LH=63)	T	f	1/	5			3	2	2	35		1	35	2	11	6	11	20
		%	1.6	7.0			4.8	2.8	3.2	49.3		1.4	55.6	2.8	17.5	8.5	17.5	28.2
	I	f	5	10	5	2	3	1	3	23	2	1	22	7	14	18	9	9
		%	7.9	14.1	7.9	2.8	4.8	1.4	4.8	32.4	3.2	1.4	34.9	9.9	22.2	25.4	14.3	12.7
	M	f	4	6		3	1		1	44			41	3	12	12	4	3
		%	6.3	8.5		4.2	1.6		1.6	62.0			65.1	4.2	19.0	16.9	6.3	4.2
	R	f	2	4		1			1	27	1	6	26	1	23	25	10	7
		%	3.2	5.6		1.4			1.6	38.0	1.6	8.5	41.3	1.4	36.5	35.2	15.9	9.9
	P	f	1	4			2			48	3	3	46	1	7	8	4	7
		%	1.6	5.6			3.2			67.6	4.8	4.2	73.0	1.4	11.1	11.3	6.3	9.9
	TOTAL %		4.1	8.1	1.6	1.7	2.8	0.8	2.2	49.8	1.9	3.1	53.9	3.1	21.2	19.4	12.0	12.9
			7.7% (RH=5.7, LH=9.8)				**58.8%** (RH=60.8, LH=56.8)								**20.3%**		**12.4%**	
Kerala (N: RH=36, LH=41)	T	f		2			1	1		21			21		6	4	8	13
		%		4.9			2.8	2.4		51.2			58.3		16.7	9.8	22.2	31.7
	I	f	1		1	2	1	2		17			15	1	8	16	10	3
		%	2.8		2.8	4.9	2.8	4.9		41.5			41.7	2.4	22.2	39.0	27.8	7.3
	M	f		2			1		1	24			24		3	11	6	4
		%		4.9			2.8		2.8	58.5			66.7		8.3	26.8	16.7	9.8
	R	f		1			1		2	19	1		13		14	18	5	3
		%		2.4			2.8		5.6	46.3	2.8		36.1		38.9	43.9	13.9	7.3
	P	f	1							30	1	4	30		3	4	1	3
		%	2.8							73.2	2.8	9.8	83.3		8.3	9.8	2.8	7.3
	TOTAL %		1.6	2.4	0.5	0.9	2.2	1.4	1.6	54.1	1.1	1.9	57.2	0.5	18.9	25.8	16.6	12.7
			2.7% (RH=2.1, LH=3.3)				**60.0%** (RH=62.1, LH=57.9)								**23.3%**		**14.6%**	
RH =3	T	f	1	3			2	1	1	19			21		6	2	5	14
		%	2.8	7.7			5.6	2.6	2.8	48.7			58.3		16.7	5.1	13.9	35.9

