

ORIGINAL ARTICLE

# Digitopalmar Dermatoglyphic Traits: A Tool for Identifying Sports Talent

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## ABSTRACT

**CONTEXT:** The modern sporting world emphasizes the detection and training of the sports talent as early as possible. Dermatoglyphics, the study of patterns in the skin ridges, has been used as a method to identify the medical conditions having a genetic basis. As the dermatoglyphs represent the development of the nervous system, they can be used to identify the innate potential of an individual towards sports.

**AIM:** This study attempts to compare both the quantitative and qualitative parameters of dermatoglyphics in sportsmen as compared to the controls.

**SETTINGS AND DESIGN:** A cross-sectional study was carried out at a university in Northern India.

**MATERIALS & METHOD:** The digitopalmar prints were taken with the help of Canon Lide 300 flatbed scanner and analyzed using SPSS software ver. 20).

**RESULTS:** A predominance of loop patterns was seen in most of the fingers of the sportsmen. It was found that the a-b, b-c and c-d ridge counts of both the left and the right hands were significantly lesser in case of the sportsmen as compared to the non-sportsmen. Also, the ATD angle of the right and the left hands seem to be greater in the sportsmen as compared to the controls which was not significant statistically.

**CONCLUSIONS:** It can be concluded that dermatoglyphics can be used as a tool to identify the sports talent by studying the characteristics features of the dermatoglyphics in a sportsman. However, further researches are required to strengthen a better understanding of the factors involved in determining the genetic potential of an individual.

**KEYWORDS** | digitopalmar, dermatoglyphics, sports talent, tool

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## INTRODUCTION

ONE OF THE GOALS OF THE MODERN SPORTING world is the earliest possible detection and development of the sports talent.<sup>1</sup> Sports talent can be defined as the individual who through inherited or acquired properties has a unique disposition for sports performance, above the general population.<sup>2</sup>

In the field of sports, the performance of the sports person depends on numerous factors like physical dimensions, psychology, training, planning, tactics etc. These factors influence but do not modify the inherent sporting ability

of an individual determined by the genetics.<sup>1</sup>

Detection of sports talent has been traditionally done through observations of trainers during sports events which can be erroneous in nature due to many confounding factors.<sup>3</sup> This can be eliminated by the use of genetic markers for the early detection of sports talent.<sup>4</sup> Genetic markers are those genes that code a specific feature and manifest on biochemical level, which takes the form of a visible external feature. The examples of these can be blood groups, iris color, dermatoglyphics

and so on.

Dermatoglyphics, which is a study of the patterns of the skin ridges on human palm, fingers, toes and soles, has been used extensively for the purpose of identifying various medical conditions having a genetic predisposition.<sup>1</sup> The unique characteristic of these patterns is that they reflect the normal growth processes of the hands and feet which are congruent with the development of the nervous system because of the common ectodermal origin. These dermatoglyphic grooves or ridges can be classified into loops, arches and whorls which represent them qualitatively whereas, the ridge counts account for the quantitative analysis.<sup>2</sup> Once formed, these are resistant to the environmental changes and thus reflect the growth disturbances that happen before or during their development.<sup>5</sup> Through the use of dermatoglyphics, one can not only determine the sports performance but also help in channelizing the time, effort and money in a right direction.

Martins used dermatoglyphics for identification of genetic physical characteristics of soccer players. They came to a conclusion that dermatoglyphic patterns can be used as a parameter to identify the potential of an individual which can help in selection of sports talent.<sup>2</sup>

Serhiyenko compared the dermatoglyphics of feet for sportsmen and non-sportsmen. They stated that foot dermatoglyphics can be used as a genetic marker for children having inclination to sports, and hand dermatoglyphs are more informative than foot dermatoglyphs for prognosis of motion abilities. They also concluded that future researches need to be carried out for identification of differences of foot dermatoglyphics in sportsmen of different sports.<sup>4</sup>

Tanwar studied the dermatoglyphic patterns in distal phalanges of sportsmen and non-sportsmen and found a significant difference in the patterns between males and females of these categories. They stressed that the general traits of an individual are reflected in their

dermatoglyphic patterns and though these are not inherited as simple Mendelian traits, they depend on genetic makeup.<sup>6</sup>

