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DERMATOGLYPHIC CHARACTERISTICS OF HYPERTENSIVES

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ABSTRACT

Introduction*: Dermatoglyphics is the analysis of fingerprints as a genetic marker that can be related to health, sports and disease prognosis. Since the method analyzes genetic markers, finding a pattern or rare marker for certain diseases is very important, it may be a useful tool for disease prognosis and diagnosis.*

Objective*: Investigate dermatoglyphics as a prognosis method for hypertension.*

Method*: This is an applied analytical study, with a quantitative approach, using the technical procedures of descriptive research. The sample was composed of 268 adults, 134 with hypertension and 134 controls, of both sexes and different ages. Fingerprints were collected from all fingers, starting with the little finger on the left hand and concluding with the little finger on the right hand. The method applied to determine the profile of individuals is computerized dermatoglyphics, using a dermatoglyphic reader to collect the fingerprints. Statistical analyses were processed in Statistical Package for the Social Science (SPSS), 20.0, at a significance level of $p \leq 0.05$. The Shapiro-Wilk test was used to compare the two groups and their quantitative variables to determine if they were normally distributed. In the event of non-normal distribution, the Mann-Whitney nonparametric test was applied to compare the following numerical variables.*

Results*: There was a significant difference in the number of lines on finger 5 of the right hand, the hypertensive group exhibiting the lowest number. In addition to the statistically significant difference in the ulnar loop pattern on the 5thh finger of the left hand, and 4th and 5th of the right hand, this pattern appeared more frequently in the hypertensive group. This evidence confirms the existence of a rare marker revealed by dermatoglyphics in patients with hypertension, demonstrating the use of dermatoglyphics as an additional parameter in identifying individuals with this disease.*

Keywords*: Hypertension, dermatoglyphics, prognosis, prevention.*

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Introduction

Hypertension is a multifactorial disease that affects a large segment of the population. It is asymptomatic in most cases, manifests itself late, has a high mortality rate and is considered a serious health problem affecting a large portion of the world's population[(1)]. Hypertension (HTN) is an avoidable and controllable chronic disease that causes considerable mortality and morbidity, as well as organ damage[(2)]. Systemic hypertension, popularly known as high blood pressure, is the force of blood pushing against the inner walls of the arteries as the heart pumps. It occurs when tension increases in the blood vessels, damaging them, and is therefore characterized as a risk factor for cardiovascular and other diseases[(3)]. Blood pressure is considered normal when systolic (maximum) pres-

sure does not exceed 130 and diastolic (minimum) is less than 85 mmHg. Approximately 24.3% of Brazil's population is currently hypertensive[4]. The diagnosis of hypertension is based on a relatively simple procedure, namely the measure of blood pressure. Anamnesis, physical examination and complementary tests help diagnose the disease, its etiology, degree of compromise to target organs and identify associated cardiovascular risk factors[5]. Hypertension (HTN) is one of the most important risk factors related to cardiovascular morbidity and mortality[6].

Genetic predisposition is a factor considered in the diagnosis of hypertension, since individuals with a family history of this factor are more likely to develop the disease. With the advance in research and genetic manipulation techniques, a possible genetic approach, in addition to environmental influences, was considered[7]. New techniques and studies on genetics make early identification of risk factors for certain diseases possible, in addition to detecting susceptible individuals, and assessing endogenous and exogenous aspects[8].

Dermatoglyphics studies fingerprints as a genetic and fetal development marker. Fingerprints, which develop during the third and sixth month of pregnancy, are a record of the relationship between genetic inheritance and the mother's intrauterine environment, remaining stable throughout life, since they are immutable. Dermal papillary ridges can be observed on the palms of the hands, soles of the feet, and distal phalanges, and are correlated with potential biophysical abilities as well as early manifestation of diseases. Taken together, genotype and phenotype broaden the possibilities of identifying sport talent, training regime, physical preparation, and exercise prescription in the interest of health promotion and disease prognosis[9].

