



Original Research

Dermatoglyphic analysis of left-handed individuals in the student population of the Faculty of Mathematics and Natural Sciences Universitas Negeri Padang

Dini Herisanti^{1*}, Riza Umami¹, Nifsa Riski Amanda¹, Vanesa Cinta Efandri¹, Shally Azhara¹, Fanesha Panca Putri¹, Frisca Rinaldi Putri¹, Nafisa Arini¹, Titi Summaiati¹, Afifatul Achyar¹ & Yuni Ahda¹

¹Department of Biology, Faculty of Science and Mathematics, Universitas Negeri Padang, West Sumatera.

*Corresponding author: e-mail address: Dherisanti@gmail.com.

Article Info

Article history:

Received 1 Juni 2022

Accepted 17 March 2023

Keywords:

Dermatoglyphics, Fingerprints pattern, and left handed

How to cite:

Herisanti, D., et al., (2023).
Dermatoglyphic Analysis of Left-handed Individuals in the Student Population of the Faculty of Mathematics and Natural Sciences Universitas Negeri Padang. *Tropical Genetics* 3(1): 27-30.

Abstract

Dermatoglyphics is a science that studies fingerprint patterns that can be inherited genetically. Fingerprint patterns can be divided into three patterns, arch, loop, and whorl. Observation of fingerprints is used to determine fingerprint patterns and the relationship between these patterns and the fields of health, education, and criminology. Left-handed is a term for people who predominantly use their left hand as their main hand to carry out daily activities. This research aims to determine the relationship between fingerprint patterns and individuals who tend to carry out activities with the left side of their body (left-handed). The type of research carried out was descriptive research with a cross-sectional sample collection method. The sample was taken from the 2019-2022 student population of the Faculty of Mathematics and Natural Sciences, Padang State University, totaling 100 individuals. The samples were taken in November and December. This research was carried out at the Genetics and Biotechnology Laboratory, Faculty of Mathematics and Natural Sciences, Padang State University. The results of this study show that the dominant fingerprint pattern found in the left-handed individual phenotype is 16 fingerprint patterns, while normal individuals have 5 arch fingerprint patterns. This shows that there is a link between the phenotype of left-handed individuals and dermatoglyphics.

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Introduction

Fingerprints are the result of images of hands and feet that can be taken either intentionally or not. The common method of taking fingerprints is usually by using ink and affixing it to paper (Desmira et al., 2022). Everyone has different fingerprints and their own uniqueness. Fingerprints can be a person's identity. It is necessary to protect fingerprints for every human being so that they cannot be misused and have a negative impact in the future (Syamsurizal, 2019).

Fingerprint patterns that contain tendrils existed in ancient times. Genetic factors in humans greatly influence the formation of fingerprint patterns, thus encouraging scientists to develop methods related to human fingerprint patterns. This pattern is usually discussed in a field, namely dermatoglyphics (Mundijo & Rezky, 2019; Syamsurizal, 2016). Dermatoglyphics relate to the skin of the palmar and plantar surfaces, where the skin is covered with many papillary lines that form a certain pattern that is usually found in the epidermal layer of the skin on the fingers, palms, toes, and soles of

the feet. Humans who live in this world and have complete bodies, especially their feet and hands, certainly have tendrils and are different from one another.

Dermatoglyphics are part of human anthropological characteristics that study tendrils and their tendril patterns. The pattern is formed in the third month of embryonic development but appears on the surface of the skin already in the 18th week of intrauterine development. The stability of the formation of this skin pattern is in the third and fifth months of fetal development (Petrova & Andreenko, 2018). The lines and patterns in this part of the epidermis do not change with age and are different for everyone. This is due to the genetic determination of the epidermis and the existing patterns so that fingerprint distortion does not occur unless the individual has an injury that can permanently affect the finger (Syamsurizal, 2016b).

Observations on fingerprints can be useful for knowing fingerprint patterns and the relationship between these patterns in the fields of health, education, and the field of criminology (Batubara et al., 2022). For example, in the field of criminology, dermatoglyphs can be used in a person's identity, personality, inheritance patterns, and potential. The information obtained from these fingerprints can be used in the search for a criminal, so dermatoglyphs can play a role in identifying someone with a specific purpose.

Human hands are generally used more often for fingerprint observations than feet. This is because the hand is easier to collect data from. On the other hand, hands are often used directly in daily activities, for example, holding, throwing, hitting, and so on. Because of this aspect, the hands come into a lot of contact with surrounding objects and leave marks in the form of fingerprints.

Each finger on the hand can have different tendrils so the fingerprints between the right hand and the left hand are also different. The characteristics of a human can be seen from these differences (Richard et al., 2019). To find out the many types of fingerprint patterns between one human hand and another, you can use the dermatoglyphic method. Apart from that, the difference between the tendrils of a hand that usually uses the right hand and a hand that usually uses the left hand or is left-handed can be different too.

