

**Title:****Comparative study of Digital dermatoglyphics in vitiligo – A case control study**

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**Abstract**

**Introduction:** Dermatoglyphics is the scientific study of finger prints from palms, fingers, soles and toes of humans and animals. The uniqueness is it reflects DNA hence does not change & correlated with genetic abnormalities and are useful in biomedical studies. Vitiligo is the commonest heritable acquired progressive pigmentary disorder of skin. Altered dermatoglyphics pattern is well established as a early diagnostic aid in such disorder.

**Material and Methods:** Patients suffering from vitiligo 100 of them (38 males and 62 females)visiting the dermatology OPD at Vydehi Institute of Medical College and Research Center, Bangalore, were considered as cases in the study. Controls were hospital staff & medical students from the same institute. Dermatoglyphic prints were taken by the ink method & analysed with the help of magnifying hand lens.

**Results:** The whorl pattern in vitiligo was the commonest, mean value was more in males than females, frequency of left hand fingers more than right in both male & female cases,

Whorl pattern showed higher ratio in males in all left fingers except ring finger, in females was in left thumb, index, ring fingers. The arch pattern in vitiligo was least, mean value showed females more than males, showed in males more frequency of left hand fingers, in females right hand fingers compared to other hand. Arch pattern showed higher frequency in males in left thumb & little finger, absent in index, ring finger, in females it was more in right fingers & absent in index finger. The loop pattern was 2<sup>nd</sup> commonest, mean value was more in males vitiligo & showed right more than left hand fingers both in males & females, Loop ratios were higher in males in all the digits except ring finger & in females showed higher ratio left hand in thumb, middle & little finger. The Total finger ridge count mean value in vitiligo showed males more than females & there was significant difference between male vitiligo & control group.

**Conclusion:** This concluded from our study that difference observed between vitiligo & control may be result of genetic abnormality or influence of some intrauterine environment factors. The study of dermatoglyphic pattern serves as aid to diagnose and may indicate an increasing tendency to develop the disease

**Key words:** Dermatoglyphics, dermis, ridge patterns, loops, arch, whorl, Vitiligo.

### **Introduction:**

The term dermatoglyphic has its origin from greek word derma means skin & glyphic means carve hence the meaning skin carving or sculpture was introduced by anatomist cumin & midlo of Tulane university in 1926.<sup>1</sup> Dermatoglyphics is the scientific study of finger prints from palms, fingers, soles and toes of humans and animals.<sup>2</sup> There are primary & secondary ridges of which primary ridge formation is responsible for the dermatoglyphics pattern. Secondary ridges are modified into sebaceous glands and are found at the apex of the primary ridges at regular intervals. The patterns may be further divided into sub-groups by means of the smaller differences existing between the patterns in the same general group. These divisions are as follows plain & tented arch, radial & ulnar loops, whorl subtypes plain, central pocket, double, accidental whorl.<sup>3</sup> In Egyptian mummies the rodes pattern may be clearly discernable even after an interval of 2000 years.<sup>4</sup> The fingerprints are permanent and are not the same even in monozygotic twins.<sup>5</sup> Dermatoglyphic patterns are genetically determined & influenced by insults during early foetal life.<sup>6</sup> There are diseases known to be caused by the genetic abnormalities e.g. Down's syndrome which has some characteristic dermatoglyphic patterns.<sup>7</sup> Vitiligo may be inherited and supposed to have genetic basis.<sup>8</sup> Vitiligo is a disorder of pigmentation where complete or partial loss of melanocytes in the skin and or hair occurs resulting in cosmetic disfigurement & causing social inhibition. Prevalence of familial vitiligo varies from 28-35%.<sup>7,9</sup> Bleehen & Ebling<sup>10</sup> stated that vitiligo may be inherited as autosomal dominant trait without any sex predomination. Dermatoglyphic pattern is a good material for genetic studies because unlike stature, intelligence & body weight, they are not influenced by age or by post natal period. It is a simple, inexpensive, atraumatic procedure & as screeing tool for determining genetic abnormality & can be used as supportive diagnosis for definitive diagnosis.<sup>11</sup>