According to Abramova[10], dermatoglyphic analysis of fingerprints includes the type of pattern, number of lines on the fingers (the number of ridges within the pattern), and the sum of patterns and total number of lines[10]. Using this methodology, researchers[11, 12] have found a prognostic ally; examples are the contributions of this technique in identifying adverse events in intrauterine development. In these cases, there is a relationship between phenotype and dermatoglyphics in diagnosing schizophrenia[13, 14], diabetes in middle age[15], eczema, psoriasis and alopecia areata[16]. Although HTN is one of the most serious health problems, the number of hypertensives treated remains low. Around 50% are unaware of their condition and among those who are, 50% do not seek treatment and of these 50% do not control their blood pressure. Only 10% of hypertensives are treated effectively[17]. Lack of treatment adherence is one of the major problems in controlling hypertension, occurring in 40% of patients for different reasons. Hypertension is a disease that involves high costs, and genetic predispositions should be analyzed and monitored.

Materials and methods

The sample consisted of 268 adults, 134 diagnosed with hypertension and 134 controls, of both sexes and different age groups. Based on the experimental design their deemed unnecessary collecting height and weigth parameters. Statistical analyses were processed in Statistical Package for the Social Science (SPSS), 20.0, at a significance level of $p \leq 0.05$. The Shapiro-Wilk test was used to compare the two groups and their quantitative variables to determine if they were normally distributed. In the event of non-normal distribution, the Mann-Whitney nonparametric test was applied to compare the following numerical variables: left hand, sum of the number of lines on finger 1 - thumb (MESQL1); left hand, sum of the number of lines on finger 2 - index (MESQL2); left hand, sum of the number of lines on finger 3 - middle finger (MESQL3); left hand, sum of the number of lines on finger 4 - ring (MESQL4); and left hand, sum of the number of lines on finger 5 - little (MESQL5); sum of the total number of lines on the left hand (SQTLE); right hand, sum of the number of lines on finger 1 - thumb (MDSQL1), right hand, sum of the number of lines on finger 2 - index, (MDSQL2); right hand, sum of the number of lines on finger 3 - middle (MDSQL3); right hand, sum of the number of lines on finger 4 - ring (MDSQL4); and right hand, sum of the number of lines on finger 5 - little (MDSQL5); sum of the total number of lines on the right hand (SQTLD); sum of the total number of lines - both hands (SQTL). The chi-square test was used to compare categorical variables: Arch (A), Radial Loop (LR), Ulnar Loop (LU), Whorl (W), left hand fingerprint patterns, finger 1 (MET1), finger 2 (MET2), finger 3 (MET3), finger 4 (MET4) and finger 5 (MET5) and right hand fingerprint patterns, finger 1 (MDT1), finger 2 (MDT2), finger 3 (MDT3), finger 4 (MDT4) and finger 5 (MDT5), and adjusted residual analysis was applied when

significant differences were observed. The study was approved by the Human Being Research Ethics Committee of UNOESC/HUST (University of Western Santa Catarina/Santa Teresa University Hospital), under protocol number 1.380.492 in accordance with ethical standards of regulatory guidelines and research directives involving human beings, and in compliance with Resolution 196/98 of the National Health Council and Declaration of Helsinki.

Results

The Shapiro-Wilk test, used to compare data normality between the two groups and their quantitative variables, detected non-normal distribution. Thus, the non-parametric Mann-Whitney test was applied to compare continuous variables (sum of the number of lines per finger, hand and both hands). Data analysis of continuous variables showed a significant difference in the 5th finger of the right hand, between the hypertensive and control groups, with the hypertensives exhibiting fewer lines on this finger (Table 1).

	Mean Control Group	Mean Hypertensives	p
MESQL1	12,20±5,13	12,32±5,31	0,970
MESQL2	9,31±5,22	8,21±5,34	0,088
MESQL3	9,90±5,53	8,57±5,53	0,063
MESQL4	12,17±5,29	11,42±5,42	0,158
MESQL5	10,91±6,34	10,12±6,02	0,216
SQTLE	54,49±21,79	50,64±21,35	0,053
MDSQL1	14,34±5,40	14,34±5,25	0,803
MDSQL2	9,22±5,51	8,81±5,61	0,636
MDSQL3	9,92±5,24	9,64±5,34	0,578
MDSQL4	12,63±5,14	11,87±5,08	0,105
MDSQL5	11,41±4,81	9,60±4,71	0,001*
SQTLD	57,52±21,39	54,25±20,76	0,090
SQTL	112,01±41,85	104,90±40,85	0,052

Table 1: Mean number of fingerprint lines on fingers of the left and right hand, and normality distribution between the hypertensive and control groups.
p<0,05

The chi-square test was used to compare categorical variables, demonstrating a significant intergroup difference in all fingerprint variables, that is, the ten fingers, as shown in Table 2.