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	I	f	2		2	2	2		1	15		1	13	2	13	11	3	8
		%	5.6		5.6	5.1	5.6		2.8	38.5		2.6	36.1	5.1	36.1	28.2	8.3	20.5
	M	f	1	1		1				21	1	3	22		4	10	8	3
		%	2.8	2.6		2.6				53.8	2.8	7.7	61.1		11.1	25.6	22.2	7.7
	R	f	2							17	2	5	14		13	14	5	3
		%	5.6							43.6	5.6	12.8	38.9		36.1	35.9	13.9	7.7
	P	f					1			30	1	4	26		7	5	1	
		%					2.8			76.9	2.8	10.3	72.2		19.4	12.8	2.8	
	TOTAL %		3.3	2.0	1.1	1.5	2.7	0.5	1.1	53.3	2.2	4.6	54.4	1.0	23.9	21.5	12.2	14.3
			3.9% (RH=4.4, LH=3.5)				**59.4%** (RH=60.4, LH=58.4)								**22.7%**		**13.3%**	
North India (N: RH=27, LH=27)	T	f	3	2			1	2	1	17			10	1	3	2	9	
		%	11.1	7.4			3.7	7.4	3.7	63.0			37.0	3.7	11.1	7.4	33.3	
	I	f	5	1		4		2	1	12			9	3	6	4	6	1
		%	18.5	3.7		14.8		7.4	3.7	44.4			33.3	11.1	22.2	14.8	22.2	3.7
	M	f	3	4		1			2	16	1	1	15	1	1	2	5	2
		%	11.1	14.8		3.7			7.4	59.3	3.7	3.7	55.6	3.7	3.7	7.4	18.5	7.4
	R	f	1	3					1	12		2	12	1	7	8	6	1
		%	3.7	11.1					3.7	44.4		7.4	44.4	3.7	25.9	29.6	22.2	3.7
	P	f	2						2	21		1	19	1	1	2	3	2
		%	7.4						7.4	77.8		3.7	70.4	3.7	3.7	7.4	11.1	7.4
	TOTAL %		10.3	0.7		3.7	0.7	2.9	5.2	57.7	0.7	2.9	48.1	5.2	13.3	13.3	21.5	4.4
			7.2% (RH=10.3, LH=4.1)				**61.7%** (RH=54.7, LH=68.7)								**13.3%**		**12.9%**	

Note: f- frequency, N-Number, RH - Right Hand, LH - Left Hand, T - Thumb, I - Index, M - Middle, R - Ring, P - Pinky.

was reported in Nigeria [14] in contrast other studies revealed significant association in subjects from Ahmadabad, India [16] and Kerala [17]. However, AB group subjects had higher percentages of simple arch in left hand (8.6%), left (ulnar) loop (11.0%) and pocket loop (11.0%) in right hand; and lower percentages of whorl (12.8%) and mixed (7.1%) pattern in left hand. Further, this group had no arch and double loop in right hand. Likewise, O blood group had higher percentage of double loop (4.0%) in right hand mixed (18.2%) in left hand; and lower percentages of ulnar loop (0.2%) and whorl (12.1%) in right hand.

3. Comparison of fingerprint pattern between vegetarians and non - vegetarians

It is noted from the table 3 that fingerprints patterns of vegetarians and non-vegetarians are very much similar. However, vegetarians did not have ulnar loop in right hand whereas other group had. This observation shows that fingerprint are not related to food habit. On the other hand, a study expresses that, our food habit may affect the DNA of our grand children in turn the fingerprint [18]. In addition, Scientists at Imperial College, London have shown that finger prints contain vital information about a person's habit including food habit [19].

4. Comparison of fingerprint pattern among States of India

Present study shows that loops are the most frequent pattern followed by whorl, mixed and arch in all the South Indian States and North India (table 4). This is in accordance with the studies carried out on subjects from Mysore [10, 12, 20], All India [21, 22] and Nepal [23]. When the major patterns are noted the percentage of arch was higher (7.7%) in students from Karnataka, lower (2.7%) in Kerala; and Andra Pradesh (formerly) had higher (19.1%) mixed pattern. Simple arches are more in left hand in Karnataka but in right hand in North Indians. Further, double loops are higher (5.1%) in left hands of Andra Pradesh subjects, mixed is lower (4.4%) in North Indians. Loop and whorl patterns did not show any difference among states. Significant geographical variation were also reported between Nepalese and Indians [23], Manipuri and Kerala population [9] and among North, East, West, Central and South Indian population [24].

When the overall patterns were evaluated among the entire study subjects, the patterns on both hands are more or less similar indicating bilateral symmetry however, in an individual it may not be the same. In support, no significant bilateral variation was observed among Nepalese [10], subjects from Vidarbha Region, India [3].

CONCLUSION

The study guides to draw following conclusions:

1. Loops are the predominant pattern followed by whorl, mixed and arch among teacher trainees.
2. No sexual dimorphism observed.
3. No bilateral variation could in overall population but, in individuals it may exist.
4. Geographical variation was noted only for arch pattern.
5. Fingerprint patterns did not show any association with ABO blood groups and food habit.

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