Borin tried to understand the distribution of quantitative dermatoglyphic indicators in basketball players according to their performance as compared to non-players. They stated that some of the fingerprint indicators should be studied between sports that use hand, owing to possible relationship between dermatoglyphics and the prehensile functions of the hand.<sup>3</sup>

Serhiyenko studied sole dermatoglyphics in different sportsmen and concluded that children with athletic inclination have larger quantity of loops on great toes, those with a bent to speed power sports have smaller ridges on both feet and feet dermatoglyphics is a less reliable for prognostication of anaerobic-aerobic kinds of sports.<sup>7</sup>

Yadav compared the atd angle between physical education and non-physical education students and came to a conclusion that the atd angle was smaller in physical education students as compared to the non-physical education students, however, this difference was not found to be significant.<sup>1</sup>

The aim of the present study is to find any differences in the digitopalmar dermatoglyphic traits in sportsmen and non-sportsmen in order to validate the use of the dermatoglyphic traits as an indicator for sports talent.

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#### MATERIALS AND METHOD

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A total of 142 individuals from Teerthanker Mahaveer University, Moradabad, were approached out of which those who met the inclusion criteria further proceeded for the study (N=84). The inclusion criteria being: individuals participating professionally in sports, having no injury or neurological insufficiency of the hand and those willing to participate in the study. The individuals having a history of genetic disorders like hypertension, cardiac disease, bronchial asthma, etc., were excluded from the study. The control group contained

CATEGORY	Lab Mean (SD)	Lab Mean (SD)	Lab Mean (SD)	Lab Mean (SD)	Lab Mean (SD)	Lab Mean (SD)	Lab Mean (SD)	Lab Mean (SD)
Sportsmen	37.12 (4.30)	36.68 (4.78)	35.79 (4.97)	36.64 (4.58)	35.81 (4.90)	36.17 (5.05)	46.43 (5.57)	47.62 (5.15)
Non-Sportsmen	37.12 (4.30)	36.68 (4.78)	35.79 (4.97)	36.64 (4.58)	35.81 (4.90)	36.17 (5.05)	46.43 (5.57)	47.62 (5.15)
P-Value	0.000	0.000	0.000	0.000	0.000	0.000	0.600	0.237
Significance	Significant	Significant	Significant	Significant	Significant	Significant	Non-Significant	Non-Significant

CATEGORY	L1	L2	L3	L4	L5	R1	R2	R3	R4	R5
Sportsmen	Loop 40.5%	Loop 47.6%	Loop 45.2%	Loop 38.1%	Loop 57.1%	Loop 52.4%	Loop 42.9%	Arch 50%	Loop 42.9%	Loop 50%
Non-Sportsmen	Whorl 42.9%	Loop 47.6%	Loop 45.2%	Whorl 38.1%	Loop 57.1%	Loop 52.4%	Loop 42.9%	Loop 50%	Loop 42.9%	Loop 50%

Table 1: Descriptive statistics of Quantitative parameters of dermatoglyphs

Table 2: Highest Frequency of the qualitative parameters of dermatoglyphs

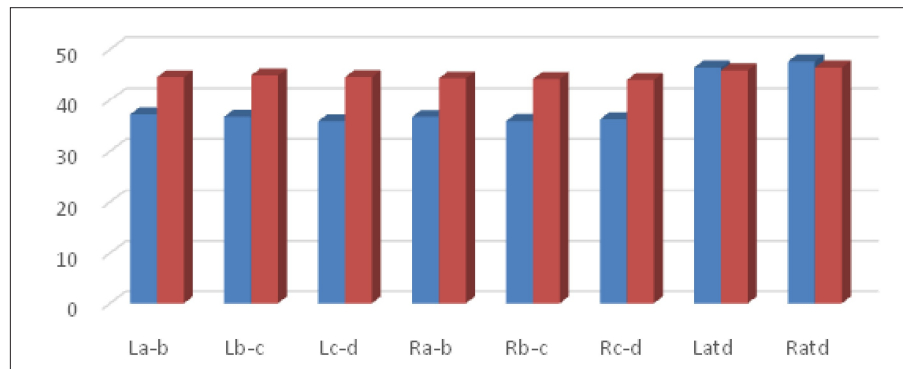


Figure 1: Descriptive statistics of Quantitative parameters of dermatoglyphs

equal number (n=42) of non-sportsmen. Age was not considered an inclusion criterion as the dermatoglyphic traits once developed remain unchanged throughout the life. However, the subjects in the control group were matched as much as possible according to the gender of the sportsmen group because the characteristics of dermatoglyphs vary based on gender.

