



Analysis of Family Fingerprint Patterns in Java and Papua Population

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Abstract

Fingerprints can be said to be a unique characteristic or unique entity for every human being, with a striped pattern on the tips of the toes of the feet and hands. The fingerprint pattern that becomes this entity does not just appear; it is passed down through genes that are passed from parents to children. At this moment in time, this entity can be used in many fields; one example is as an indication of a disease. The aim of this research is to know the pattern of fingerprints inherited from parents to children, which has expanded with the identification of disease indications. Samples from this study were taken from families consisting of fathers, mothers, and children in several cities on the islands of Java and Papua to further examine the typical patterns that exist in these populations.

Keywords: Fingerprints, Genetics, Disease, Parental

1. Introduction

Fingerprints are identical markers on humans. Every human being has a different fingerprint pattern. This fingerprint pattern is influenced by genetic factors (Hartl, 2020). Fingerprint patterns are unique patterns that distinguish one race from another (one person from another) even in identical twins (Purbasari and Sumadji, 2017).

Differences in biological characteristics between Javanese and Papuan populations include hair shape and color, nose shape, iris color, and eye slit location. In addition, it is likely that these two groups also have differences in fingerprint patterns. Genetics play an important role in fingerprint formation, as fingerprint patterns are influenced by polygenic elements (Suryo, 2010).

In a study conducted by Fanani Hidayati (2015), it was said that there were differences between fingerprints in Javanese samples and Papuan samples, where in the sample of the Java island area, the loop pattern was found more, while in the sample of the Papua island area, the whorl pattern was more common. The fingerprint patterns that appeared in the Javanese and Papuan samples showed a significant difference in the percentage of occurrence, indicating a significant difference in fingerprint patterns between these two groups. These differences in fingerprint patterns reflect the diversity of biological traits possessed by the two populations. However, the research conducted by Fanani Hidayati (2015) has not discussed the possibility of genetic diseases that occur in the two regions, so we want to discuss the research further by identifying the effect of differences in fingerprint patterns with the potential genetic diseases that can be inherited in a family.



By knowing the fingerprint pattern in a family, we can take advantage, namely by knowing the fingerprint pattern in a family, it can also identify the family's health condition with a cheaper and more practical method. And if there are differences in fingerprint patterns in the family, does it also affect the genetic diseases that are inherited. If this research can be published, it is hoped that it can update existing research. That way it can add a source of knowledge and learning to the general public and students, and the academic community in the Universitas Terbuka environment. The research aims to analyze family fingerprint patterns in Javanese and Papuan populations, assess the hereditary transmission of fingerprint pattern genes, identify population-based differences, offer cost-effective alternatives for detecting hereditary diseases, contribute to community health awareness, support simplified genetics education, and enrich learning resources, particularly within the Indonesia Open University setting.

2. Research Method

This research uses descriptive quantitative methods. This sampling was conducted on two islands in Indonesia, Java and Papua. Starting in June to August. In this study, the data used is primary data. The data sample criteria that fulfill this fingerprint research are nuclear families consisting of fathers, mothers and children.

The sample data is obtained by applying ink to the ten fingers which are then attached to the paper one by one. Then the patterns listed will be re-examined to be categorized in the Arch pattern, Loop pattern or Whorl pattern. The data that has been categorized as the shape of the fingerprint pattern is then written in the report and discussed to draw conclusions.

3. Results and Discussion

This research was taken from 31 respondents' fingerprint samples. For the island of Java, respondents came from several areas such as Surabaya, Sidoarjo, Kediri, Karawang Bekasi and Purwakarta. Respondents who are willing to provide their fingerprint samples consist of 15 families with an age range of 2-64 years. Each respondent who was asked to sample fingerprints on all ten fingers. The frequency distribution of the sex of respondents with a total of 31 people, 14 male respondents or 45.17% and 17 female respondents, amounting to 54.83%. These results are described again by grouping respondents based on fingerprint patterns with a count of fingerprint patterns based on the fingers of each individual with a total of ten fingerprint patterns per individual.



Table 1. Frequency distribution table of respondents' fingerprint patterns

Pattern	Distribution	
	Frequency (finger)	Percentage (%)
Loop	200	64,51%
Whorl	90	29,03%
Arch	20	6,46%
Total	310	100%

In table 1, it can be obtained the number of fingerprint patterns on respondents with the most patterns, namely the Loop pattern of 200 or 64.51% then the Whorl pattern of 90 or 29.03% and finally the Arch pattern which occupies the position of the least amount of 20 or 6.64%. The patterns that dominate fingerprints in a person are Loop and Whorl patterns, which are around 25-30% while Arch is only 5% (Mundijo, 2015).

Table 2. Frequency distribution table of respondents who have fingerprint patterns more than one type

Pattern	Distribution	
	Frequency (finger)	Percentage (%)
1 pattern (Loop, Whorl, Arch only)	24	77,41%
2 pattern (Loop dan Whorl)	7	22,59%
Total	31	100%

In this study, it was found that each individual does not necessarily have a pattern that is 100% composed of only one type of pattern. However, each individual can have more than one pattern. The sample results on the island of Java showed 24 respondents or 77.41% of the total respondents showed that they only had 1 type of pattern on their ten fingers. While the remaining 7 respondents or equivalent to 22.59% showed that they had more than 1 type of fingerprint pattern. In accordance with research (Mundijo, 2015) a person can have a variety of fingerprint patterns of more than 1 with Loop and Whorl patterns being the most common patterns.



Table 3. Distribution of inheritance of fingerprint patterns from parents to children

Pattern	Distribution	
	Frequency (finger)	Percentage (%)
100% identical to father	5	45,46%
100% identical to mother	3	27,27%
Mixed	3	27,27%
Total	11	100%

In table 3, it can be seen that the inheritance of fingerprint patterns from parents to children has three categories, namely 100% similar to father, 100% similar to mother or a mixture of both. Of the total number of respondents, 11 of them are children in the family. The results in the table show 5 respondents or 45.46% of whom 100% of the fingerprint patterns are the same as the father then followed by 3 respondents each or equal to 27.27% in the inheritance of fingerprint patterns from parents to children who are 100% similar to the mother and a mixture of father and mother. This refers to Mendel's laws I and II where the theory explains that each allele will separate and will pair freely. This fingerprint pattern does not initially appear, but is due to polygenes (which amount to seven genes) playing a role in the variation of fingerprint patterns in each individual (Chastanti, 2020).

Data on Papuan respondents could not be obtained until the end of the research. It because of difficulty to find respondents who are willing to provide their data to us. We are well aware that this involves the personal data of respondents so that these difficulties occur. Although this research stops at the sample population of Java, we hope that this research can be continued in the following year or in the future for more concrete scientific updates so that this research can be useful for the public.

4. Conclusions

Based on the results of collecting and processing research data relating to family fingerprint patterns in the Java and Papua regions, it can be concluded that the fingerprint pattern most commonly found in Javanese communities is the loop fingerprint pattern with most individuals only having one type of fingerprint pattern and Most children usually inherit their father's fingerprint pattern.



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