ISSN 2394–806X (Print), ISSN 2454-5139 (Electronic)
IJHRMLP, Vol: 04 No: 01 January, 2018
Printed in India

ORIGINAL PAPER

Dermatoglyphics in Vitiligo

Prachi V Gole[1], Bhalchandra G Chikhalkar[2], Siddhi B Chikhalkar[3], Sandeep V Haridas[4], Swapnil A Sanghavi[5], Uday S Khopkar[6], Kuber J Bhinde[7]

Received on May 28, 2017; editorial approval on November 30, 2017

ABSTRACT

Introduction*: Dermatoglyphics is the study of dermal ridges and the patterns formed by them.* ***Aims****: Here, we have compared dermatoglyphic patterns in patients with vitiligo and gender matched control population, and tried to find out if any of the dermatoglyphic patterns is more commonly associated with severe disease.* ***Methods****: A total of 100 clinically diagnosed cases of vitiligo were included along with 100 gender matched controls. Fingerprints were recorded using the Ink method of Purvis and Smith. Rolled fingertip prints as well as palm prints were taken and studied using a hand lens. Parameters studied were pattern types (loops, arches and whorls), a-b ridge count, atd angle. Analysis of dermatoglyphics was done by forensic experts.* ***Results****: Loops were the commonest pattern noted in both cases and controls. The study population showed increased incidence of whorls, predominantly on the 4th digit, and arches on 2nd digit as compared to controls. Patients with generalized vitiligo showed more than two whorls as compared to those with localized disease. Mean a-b ridge count and mean "atd" angle did not show any significant difference compared to controls.* ***Conclusion****: We concluded that patients with vitiligo have a higher incidence of whorls and those with more than two whorls may have a higher risk of developing generalized disease. Further large scale studies including both affected and unaffected first degree family members and long term follow up of these patients are required to corroborate our results.*

Keywords*: Dermatology, loops, whorls, arches, genetic diseases*

INTRODUCTION

Dermatoglyphics is the study of dermal ridges and the patterns formed by them.[1] The ridges are formed during the fourth month of foetal life and are useful in the diagnosis of hereditary diseases.[2] Doctor Harold Cummins is universally acknowledged as the Father of Dermatoglyphics. Galton described three main types of fingerprint patterns:-Arch, loop and whorl.[3] Dermal Ridges are known for their uniqueness, persistence through out life irrespective of age and hence have a lot of implications ranging from legal matters, biometrics for staff management, finger print sensors and many more. Today, dermatoglyphics is being studied to support the diagnosis of many genetic diseases, psychiatric diseases and cancers.There is a relative paucity of studies in dermatological conditions. We have made an attempt to diagnose a hereditary condition, vitiligo; included in our study arethose afflicted by the disease and gender matched controls. The incidence of vitiligo is reported to be 0.25-2.5% in India.[4,5] Gujarat and Rajasthan states have the highest prevalence ~ 8.8%.[6,7] It has a polygenic or an autosomal dominant inheritance pattern showing variable expression.[8-10] Vitiligo is defined as a focal failure of pigmentation due to destruction of melanocytes that is thought to be mediated by immunological mechanisms.[11]

METHODS

We conducted a cross sectional observational study including a hundred clinically diagnosed cases of vitiligo attending dermatology outpatient department of a tertiary care hospital and a hundred sex matched controls. Though dermatoglyphic

Address for correspondence:
[1]Assistant Professor
[2]Professor (Corresponding Author)
Email: drbgchikhalkar@yahoo.com
Mobile: +919969037650
[3]Professor of Forensic Medicine & Toxicology, Grant Government Medical College & Sir JJ Group of Hospitals, Mumbai-08; [4]Assistant Professor of Forensic Medicine & Toxicology, Swami Ramananda Tirth Rural Government Medical College, Ambajogai – 431517; [5]Consultant Dermatologist, CutiLyf, Borivali West, Mumbai–92; [6]Professor & Head of Dermatology, Seth Gordhandas Sunderdas Medical College & KEM Hospital, Mumbai-12, [7]2nd year MBBS Student Grant Government Medical College and Sir JJ Group of Hospitals, Mumbai-08

patterns are not age dependent, there have been some differences in these patterns in individuals of different sex. Hence we included controls which were sex or gender matched.

