

Whorl Pattern and Total Ridge Count on Patient with Essential Hypertension at Ulin Hospital Banjarmasin

Pola Whorl dan Total Jumlah Rigi Sidik Jari Pasien Hipertensi Esensial di Rumah Sakit Ulin Banjarmasin

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Abstract

Dermatoglyphics can be used to predict a disease such as essential hypertension. The aim of this research is to know of summary of whorl pattern and total ridge count on patient with essential hypertension in department of internal medicine of Ulin hospital Banjarmasin period Juli – August 2007. Sample of research from patient with essential hypertension that diagnosed by doctor in department of internal medicine of Ulin hospital Banjarmasin (32 samples), control samples are from normotension person (32 samples). The variables that observed are summary of whorl pattern and total ridge count. The result show that patient with essential hypertension with whorl pattern ≥ 6 is 81,25 %, normotension is 25%. Summary of average of total ridge count in patient with essential hypertension is 147,38, normotension is 129,38. It can be concluded there is difference from patient with whorl pattern ≥ 6 and total ridge count between essential hypertension with control ($p < 0,05$).

Key words: whorl, essential hypertension, ridge skin

Abstrak

Dermatoglifi dapat digunakan untuk memprediksi penyakit seperti hipertensi esensial. Tujuan penelitian ini adalah untuk mengetahui pola sidik jari *whorl* dan total jumlah rigi sidik jari pada pasien dengan hipertensi esensial di bagian penyakit dalam rumah sakit Ulin Banjarmasin periode Juli – Agustus 2007. Sampel penelitian adalah pasien dengan hipertensi esensial yang didiagnosis oleh dokter di bagian penyakit dalam rumah sakit Ulin Banjarmasin sebanyak 32 sampel, kontrol dari pasien dengan normotensi sebanyak 32. Variabel penelitian adalah pola sidik jari *whorl* dan total jumlah rigi sidik jari. Hasil penelitian menunjukkan bahwa pasien hipertensi esensial dengan pola *whorl* ≥ 6 adalah 81,25%, normotensi adalah 25%. Rata-rata jumlah rigi sidik jari pada pasien dengan hipertensi esensial adalah 147,38, normotensi adalah 129,38. Disimpulkan bahwa ada perbedaan dari pasien dengan pola *whorl* ≥ 6 dan total jumlah rigi sidik jari antara hipertensi esensial dengan kontrol ($p < 0,05$).

Kata kunci: *whorl*, hipertensi esensial, rigi sidik jari

INTRODUCTION

Dermatoglyphics (finger prints), also known as “epidermal ridge configurations” are the characteristics of the ridged skin on the fingertips, palms, toes and soles of primates (including human beings) and some other mammals. They consist of the alignment of the sweat glands’ pores and are shaped in the first trimester of gestation (between the tenth and eighteenth weeks of gestation).¹

Dermatoglyphics is one field which gets affected by genetic changes as shown in cases of Down syndrome, Schizophrenia, Huntington’s chorea and syndactyly. The formation of dermal ridges takes place in fetus during 3rd month as a result of physical and topographical growth process. Dermal ridges and configuration once formed are not affected by age, development and environment changes in post natal life. So it has potential to predict various of genetic and acquired disorders which influenced by genetic factors.²

Essential hypertension is one of the disorders affected by genetic factor. Hypertension is initiated by several combinations of hereditary and environmental factors, developing to be an established hypertension. Essential hypertension is usually occurred in 20-50 year-olds.³ Essential hypertension is regarded as a multifactorial condition such as, the onset and severity of which are influenced by both genetic and environmental factors. The role of genetic factors in the pathology of hypertension is supported by cross-sectional studies that document familial aggregation of the disorder despite different environmental factors. Twins and adoption studies have indicated a greater degree of trait concordance between identical twins and dizygotic twins and between natural and adoptive siblings

respectively, which also stress the importance of genetic factors.⁴

Study by Daniela et al. (1991),³ suggested a difference in dermatoglyphic characteristic in teenagers who suffered from hypertension compared with normal (individual with *whorl* pattern ≥ 6 of 10 fingers may suffer from hypertension), therefore, dermatoglyphics may be used as a cheaper, easier (non-invasive), and faster predictor of the risk of hypertension.⁵ Raden suggested that individual with high number of *whorl* type (> 7) in fingers of both hands, it was predicted that the individual had a tendency to have systolic hypertension when he/she was > 40 years old.

A study on the dermatoglyphs of fingertips of essential hypertension patients in Ulin Hospital Banjarmasin has never been done before. Therefore, this study was conducted to provide information about the dermatoglyphs of essential hypertension patients in Ulin Hospital Banjarmasin.

The benefit of this study was to give information about the dermatoglyphs of the fingertips of essential hypertension patients, so that if they have the dermatoglyphic features of essential hypertension patients, they can maintain their healthy lifestyle to decrease the incidence of hypertension in the future. If essential hypertension is proven to be associated with dermatoglyphics, it can be used as a cheaper, easier (non-invasive,) and faster predictor of the risk of hypertension.