Left-handed is generally used to refer to people who carry out daily activities such as writing, holding, cooking, etc. comfortably with their main hand, namely the left hand. Factors that cause a person to be left-handed can come from genetic and environmental factors (Mardianto et al., 2021). In a dermatoglyphic study, differences in fingerprints were found between right-handed and left-handed subjects of both sexes. This distinction is based on a study conducted in Bulgaria, where there was a study of dermatoglyphics related to ethnicity, sexual dimorphism, and fluctuating asymmetry. (Andreenko et al, 2017). People who are born left-handed can be identified from the time they are small, which can be seen from their activities which predominantly use their left hand. With these factors, the comparison of left-handed and right-handed people can be seen from fingerprints.

Based on the background above, this study aims to determine the relationship between fingerprint patterns and individuals who tend to do activities with the left side of the body (left-handed).

Method

Sampling and research were carried out at Padang State University, Faculty of Mathematics and Natural Sciences from November to December 2022. The type of research used in collecting samples was descriptive using a cross-sectional method. The sample in this study were active students from class 2019 to 2022, Faculty of Mathematics and Natural Sciences, Padang State University. The data sample collection lasted for three weeks with data consisting of 50 right-handed people and 50 left-

handed people. The materials and tools used in data collection were sample paper, ink, stamps, wet wipes, and hand sanitizer.

Fingerprints of students' hands are taken on a piece of paper that has been provided. Before taking fingerprints, the pattern is observed, and the frequency count is calculated. Student fingerprint results from individuals who tend to carry out activities on the right side of the body (normal) with individuals who tend to carry out activities on the left side of the body (left-handed). The tip of each finger is placed on a stamp pad that has been given ink and then rolled onto white paper starting from the thumb of the right hand to the little finger and the thumb of the left hand to the little finger.

The data will be presented in table form with the frequency formula:

$$\text{Arch Pattern} = \frac{\text{Total Arch found}}{\text{Total finger prints found}} \times 100\%$$

The individual fingerprint patterns were summed to obtain the total number of the patterns. The Total Ridge Count (TRC) was then calculated to average the total number of patterns in each left- and right-handed individual and analyzed descriptively.

Results and Discussion

Based on the research conducted, data was obtained regarding the comparison of dermatoglyphic patterns of the student population of the Faculty of Mathematics and Natural Sciences. Research data can be seen in the following figure.

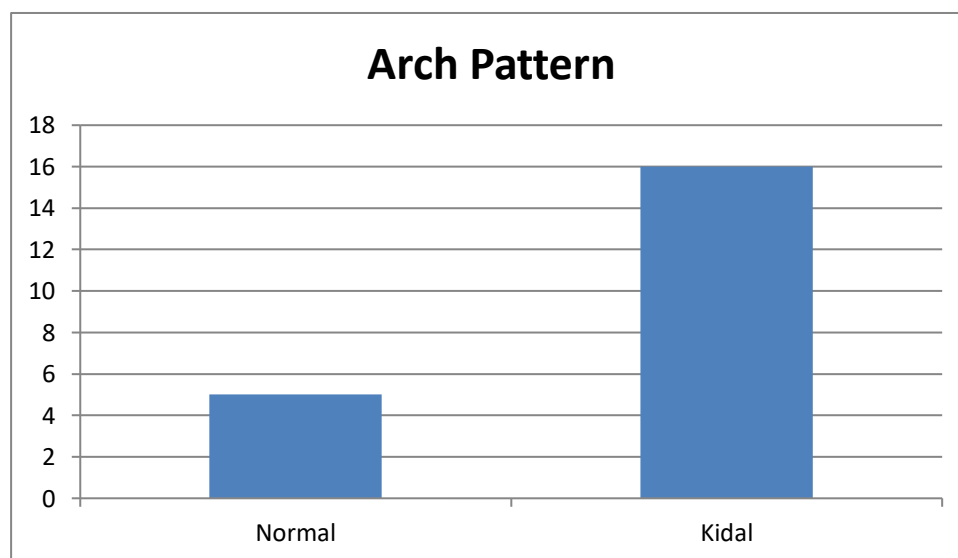


Figure 1. Arch pattern found in samples.

In the table above it can be seen that the type of dermatoglyphic pattern of the fingertips of normal and left-handed individuals focuses on the arch pattern type only. The arch type in left-handed individuals is found in 16 fingers out of a total of 500 fingers possessed by left-handed individuals. The arch pattern in normal individuals only has 5 fingers out of a total of 500 fingers that normal individuals have. The frequency of the arch pattern in left-handed individuals is 3.2%, while in normal individuals the frequency is 1%. These frequency differences can be caused by the genetic factors of an individual.

The distribution of arch patterns on the fingers of left-handed individuals starts from the left hand, namely 1 thumb, 5 index fingers, 4 middle fingers, 2 ring fingers, and 1 little finger, while from

the right hand, namely no thumb, 1 index finger, 1 middle finger, 1, ring finger 1, and little finger none. The distribution of arch patterns on normal individual fingers starts from the left hand, namely 2 thumbs, 1 index finger, no middle finger, no ring finger, and no little finger, while from the right hand, there are 2 thumbs, and 2 index fingers. none, middle finger absent, ring finger absent, and little finger absent.