Exclusion Criteria - Patients and controls with hand dermatitis or any other lesions obscuring the finger print patterns. Also, patients not willing to give finger prints were excluded.

After explaining the aims and objectives of the study to the patients and obtaining willful consent they were included in the study. Detailed history and examination was done to identify the type of vitiligo, stability of the disease and family history. Both patients and controls were asked to wash their hands clean with tap water. Fingerprints were recorded using the Ink method of Purvis and Smith.[12] A glass plate, 12 by 12 inches, was cleaned and smeared with printers ink with the help of a roller. Each fingertip was pressed against the glass slab spread with ink so as to stain the ink over fingers and fingerprints were taken by pressing them over a clean white paper. Rolled fingertip prints as well as palm prints were taken and studied using a hand lens by forensic experts.

The fingers were numbered from right thumb to right little finger (1 to 5 respectively) and left thumb to left little finger (6 to 10 respectively).

Parameters studied were type of dermatoglyphic patterns (loops, arches and whorls), a-b ridge count (a, b, c, d are triradii at base of digits except thumb), add angle (t - triradius at base of palm) as shown in figure 1. The a-b ridge count also known as inter-radial interval was obtained by counting the number of ridges between "a" and "b" triradius points.

Triradius is formed by confluence of three ridge systems. (a,b,c,d are digital triradii at base of digits except thumb).

The add angle - Angle formed by joining lines from digital "a" and "d"to axial triradius "t" (t - triradius at base of palm) as shown in figure 1.

Statistical method used was t test, Levene's test.

P value< 0.05 was taken to be significant.

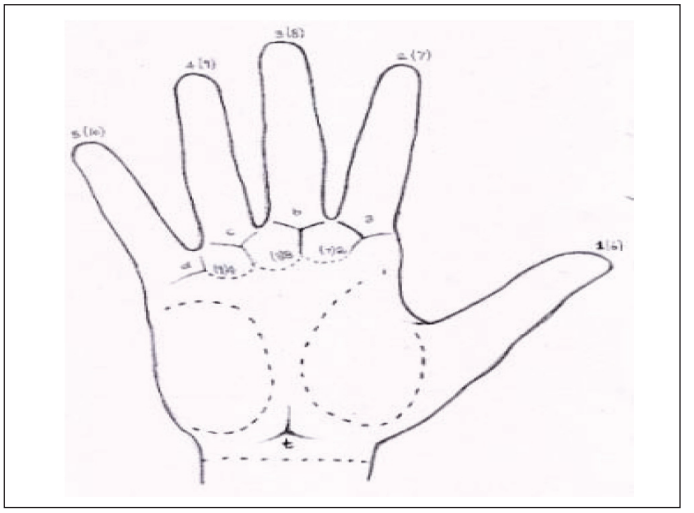

Figure 1 Counting of fingers from thumb to little finger (1-5 of right hand and 6-10 of left hand), tri radii at the base of figures (a, b, c, d), tri radii at the base of palm (t) and add angle measure.

RESULTS

Since it was a gender matched study, both Vitiligo (Case) group and Control group had an equal number of male and female Participants. Family history of vitiligo was present in 16% of the case group; slightly less than the 21.93% in a study by Shajil etal.[13] Amongst the study population, 30% of the patients had unstable disease while rest 70% had stable disease. There were 61% patients with generalized vitiligo while 39% had localized disease, similar to the reports of Koranne et al[14] and Sarin et al[15] where generalized vitiligo was found to be more common.There was no significant difference in loop pattern in cases & controls in our study.

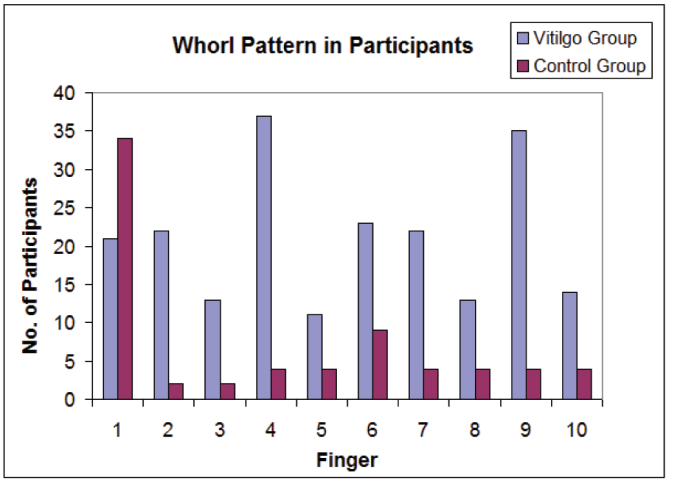

Figure 2 Whorl patterns in all the fingers

Except in **Figure 1**, whorl pattern was more commonly seen in Vitiligo group as compared to Control Group and it was statistically significant (p<0.05).