The purpose and procedure of the study was explained to the participants and a written informed consent was taken from those who were willing to participate. The subjects were made to wash and dry their hands thoroughly before taking the hand prints. A Canon Lide 300 flatbed scanner was used to take the scans of the fingers, thumb and palms individually. The subjects were asked to put the fingers, thumb and palms of both the hands lightly on the flatbed of the scanner without overpressure. The scans were captured and stored for future analysis. An app was used to measure the atd

angle from the digital scans of the palms. The method of fingerprint analysis used was that as proposed by Cummins and Midlo (1961). The data was recorded and statistically analyzed using SPSS (version 20) software for the interpretation.

**RESULTS**

Upon analysis of the recorded data, it was found that the mean age of the Sportsmen was 25.50±5.07 and that of non-sportsmen 21.14±1.60. There were 35 males and 7 females in the sportsmen group and 29 males and 13 females in the non-sportsmen group. Out of 42 subjects, 37 were right-handed in the sportsmen group and 39 in the non-sportsmen group. In the Sportsmen group 23.8% played cricket, 14.3% volleyball, 11.9% badminton, 11.9% kabaddi and 9.5% constituted the athletes. It can be seen from the Table 1 above that the a-b, b-c and c-d ridge counts of both the left and the right hands

are significantly lesser in case of the sportsmen as compared to the non-sportsmen. Also, the atd angle of the right and the left hands seem to be greater in the sportsmen as compared to the controls which is not significant statistically.

The dermatoglyphic patterns which were found to be of highest frequency in the fingers of the two hands are depicted in Table 2. It can be seen that the loop patterns emerge as the patterns of greatest frequency in the fingers of the sportsmen as well as non-sportsmen but with a distinct distribution of the pattern in different fingers.

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#### DISCUSSION

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This study was conducted to find the differences in the quantitative as well as qualitative digitopalmar dermatoglyphics of the sportsmen as compared to those of non-sportsmen.

The analysis of the data showed that, the mean age of the Sportsmen was  $25.50 \pm 5.07$  and that of non-sportsmen  $21.14 \pm 1.60$ . Here we have not taken age as a classifying feature because once formed these dermatoglyphic patterns do not change but remain same throughout the life. So, these prints do not reflect the changes happening because of the ageing or the growth process and thus are independent of the age.

There were 35 males and 7 females in the sportsmen group and 29 males and 13 females in the non-sportsmen group. The two groups were tried to be gender matched to the maximum possible extent. This was done to eliminate the gender bias in the pattern characteristics which has been confirmed in the earlier researches.

A heterogenous group of sportsmen were taken as subjects who played sports involving strength, agility, flexibility, endurance, prehensile functions, power etc. Similar selection of subjects is seen in the research carried out by Serhiyenko L.P., where the sportsmen were classified into groups dominating speed-power orientation, anaerobic-aerobic abilities and aerobic energy supply in competitions.<sup>7</sup>

The present study reflects a significantly

lesser number of the a-b, b-c and c-d ridge counts of both the left and the right hands in case of the sportsmen as compared to the non-sportsmen. The previous studies have taken into account only the a-b ridge count as a quantitative parameter and this is the first study to our knowledge which has tried to correlate all the three ridge counts with the inherent ability of an individual towards sporting events.

When the differences in the atd angles of both the hands were compared it was found that atd angle of the right and the left hands seem to be greater in the sportsmen as compared to the controls which was not significant statistically. This is similar to the study done by Borin, where the atd angle (of both the hands) of the players was found to be greater or equal to that of the non-players.<sup>3</sup>

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#### CONCLUSION

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The selection and training of sports talent cannot be based on experience or experimentation, but has to be based on scientific grounds. This selection should take into account the genetic potential of an individual towards the sporting ability. This knowledge in combination with the correct and timely training techniques creates a conducive environment for a sports person to perform at an optimal level. This study highlights the use of dermatoglyphics as a tool to identify the sports talent by bringing out characteristic quantitative and qualitative features of the dermatoglyphs in a sportsman. However, further researches are required to strengthen the better understanding of the factors involved in determining the genetic potential of an individual.

It is proposed to conduct researches involving a specialized sport, to consider differences based on gender, and study other dermatoglyphic patterns not only in hands but feet also. **IJFMP**

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