An arch is the basic shape of a fingerprint where all the lines come from one side of the pattern, tend to flow to the other side, and wavy up in the middle. Arch patterns are classified into 4 types, namely radial arch, tented arch, plain arch, and ulnar arch (Miranda et al., 2020). The arch patterns that have been observed can be related to individual tendencies such as behavior and the way the brain works. This tendency can be influenced by genetics and the surrounding environment.

In terms of self-depth, left-handed individuals with this arch pattern tend to lack understanding of the negative traits that exist in themselves. Individuals with this arch pattern are basically someone who has a strong opinion and is easy to absorb information that has been instilled from an early age (Nazhifah et al., 2022). The behavior of left-handed individuals generally adheres to existing norm values. This kind of personality is not easily influenced by the surrounding environment.

In general, left-handed individuals have a different way of working their brains from ordinary right-handed individuals. The left brain is usually more dominant for normal right-handed individuals, while the right brain is usually more dominant for left-handed individuals. However, the functioning of both the left and right brain can change, this is related to the brain's capacity to change and adapt to functional needs (Mustafa, 2020). Left-handed individuals tend to use the right brain so they can have spatial abilities and pattern recognition. These abilities can include thinking visually, intuitively, and creatively. In normal individuals, right-handed users tend to use the left brain. The abilities of left-brain users generally include analytical, objective, and practical thinking. These individuals can do work that requires reasoning and rationality.

Based on the research results, it appears that left-handed fingerprint patterns are dominant compared to normal ones. There are 16 arch fingerprint patterns in the left-handed sample, while 290 fingers have a loop pattern, and 194 fingers have a whorl pattern. This indicates that the arch pattern is related to determining left-handed individuals.

Conclusion

Based on the research results, it was found that arch-type fingerprint patterns were more common in left-handed individuals than in normal individuals. Therefore, through research on hand dermatoglyphic patterns, information was obtained regarding the arch fingerprint pattern that is dominant in left-handed individuals and the relationship between the phenotypic fingerprint pattern of left-handed individuals and dermatoglyphics.

References

- Andreenko, E., S. Baltova. Sexual Dimorphism in Dermatoglyphic Traits and Fluctuating Asymmetry in Bulgarians from Northeast Bulgaria. *Homo*, 68(4), 2017, 316-327.
- Batubara, S. I., Simbolon, P., & Siregar, R. (2022). Analisis Pola Dermatoglifi Ujung Jari Tangan Mahasiswa Pendidikan Biologi Angkatan 2020 Institut Pendidikan Tapanuli Selatan. *Jurnal Edugenesi*, 5(1), 27-29.
- Desmira, D., Aribowo D., & Putra T.H. (2022). Pemanfaatan Sensor Sidik untuk Absensi Siswa Smkn 1 Pulo-Ampel. *PROSISKO: Jurnal Pengembangan Riset dan Observasi Sistem Komputer*, 9(2), 25-32.
- Mardianto, M., Syukri, M., & Irwan, S. (2021). Kebijakan Pendidikan Ramah Bertangan Kidal di Universitas Islam Negeri Sumatera Utara Medan. *Jurnal MUDARRISUNA: Media Kajian Pendidikan Agama Islam*, 11(3), 363-380.
- Miranda, N. D., Novamizanti, L., & Rizal, S. (2020). Convolutional Neural Network pada Klasifikasi Sidik Jari Menggunakan RESNET-50. *Jurnal Teknik Informatika (Jutif)*, 1(2), 61-68.
- Mundijo, T., & Rezky, M. (2019). Dermatoglifi Narapidana di Palembang. *Syifa'MEDIKA: Jurnal Kedokteran dan Kesehatan*, 9(2), 86-91.
- Mustafa, P. S. (2020). Implikasi Pola Kerja Telensefalon dan Korteks Cerebral dalam Pendidikan Jasmani. *Media Ilmu Keolahragaan Indonesia*, 10(2), 53-62.
- Nazhifah, F. S., Safuan, S., & Alhabshy, M. A. (2022). Analisa Kepribadian Dengan Penerapan Sistem Aplikasi Analisa Sidik Jari (Studi Kasus Pada PT Unique Analisa Sidik Jari). *Syntax Literate; Jurnal Ilmiah Indonesia*, 7(2), 663-672.
- Petrova, N., & Andreenko, E. (2018). Bilateral Differences in Papillary Fingerprint Patterns of Left-handed and Right-handed Individuals. *Glasnik Antropološkog društva Srbije*, 53 (1), 79-81.
- Richard, N. E. K. U., Kiekwe, V., & Olawepo, A. (2021). Relationship Between Whorls Dermatoglyphic Patterns and Handedness Amongst Students of Tertiary Institutions in Ilorin Nigeria. *Cumhuriyet Medical Journal*, 43(4), 339-3.
- Syamsurizal, S. (2019). Sudut ATD sebagai Penanda Diabetes Mellitus Tipe-2 (DMT2). *Bioscience*, 2(1), 34-40.
- Syamsurizal, S. (2016a). *Arch As Genetic Marker Type-2 Diabetes Mellitus*.
- Syamsurizal, S. (2016b). Jumlah Sulur sebagai Penanda Diabetes Mellitus Tipe-2 Etnis Minangkabau. *Biospecies*, 9(2).