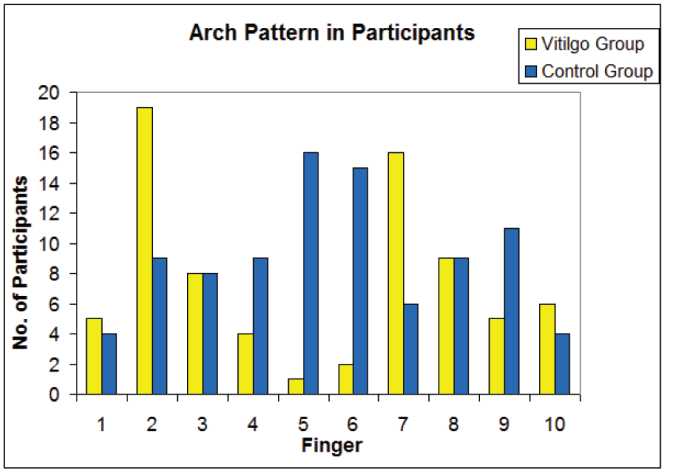

Figure 3 Arch patterns in all fingers

"Arch" pattern was more common in Vitiligo (Case) Group as compared to Control Group in fingers 2 and 7; it was statistically significant (p<0.05). In contrast, Fingers 5, 6 & 9 showed "Arch" pattern more in Control group as compared to Vitiligo (Case) Group (p<0.05).

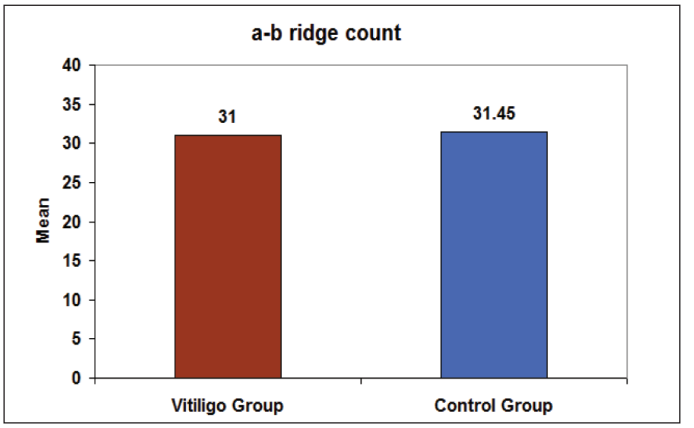

Figure 4 Difference in a-b ridge count in cases and control group

The difference in a-b ridge count in Vitiligo (Case) Group & Control Group was statistically not significant (p>0.05).

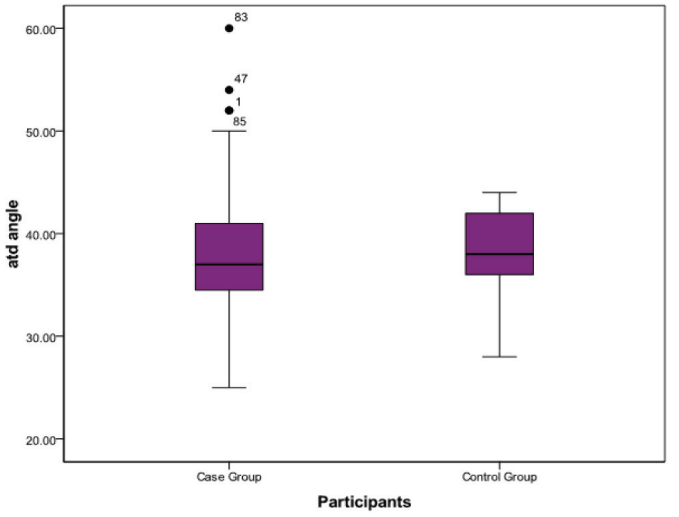

Figure 5 Add angle in cases and controls, difference between which was statistically insignificant

