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

Abstract

Dermatoglyphics can be used to predict a disease such as essential hypertension. The aim of this research is to know the summary of whorl pattern and total ridge count on patient with essential hypertension in the Department of Internal Medicine of Ulin Hospital Banjarmasin period July – August 2007. Sample of research from patients with essential hypertension diagnosed by doctors in the Department of Internal Medicine of Ulin Hospital Banjarmasin (32 samples), control samples are from normotension persons (32 samples). The variables observed are the summary of whorl pattern and total ridge count. The result shows that patients with essential hypertension with whorl pattern $>6$ is $81.25\%$, normotension is $25\%$. Summary of average of total ridge count in patients with essential hypertension is $147.38$, normotension is $129.38$. It can be concluded there is a difference from patients with whorl pattern $>6$ and total ridge count between essential hypertension with control ($p<0.05$).

Key words: whorl, essential hypertension, ridge skin

Abstrak


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 individu with high number of whorl type (> 7) in fingers of both hands, it was predicted that the individu 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 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. Numbers of Whorl Pattern in Essential Hypertension and Non-Essential Hypertension Patients in Ulin Hospital Banjarmasin, July-August 2007

<table>
<thead>
<tr>
<th>Whorl pattern</th>
<th>Essential hypertension</th>
<th>Non-essential hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>≥6</td>
<td>26</td>
<td>8</td>
</tr>
<tr>
<td>&lt;6</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
<th>Total average</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>64.18</td>
<td>65.2</td>
<td>129.38</td>
</tr>
<tr>
<td>HE</td>
<td>74.82</td>
<td>73.3</td>
<td>147.38</td>
</tr>
</tbody>
</table>

N = average ridge count of non-essential hypertension patients
HE = average ridge count of essential hypertension patients
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) who suggested that if there were $> 6$ of 10 fingers which have whorl patterns, it can be a predictor for hypertension in the future, and Raden (2006) 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.

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.

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.

Incidence of inherited defects showed a close relationship with particular fingerpattern, 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.

According to Rashad (2007), 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.

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