## Materials and methods

The study group consisted of 100 clinically diagnosed cases of vitiligo, among which 38 were males and 62 were females visiting the dermatology OPD at Vydehi Institute of Medical College and Research Center, Bangalore, were considered as cases in the study. The controls of 100 in number (38 males and 62 females) were students and staff members from the same institution and were clinically checked to rule out vitiligo. Dermatoglyphic prints were taken by the 'ink method' of Cummins and midlo (1961).<sup>12</sup>

Informed consent of the cases and controls was obtained. The subjects were asked to clean their hands with soap and water and then dry them. A requisite amount of ink was uniformly smeared on the extended palms to get a thin and even film. The inked hands were pressed on the sheet of the paper from proximal to distal end. The palm was then lifted away from the paper in reverse order from distal to proximal end. The prints were then subjected to detailed digital dermatoglyphic analysis with the help of magnifying hand lens pattern like arch, loop, whorl & total finger ridge count was done of all the fingers of both right & left hand. Statistical analysis was done using Epi Info 6, Version 6.04d software.

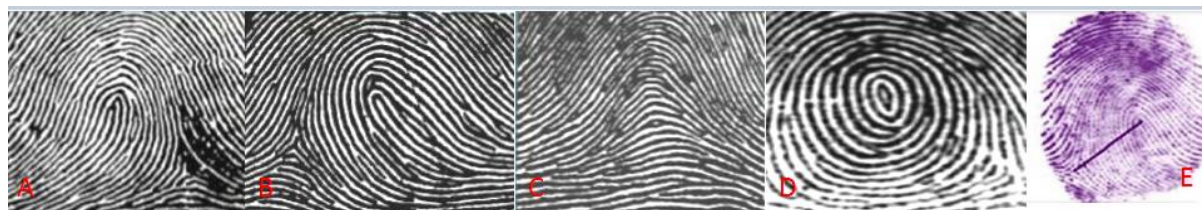


Figure no 1: showing dermatoglyphic pattern. A: radial loop, B: ulnar loop, C: arch, D: whorl, E- total ridge count of loop

## Results

The dermatoglyphic pattern wise details of the observations made are given as below.

Group	Gender	Side	Whorls		Arches		Loops	
			No.	%	No.	%	No.	%
Vitiligo patients	Male	R	41	21.5	3	1.6	146	76.8
		L	52	27.3	4	2.1	134	70.5
		R+L	93	24.4	7	1.8	280	73.6
	Female	R	48	15.5	35	11.3	227	73.2
		L	57	18.4	33	10.6	220	70.9
		R+L	105	16.9	68	10.9	447	72.1
Controls	Male	R	55	28.9	3	1.6	132	69.4
		L	33	17.4	6	3.2	151	79.5
		R+L	88	23.1	9	2.4	283	74.5
	Female	R	64	20.6	20	6.4	226	72.9
		L	79	25.5	23	7.4	208	67.1
		R+L	143	23.1	43	6.9	434	70

Table 1: Frequency and percentage distribution of finger tip patterns among male & female of vitiligo & control cases. (R: Right, L: Left, R+L: both right & left)

Digits	FTP	Males						Females					
		Right		Left		Total		Right		Left		Total	
		V	C	V	C	V	C	V	C	V	C	V	C
Thumb finger	L	20	21	17	30	37	51	38	47	41	39	79	86
	W	17	17	18	7	35	24	4	10	9	18	13	28
	A	1	0	3	1	4	1	20	5	12	5	32	10
Index finger	L	34	25	32	30	66	55	47	47	39	52	86	99
	W	4	13	6	7	10	20	15	15	19	7	34	22
	A	0	0	0	1	0	1	0	0	4	3	4	3
Middle finger	L	32	29	29	31	61	60	45	42	48	32	93	74
	W	4	6	9	6	13	12	10	11	9	25	19	36
	A	2	3	0	1	2	4	7	9	5	5	12	14
Ring finger	L	23	28	31	24	54	52	47	45	39	46	86	91
	W	15	10	7	11	22	21	10	17	12	16	22	33
	A	0	0	0	3	0	3	5	0	11	0	16	0
Little finger	L	37	29	25	36	62	65	50	45	53	39	103	84
	W	1	9	12	2	13	11	9	11	8	13	17	24
	A	0	0	1	0	1	0	3	6	1	10	4	16