Table 1 Showing no. of whorls in patients with generalized and localized vitiligo

Type of Vitiligo	Total No. of Whorls		Total
	Less than 2	More than 2	
Generalized vitiligo	34	27	61
Localized vitiligo	34	5	39
Total	68	32	100

(Chi Square = 10.80, Degree of freedom = 1, p value = 0.001, statistically significant)

Generalized vitiligo was commonly seen in cases with more than 2 whorls in both hands. (p<0.05). Thus presence of more than 2 whorls in both hands may be associated with occurrence of generalized disease in vitiligo patients.

DISCUSSION

Dermatoglyphic studies have been conducted on various other dermatomes such as psoriasis, alopecia areata, Darier's disease, ichthyosis, atopic dermatitis, anhidrotic ectodermal dysplasia and eczemas.[16-18] There is a paucity of data on study of dermatoglyphics in vitiligo and sample size of available studies is also small.

There was increased incidence of ulnar loops on the 5th digit as compared to controls, in the study done by Kumar P & Gupta A[19], Sahasrabuddhe *et al*[20] and Singh et al[21] while there was no such difference in our study. In our study, no significant difference was found in the mean a-b ridge count, as was found in the study performed by Kumar P & Gupta A. Also, there was no significant difference in add angle between cases and controls in our study while a significant decrease was noted in the mean add angle in females of vitiligo (37.97) when compared with control females (42.20) in the study by Kumar P and Gupta A. The arch pattern was more common in fingers 2, 7 of the cases as compared to controls in our study. There was no significant difference in the dermatoglyphic patterns and a-b ridge count in cases and controls in study by Verma KC and Jain VK.[22] In our study, presence of more than two whorls was observed in patients with generalized disease, a finding not reported in the previous studies. In a study by Tabhane et al, vitiligo patients exhibited increase percentage of whorl pattern on first finger followed by second finger in both the sexes.[23] In our study, vitiligo group exhibited increased whorl pattern on second finger but not on the first. Karnul et al reported that ATD angle in both hands of vitiligo males & right hand of female vitiligo cases reduced significantly,[24] contrary to our study where no significant difference in the add angle was noted between cases and controls. The mean value of add angle was increased in vitiligo males and females on both sides in a study by Kar et al.[25]

CONCLUSION

Patients with vitiligo have a higher incidence of whorls in their dermatoglyphic pattern than controls and those with more than two whorls may have a higher risk of developing generalized disease. Thus we suggest that number of whorls may be considered as a prognostic factor for cases. There was a higher incidence of arches on second and seventh finger in cases. There is no significant difference in the mean a-b ridge count and add angle among cases and controls. We suggest further studies including both affected and unaffected first degree family members, involving a larger study population and long term follow up to support our results, which might help in predicting the severity of the disease and we plan to continue our efforts in same direction.

Acknowledgements: We owe our sincere gratitude to the staff of the Department of Forensic Medicine and Toxicology and Department of Dermatology of Seth GS Medical College for their support in setting up the instruments.

Conflict of interest: No conflict of interest associated with this work.

Ethical clearance: Institutional Ethical Committee clearance was obtained before beginning the study.

Source of funding: Self-Funded.

Contribution of authors: We declare that this work was done by

the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. All the authors have contributed as follows:

Dr. Prachi Gole – Examination and Diagnosis of Vitiligo cases, Conception of Idea, Collection of Data; Dr. Bhalchandra Chikhalkar – Conception of Idea, Interpretation of Data; Dr. Siddhi Chikhalkar – Examination and Diagnosis of Vitiligo Cases; Dr. Sandeep Haridas – Interpretation of Data, Statistical Analysis; Dr. Swapnil Sanghvi – Examination and Diagnosis of Cases; Dr. Uday Khopkar – Confirmation of Diagnosis and Mr. Kuber Bhinde – Collection of Data, Statistical Analysis of Data.