The objectives of this research to find out the difference between the patient who have *whorl* pattern ≥ 6 in essential hypertension and non-essential hypertension groups in Ulin Hospital Banjarmasin and to find out the between the ridge counts in essential hypertension and non-essential hypertension groups in Ulin Hospital Banjarmasin.

MATERIAL AND METHOD

The method of this research was analytical observational study, with cross-sectional approach. Population of the research was essential hypertension patients who visited Internal Medicine Polyclinic, Ulin Hospital, in July-August 2007. Samples were essential hypertension patients diagnosed by doctors in the Polyclinic of Ulin Hospital Banjarmasin, aged ≤ 50 years old. If the diagnosis of essential hypertension was not recorded in medical record, it was established by the following criteria age ≤ 50 years old, systolic BP ≥ 140 mmHg, diastolic BP ≥ 90 mmHg, not suffered from renal failure, based on laboratory result in the medical record, not suffered from DM, leprosy, polydactyly, Down syndrome, Turner syndrome, and other inherited diseases.

Thirty-two samples were taken with consecutive sampling. Materials and instruments used in this research were paper, plastic cover, scanner Canon Lide, laptop, records of fingerprint pattern, and identity forms which contained the name, age, sex, educational level, and history of diseases/accidents of the samples.

There were independent, dependent, and confounding variables in this research. The independent variable was essential hypertension patients, and dependent variables were number of *whorl* pattern, and ridge count. The confounding variables were the hygiene of the fingers, history of previous diseases, procedure of fingerprinting, overperspiration, dirt on the scanner, burns, or genetic diseases.

Result data were tabulated and presented in frequency distribution tables, and then the *whorl* patterns were analyzed with Chi-square test. Total

Table 1. Numbers of *Whorl* Pattern in Essential Hypertension and Non-Essential Hypertension Patients in Ulin Hospital Banjarmasin, July-August 2007

<i>Whorl</i> pattern	Essential hypertension		Non-essential hypertension	
	Total	%	Total	%
≥ 6	26	81.25	8	25
< 6	6	18.75	24	75
Total	32	100	32	100

ridge counts were analyzed for distribution and homogeneity with Shapiro-Wilk test, which showed that the data were normally distributed and homogenous (for samples less than 50), and then they were analyzed with t-test with 95% confidence level.

RESULT

A study has been conducted to calculate the dermatoglyphic *whorl* pattern and ridge count of essential hypertension and non-essential hypertension patients in the Internal Medicine Polyclinic of Ulin Hospital Banjarmasin in July-August 2007. The result is shown in the following Table 1.

Table 1. showed that most (81.25%) essential hypertension patients in Ulin Hospital Banjarmasin in July-August 2007 had *whorl* pattern ≥ 6 of their ten fingers, while there were only 25% non-essential hypertension patients had *whorl* pattern ≥ 6 .

The difference of the numbers of *whorl* patterns between essential hypertension and non-essential hypertension patients was analyzed with Chi-square test. Statistical analysis showed that there was a significant difference ($p < 0.05$) in the numbers of *whorl* patterns ≥ 6 between essential

Table 2. Average Ridge Counts in Essential Hypertension and Non-Essential Hypertension Patients in Ulin Hospital Banjarmasin, July-August 2007

	Left	Right	Total average
N	64.18	65.2	129.38
HE	74.82	73.3	147.38

N = average ridge count of non-essential hypertension patients
HE = average ridge count of essential hypertension patients

Table 3. The Development of Fingerpattern After Conception⁸

Week	The Development of Fingerpattern
6-8 weeks after conception	Volar pads are developed (similar to the structure of small ball, eleven in one hands, making the contour of foetal hands)
10-12 weeks after conception	Volar pads are shrinked
13 weeks after conception	Ridge/fingerprint starts to be visible, taking the forms from the shrinkage of volar pads
21 weeks after conception	Fingerpattern is completed

hypertension and non-essential hypertension patients, and the odds ratio was calculated. The odds ratio showed that individu with *whorl* pattern ≥ 6 were 21.598. It means that individu who had *whorl* pattern ≥ 6 were 21.59 times more likely to suffer from hypertension in the future, compared with those who had *whorl* pattern < 6 .

Table 2. showed a comparison of ridge counts between essential hypertension and non-essential hypertension patients. Average ridge count of all ten fingers of essential hypertension patients were higher than those of non-essential hypertension patients. This difference was significant (p value < 0.05). Analysis with t-test gave p value = 0.000 ($p < 0.05$). It can be concluded that there was a significant difference in ridge counts of essential hypertension and non-essential hypertension patients.