Table 2 : Showing Frequency and percentage distribution of finger tip patterns in male & female vitiligo & control cases. (V- Vitiligo patients; C-Controls, L: Loop, W: Whorl, A: Arch)

TFRC	gender	Vitiligo	Control	t-Value	P- Value( P<0.05)
Mean TFRC	Male	123.76	117.55	2.018	0.047*
	Female	112.32	115.19	0.995	0.322
*P<0.05 there is a significance between Vitiligo and controls in the Male TFRC					

Table 3: showing the Total Finger Ridge Count (TFRC ) in male & female vitiligo & control cases

Whorl pattern were the commonest & loop being second commonest, least is the arch pattern in all the fingers in our study. The whorl pattern in vitiligo showed left hand fingers more than right in both male & female cases, mean value in vitiligo was more in males than females. Whorl pattern showed higher ratio in males in all left fingers except ring finger and in females was in left thumb, index & ring fingers. The arch pattern in vitiligo showed in males was left more than right hand fingers and in females right hand fingers more than left hand fingers, in control in males, right was more & in females left hand fingers was more compared to other side. Mean value of arch showed females higher frequency than males both in vitiligo & control group. Arch pattern showed higher frequency in males in left thumb

& little finger, absent in index, ring finger. In females it was more in right hand fingers & absent in index finger. The loop pattern showed in vitiligo right more than left hand fingers both in males & females, mean value was more in frequency in males both in vitiligo & control group. Loop ratios were higher in males in all the digits except ring finger & in females showed higher ratio of left hand in thumb, middle & little finger. The Total finger ridge count in vitiligo showed males more than females, in control group showed females more than males. The mean Total finger ridge count was more in value in males both in vitiligo & control group compared to females. The mean Total finger ridge count showed significant difference between male vitiligo & control group.

## Discussion

The studies done by Iqbal et al<sup>13</sup>, Sumit kaur et al<sup>14</sup>, Sahasrabuddhe et al<sup>15</sup>, Verma KC and Jain et al<sup>16</sup> and Singh et al<sup>17</sup> showed reduced frequency of whorl pattern in vitiligo cases in males. Premalatha et al<sup>18</sup> studies showed increase ratio of whorl in males, but Kapur et al<sup>19</sup> study showed Vitiligo affected females & increased whorl pattern in 4th & 5th finger tips of both hands. Sumith kaur et al<sup>14</sup> studies showed increased frequency of whorl in male both in vitiligo cases & control group. In the present study whorl pattern were more in frequency in in male vitiligo cases compared to female & was equal in both male & females in control group, which was similar to Premalatha et al<sup>18</sup> & Sumith kaur et al<sup>14</sup> except Iqbal et al<sup>13</sup>, Sahasrabuddhe et al<sup>15</sup>, Verma KC and Jain et al<sup>16</sup> and Singh et al<sup>17</sup>, Kapur et al<sup>19</sup> studies where male whorl pattern was less. The highest percentage of total arches in female vitiligo patients was reported by Iqbal et al<sup>13</sup>, Shashrabuddi et al<sup>15</sup> and Premalatha<sup>18</sup> where as it was reduced in the study done by Verma KC and Jain et al<sup>16</sup> and Singh et al<sup>17</sup>. Sumith kaur et al<sup>14</sup> study showed increased female vitiligo cases & increased male control arch pattern. In the present study there was a increased frequency of arch pattern in female in both vitiligo cases & control which is similar to Iqbal et al<sup>13</sup>, Shashrabuddi et al<sup>15</sup>, Premalatha et al<sup>18</sup>, Sumith kaur et al<sup>14</sup> except Verma KC and Jain<sup>16</sup> and Singh et al<sup>17</sup> showed less arch pattern in females. Shashrabudhe et al<sup>15</sup> Studies showed higher ratios of Loops pattern in 2<sup>nd</sup>, 3<sup>rd</sup> & 4th finger tips of both hands in males. Kapur et al<sup>19</sup> & Iqbal et al<sup>13</sup> studies observed increased ulnar loops in vitiligo affected group in males. Sumit Kaur et al<sup>14</sup> studies observed high frequency of loop in female vitiligo & in female control group compared to other group. Verma KC and Jain et al<sup>16</sup> studies observed the distribution about radial loop of 2<sup>nd</sup> fingers more in frequency in females & also increase loop in females was studied by Premalatha et al<sup>18</sup>. In the present study loop pattern was more in frequency in male vitiligo & control group compared to females which is similar to Shashrabudhe et al<sup>15</sup>, Kapur et al<sup>19</sup>, Iqbal et al<sup>13</sup>, except Verma KC and Jain et al<sup>16</sup>, Sumit kaur et al<sup>14</sup> & Premalatha et al<sup>18</sup> studies where female loop pattern was more. Increased mean value of total finger ridge count (TFRC) in males was observed by Singh et al<sup>17</sup> and a reverse of it in females was noted by Iqbal et al<sup>13</sup> studies. Sumit kaur et al<sup>14</sup> study showed more in both male vitiligo & control cases. TFRC was reduced in female in study done by premalatha et al<sup>18</sup>. In the present study TFRC was more in value in both male vitiligo compared to females which was similar to Iqbal et al<sup>13</sup> Sumith kaur et al<sup>14</sup> except Iqbal et al<sup>13</sup>, premalatha et al<sup>18</sup> where female TFRC was more. There was no statistical significant difference in vitiligo & control in palmar finger pattern & in TFRC in Verma KC et al<sup>16</sup>. In the present study there is a significance between male vitiligo & control