REFERENCE

1. Meier RJ. Sequential development components of digital dermatoglyphics. Hum Biol 1981;53:557-73.
2. Babler JW. Embryonic development of epidermal ridges and their configurations. In: Platto CC, Guarutto RM, Schaumann B, editors. Dermatoglyphics: science in transition. New York: Wiley-Liss; 1991. p. 95-112.
3. Gangane SD. Human genetics. 4th ed. New Delhi: Reed Elsevier India Private Limited;2012. p. 217.
4. Das SK, Majumder PP, Chakraborty R, Majumdar TK, Haldar B. Studies on vitiligo epidemiological profile in calcutta, india. Genet Epidemiol 1985;2(1):71-8.
5. Handa S, Kaur I. Vitiligo clinical findings in 1436 patients. J Dermatol 1999;26:653-7.
6. Valia AK, Dutta PK. IADVL Text book and atlas of dermatology. Edition… Mumbai: Bhalani Publishing House; 1996. p. 500-86.
7. Shah H, Mehta A, Astik B. Clinical and sociodemographic study of vitiligo. Indian J Dermatol Venereol Leprol 2008 Nov-Dec;74(6):701.
8. Bleehen SS, Ebling FJ, Champion RH. Disorders of skin color. In: Champion RH, Burton JL, Ebling FJ, editors. Text book of dermatology. London: Blackwell scientific publications; 1992. p. 1561-622.
9. Moscher DB, Fitzpatrick TB, Hori Y, Ortonne JP. Disorders of pigmentation. In: Fitzpatrick TB, Isen AZ, Wolff K, Freedberg IM, Austen KF, editors. Dermatology in general medicine. New York: Mc Graw Hill; 1993. p. 903.
10. Bolognia JL, Pawelek JM. Biology of hypopigmentation. J Am Acad Dermatol 1988;19:217-55.
11. Marks R. Roxburgh's common skin diseases. 17th ed. London: Arnold Publishers; 2003. p. 297.
12. Purvis Smith SG, Menser MA. Finger and palm printing techniques for the clinician. Med J Aust 1969;2:189-91.
13. Shajil EM, Agrawal D, Vagadia K, Marfatia YS, Begum R. Vitiligo: clinical profiles in vadodara, gujarat. Indian J Dermatol 2006;51:100-4.
14. Koranne RV, Sehpgal VN, Sachdeva KG. Clinical profile of vitiligo in north india. Indian J Dermatol Venereol Leprol 1986;52(2):81-2.
15. Sarin RC, Kumar AS. A clinical study of vitiligo. Indian J Dermatol Venereol Leprol 1977;43:300-14.
16. Sharma NK, Sarin RC, Prabhakar BR. Study of dermatoglyphics in dermatoses. Indian J Dermatol Venereol Leprol 1977;43:262-5.
17. Verbov JL. Dermatoglyphics of malignant acanthosis nigricans. Clin Exp Dermatol 2005 May;30(3):302-3.
18. Pour-Jafari H, Farhud DD, Yazdani A, Hashemzadeh Chaleshtori M. Dermatoglyphics in patients with eczema, psoriasis and alopecia areata. Skin Res Technol 2003 Aug;9(3):240-4.
19. Kumar P, Gupta A. Dermatoglyphic patterns in psoriasis, vitiligo and alopecia areata. Indian J Dermatol Venereol Leprol 2010;76(2):185-6.
20. Sahasrabuddhe RG, Singh G, Agrawal SP. Dermatoglyphics in vitiligo. Indian J Dermatol 1975;21:20-2.
21. Singh PK, Pandey SS, Singh G. Palmar Patterns in vitiligo. Indian J Dermatol 1983;28:91–6.
22. Verma KC, Jain VK. Dermatoglyphics in vitiligo. Indian J Dermatol Venereol 1981;47:102-4.
23. Tabhane MK, Palikundwar KG, Ksheersagar DD, Meshram MM, Rahule AS. Comparative study of finger print pattern in vitiligo population of vidarbha region of india. Medico-Legal Update 2014;14(1):122-6.
24. Karnul AM, Kadlimatti HS, Karnul AA, Karnul AK. Study of palmar dermatoglyphics in vitiligo and normal individuals. Al Ameen J Med Sci 2015;8(2):94-9.
25. Kar S, Krishnan A, Bhakta A, Dongre A. Digito-palmar dermatoglyphics in vitiligo a case control study. J Saudi Society of Dermatology and Dermatologic Surgery 2012;16:61-6.