DISCUSSION

The result of this study (Table 1) was consistent with a study conducted by Ramelan (1999)⁶ who suggested that if there were ≥ 6 of 10 fingers which have *whorl* patterns, it can be a predictor for hypertension in the future,⁶ and Raden (2006)³ suggested that individual with high number of *whorl* type (> 7) in fingers of both hands, it was predicted that the individual had a tendency to have systolic hypertension when he/she was > 40 years old.³

In this study, the average rige count in essential hypertension patients were higher than those

of non-essential hypertension patients. The number of ridges in essential hypertension patients are increased, because there are an increase in *whorl* pattern compared with those in non-hypertension patients, because the number of ridges in *whorl* pattern is higher than those in loop and arch patterns.³

The cause of the difference in fingerprint pattern, particularly in *whorl* pattern, in essential hypertension compared to normal person, is not clear. There are considerable factors that may affect the dermatoglyph/ridge count, but the nerves in the epidermis were assumed to have a role.⁷

Incidence of inherited defects showed a close relationship with particular fingerpattern,³ for example, mitral valve prolapse was reported to be associated with arch type, essential hypertension was associated with *whorl* pattern, and abnormality in dermatoglyhic ridges in finger was associated with vascular thrombosis.⁸

According to Rashad (2007)⁸, a tendency of *whorl* pattern to be associated with hypertension was caused by a proximity and close association of the organogenesis of the hands and cardiovascular system, and was controlled completely by genetic mechanism and foetal environment. But the relationship between essential hypertension and *whorl* pattern was still not explained clearly.⁸

Before gestational age of 12 weeks, environmental factors may affect the dermatoglyph (ridge

count). The environmental factors may be the pregnant mother's condition (for example, severe stress), food, drugs, etc. These factors also may affect the development of cardiovascular system, moreover, the development of cardiovascular system has a close proximity in time with the development of hands (Table 3).

At the early weeks of pregnancy, all organogenesis goes through critical phase where hereditary and environment factors affect the final result of organogenesis. In the 6-8 weeks, the initial dermatoglyph is developed, in the form of small balls, which are pulled backwards at 10-12 weeks after conception, the finger pattern is visible at 13 weeks and is completed at 21 weeks.⁸

The fingerprint is not changed from birth until death. Dermatoglyphic patterns between individuals are never be similar. Variation of dermatoglyphic pattern of a species is different with that of other species, and shows the characteristic of the species. In human, there are variations of dermatoglyphic patterns between ethnicities. Dermatoglyphic pattern variation is a combination of genetic and prenatal environmental factors.⁹ Abnormalities in the growth process, which are liable to distort the alignment of dermal ridges, may result from the action of abnormal genes, chromosomal aberrations, even from poisoning by a drug, or from a viral infection.¹⁰

CONCLUSION

There was a significant relation between both of whorl pattern ridge counts and type of hypertension.

From the result, if the individu has *whorl* pattern more than six, he/she has to change his/her lifestyle, for example, increase the physical activity and reduce salt intake. Since the fingerprint is not

changed from birth until death, it can be used as predictor for hypertension in the future.

REFERENCES

1. Najafi, M. Association between Finger Patterns of Digit II and Intelligence Quotient Level in Adolescents. *Iran J Pediatr*, 2009; 19 (3):277-284
2. Sharma, MK., Jahwar P., Sharma, H., Sharma, S. & Kalavatia, I. Dermatoglyphics an Attempt to Predict Downs Syndrome. *Int J Biol Med Res*. 2012; 3 (2): 1631-1635.
3. Raden I. *Pola Dermatoglifi pada Ujung Jari dan Tapak Tangan Penderita Hipertensi Esensial Orang Dewasa Indonesia*. *Maj Kedok Yarsi*, 2006; 14 (1): 005-010
4. Maolian G and Norbert H. Molecular Genetics of Human Hypertension. *Clinical Science*, 2006; 110 (3): 315–326.
5. Daniela P, Kuklik M, Berankova M, Schaumann. Dermatoglyphics in Juvenile Hypertension. *J Biol*. 1991; 49 (4): 361-366.
6. Ramelan W. Perkembangan Genetika Manusia dalam Hubungan dengan Reproduksi. *MKI*, 1999; 49 (6): 228-239
7. Sufitni. Perbandingan Garis Simian dan Pola Sidik Jari pada Kelompok Retardasi Mental dan Kelompok Normal. Tesis. Fakultas Kedokteran, Universitas Sumatera Utara, MKI 2007; 4: 3
8. Edward DC. *Fingerprint & Palmar Dermatoglyphics*, (<http://www.pdc.co.il> diakses 1 april 2007).
9. Schaumann B. *Alter M. Dermatoglyphic in Medical Disorders*. New York: Springer-Verlag, 1976.
10. Rajangam, S., Ravindranth, R., Shubha, R., Nagesh, H.V. & Johnson, J. Dermatoglyphics-Quantitative Analysis in Rheumatoid Arthritis. *Anthropologist*. 2008; 10 (3): 233-235.