TFRC. In the present study when compared to other study we found mean frequency of whorl pattern more in male vitiligo & equal in both male & female control group, arch pattern more in female vitiligo & control group, loop pattern was more in male vitiligo & control group & mean Total finger ridge count was more in male vitiligo & control group. In the present study in vitiligo patients compared to control group we found whorl pattern were the commonest & loop being second commonest, least is the arch pattern in all the fingers in our study. The whorl pattern in vitiligo mean value in vitiligo was more in males than females, showed left hand fingers more than right in both male & female cases, showed higher ratio in males in all left fingers except ring finger, in females was in left thumb, index, ring fingers. The arch pattern in vitiligo, mean value of arch showed females more than males both in vitiligo & control group, showed in males was left more than right hand fingers, in females right hand fingers more than left hand fingers, in control in males right was more & in females left hand fingers was more compared to other side, showed higher frequency in males in left thumb, & little finger, absent in index, ring finger, in females it was more in right fingers absent in index finger. The loop pattern, mean value was more in males vitiligo & control group showed in vitiligo right more than left hand fingers both in males & females, Loop ratios were higher in males in all the digits except ring finger & in females showed higher ratio left hand in thumb, middle & little finger. The Total finger ridge count mean value in vitiligo showed males more than females & there was significant difference between male vitiligo & control group. The dermatoglyphics are important in forensic sciences due to their important feature that fingerprints are unchanged in due course even after death. Different patterns of fingerprints represent various pathologies.<sup>20</sup> This concluded from our study that difference observed between vitiligo & control may be result of single genetic mutation, chromosomal aberration or influence of some intrauterine environment factors.<sup>21</sup> Here lies the importance of investigation of the study of dermatoglyphic in vitiligo, not only for the academic identification of association but their practical application in a meaningful association can be established may be of use in screening cheaply the population at risk so that a watch may be kept for the early onset of symptoms, however requires proof that dermatoglyphic character may furnish as a guide to disease diagnosis.<sup>22</sup>

### **Conclusion**

The altered dermatoglyphic finger pattern in vitiligo like whorl pattern in males being commonest than loop in females, least being arch pattern in males, total finger ridge pattern more in males compared to control group in our study may be due to genetic cause can be taken into consideration for the diagnosis of vitiligo. These altered dermatoglyphic pattern of vitiligo can be considered as preliminary test which is noninvasive, simple & inexpensive test compared to other routine clinical test done in early diagnosis & clinical management of vitiligo

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