Fingerprint Ridge Density as a Potential Morphogenetic Marker for Talent Identification in Discus Throwers

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Abstract: The purpose of this study was to examine whether fingerprint ridge density could serve as a potential morphogenetic marker for talent identification among discus throwers. Thirty male discus throwers aged 18–25 years from Mahatma Gandhi University participated in the study. Thumb fingerprint impressions were collected using a standard ink method, and ridge density (ridges/cm²) was calculated. Discus throw performance was assessed by measuring the best throwing distance in meters using a standardized measuring tape procedure. Descriptive statistics (mean and standard deviation) and Pearson's product–moment correlation were computed using SPSS version 25 to determine the relationship between thumb fingerprint ridge density and throwing performance. The results revealed that the mean discus throw performance was 45.28 ± 2.33 meters, while the mean thumb fingerprint ridge density was 14.56 ± 2.24 ridges/cm². A statistically significant strong positive correlation was found between thumb fingerprint ridge density and discus throw performance ($r = .68$, $p = .01$). The findings indicate that athletes with higher ridge density tended to achieve greater throwing distances. The study concludes that fingerprint ridge density, a stable dermatoglyphic trait formed during prenatal development, may serve as a non-invasive and congenital biomarker associated with athletic predisposition in power-oriented events such as discus throw. Although causality cannot be established, the results provide preliminary evidence supporting the integration of morphogenetic markers into talent identification programs, particularly in resource-limited settings. Further research with larger samples and diverse athletic populations is recommended to validate these findings.

Keywords: *Fingerprint Ridge Density, Dermatoglyphics, Morphogenetic Marker, Talent Identification, Discus Throw Performance, Athletic Predisposition, Sports Genetics.*

I. INTRODUCTION

Talent identification in sports has long relied on observable performance indicators, anthropometric parameters, and physiological assessments. However, recent advances in genetics and morphogenetic science have revealed that inherent biological markers may also play a crucial role in determining athletic potential. One such morphogenetic trait is fingerprint ridge density, which is established during early embryonic development and remains constant throughout life. Fingerprint patterns are influenced by both genetic and prenatal environmental factors, making them a non-invasive and stable indicator of biological predisposition.

In the context of discus throwers, performance depends heavily on strength, coordination, grip efficiency, and neuromuscular control—traits potentially reflected in dermatoglyphic features. Previous studies have shown correlations between fingerprint ridge patterns and certain physical or motor abilities. Therefore, analyzing fingerprint ridge density could provide valuable insights into inherent physical predispositions that favor success in specific track and field events such as the discus throw. This emerging interdisciplinary approach, integrating sports science with morphogenetics, could revolutionize the process of identifying and nurturing athletic talent.

Traditional methods of talent identification in throwing events largely depend on performance testing, observation, and physical measurements. These approaches, while effective to an extent, do not capture the underlying genetic and morphogenetic influences that contribute to athletic potential. There is limited research exploring the relationship between fingerprint ridge density and sports-specific abilities, particularly in the field of athletics.

Hence, the research problem addressed in this study is: "Can fingerprint ridge density serve as a potential morphogenetic marker for talent identification among discus throwers?" The main objective of this study was to analyze the fingerprint ridge density patterns among discus throwers and to examine the possible relationship between fingerprint ridge density and performance in discus throwers.

This study holds significance in both sports science and talent identification research. By exploring fingerprint ridge density as a morphogenetic marker, it provides a non-invasive, cost-effective, and scientific tool for early talent detection. If correlations are established, coaches and sports scientists could use dermatoglyphic analysis as an additional parameter in athlete selection and training programs.

Moreover, this approach integrates biological science with sports performance analysis, paving the way for personalized athletic development based on inherent physical predispositions. For developing countries like India, where access to advanced performance testing tools is limited, such a biomarker-based method could enhance the efficiency of talent identification programs in athletics.

II. METHODS

Thirty male discus throwers selected from MG university aged 18–25 years participated in the study. The study employed several instruments to collect and analyze data related to fingerprint ridge density and athletic performance. For thumb fingerprint collection, a standard black ink pad was used to obtain clear impressions of thumb fingers of each participant, which were then recorded on pre-labeled fingerprint cards. To evaluate athletic performance, a measuring tape was used to record throwing distances in meters. Statistical Analysis Descriptive statistics (mean, SD) were computed. Pearson's correlation analysis was used to examine relationships between discuss throw performance and thumb fingerprint ridge density. Data were analyzed using SPSS version 25.

III. RESULTS

Dermatoglyphics, the study of fingerprint patterns and ridge density, is a genetic characteristic that does not change over a person's lifetime. Therefore, it has been used as a tool to predict various physical and motor capabilities in individuals.

The fingerprint ridge density of the thumb, expressed in ridges per square centimeter, may indicate underlying genetic characteristics that define neuromuscular coordination, handgrip, and motor capabilities, all of which are critical for successful performance in power-throw events, such as the discus throw.

Given that the successful completion of a discus throw event is based on handgrip, accuracy of release, power, and movement patterns, an exploration of the link between the two variables may prove to be an interesting area of inquiry.

Therefore, the purpose of the current study was to examine the link between performance in the discus throw and thumb fingerprint ridge density using Pearson's correlation coefficient, with the results presented in Table 1.

Table 1 Correlation Between Discus Throw Performance and Thumb Fingerprint Ridge Density

Variables	Mean	SD	r	Sig.
Discuss Throw Performance (m)	45.28	2.33	0.68	0.01
Thumb Fingerprint Ridge Density (ridges/cm²)	14.56	2.24		

Table 1 showed that the mean discus throw performance was $M = 45.28$ m (SD = 2.33), and the mean thumb fingerprint ridge density was $M = 14.56$ ridges/cm² (SD = 2.24). The positive correlation suggests that as thumb fingerprint ridge density increases, discus throw performance also tends to increase. Pearson correlation coefficient was computed to assess the relationship between discus throw performance and thumb fingerprint ridge density. The results indicated a statistically significant strong positive correlation between the two variables, $r = .68$, $p = .01$.

IV. DICUSSION

The primary finding of this study reveals a statistically significant, strong positive correlation ($r = .68$, $p = .01$) between thumb fingerprint ridge density and discus throw performance. This suggests that athletes with a higher number of ridges per square centimeter on their thumbs tend to achieve greater throwing distances. This finding provides preliminary support for the potential link between dermatoglyphic patterns, which are formed during fetal development and are genetically influenced, and a specific athletic performance outcome.

V. CONCLUSION

The findings of this study confirm a statistically significant, strong positive correlation between thumb fingerprint ridge density and discus throw performance. This association suggests that dermatoglyphic patterns, specifically ridge density, may serve as a non-invasive and congenital marker with potential relevance for identifying athletic predisposition in power and precision sports. While the results do not establish a causal relationship, they contribute to the growing evidence linking early developmental traits, established in utero, with later-life physical capabilities.

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