Once a significant difference was identified between the categorical variables of the hypertensive (HG) and control groups (CG), adjusted residual analysis was conducted to ascertain which pattern was significant in the groups, in order to determine the predominant and different fingerprint marker in the HG, compared to the CG. Given that the chi-square test showed a significant intergroup difference, adjusted residual analysis was conducted, as recommended by Pereira[18].

MET1	MET2	MET3	MET4	MET5	MDT1	MDT2	MDT3	MDT4	MDT5
0,451	0,368	0,673	0,103	0,040*	0,857	0,843	0,455	0,028*	0,036*

Table 2: Difference between finger patterns on the right and left hand of the hypertensive and control groups.
p<0,05

In this case, data were compared, considering the standard value of 1.96, that is, all the results above the standard showed a significant intergroup difference and which of the fingerprint patterns is more frequent in the HG, as depicted in Table 3.

		Figures fingerprints			
		A	LR	LU	W
		R_{aj} (n)	R_{aj} (n)	R_{aj} (n)	R_{aj} (n)
MET5	Hypertensive Group	-2,6 (1)	-0,5(2)	2,3 (119)	-1,0 (12)
	Control Group	2,6 (9)	0,5 (3)	-2,3 (105)	1,0 (17)
MDT4	Hypertensive Group	-2,0 (0)	1,1 (5)	2,0 (83)	-1,9 (46)
	Control Group	2,0 (4)	-1,1 (2)	-2,0 (67)	1,9 (61)
MDT5	Hypertensive Group	-1,7 (1)	-2,0 (0)	2,3 (118)	-1,1 (15)
	Control Group	1,7 (5)	2,0 (4)	-2,3 (104)	1,1 (21)

Table 3: Pattern frequency and adjusted residual value of the variables under study.

The data show a significant difference for the 5th finger of the left hand, as well as the 4th and 5th of the right hand. The ulnar loop pattern is more frequent on MET5, MDT4 and MDT5, in the hypertensive group compared to controls. This frequency and the difference exhibited is a prognostic marker of hypertension. In the control group the arch pattern is predominant on MET5 e MDT4, as well as the radial loop on MDT5, which may be a protective marker for hypertension. Hypertension is prevalent worldwide, characterized by high risk of morbidity and mortality, a serious public health problem. Moreover, its evolution is slow and silent, which hinders the perception of individuals affected by the disease[19]. In this respect, the present study aims to find means and methods to identify hypertension before it progresses, thereby collaborating with its prevention.

Discussion

This study revealed a significant difference in hypertensive individuals compared to a healthy control group, in terms of quantitative (number of lines) and qualitative (type of pattern) dermatoglyphic characteristics, the former exhibiting a smaller number of lines and predominance of ulnar loops (LU). A study conducted in India by Kulkarni et al.,[20], with 200 hypertensive individuals and 200 controls (100 men and 96 women in each group), obtained different results, with a large number of W and low number of LU on both hands. In 2013 Kachhave et al.[21] conducted a study, also in India, with 120 individuals, 60 with hypertension and 60 controls, obtaining a small number of LU on both hands. The studies carried out by Kulkarni et al.[20], Kachhave et al.[21], and Bulagouda et al.[22] analyzed a specific racial or ethnic group, showing the need for anthropological research on the differences in fingerprints between individuals from other continents. In the sample studied here, data were collected in Santa Catarina, Brazil, which has a multirracial and multiethnic population, predominantly of European origin. According to Zhang a study conducted in China already showed differences between the ethnic groups of the country, presenting difference between northern peoples and the southern[23]. Quantitative analysis found no significant differences in the number of lines on the fifth finger of the right hand , where hypertensives exhibited a smaller number of lines.

Categorical analysis revealed greater frequency of LU on MET5, MDT4 and MDT5 in hypertensives, representing a possible prognostic marker for the disease. The CG showed a higher number of arches (A) on MET5 and MDT4; and radial loops (LR) on MDT5, the latter possibly a protective marker for hypertension. These characteristics are different from those found in Asians. There may be a significant difference between the markers observed in hypertensives, as a function of their ethnicity or race. The present study demonstrated a significant difference in the number of lines on the little finger of the right hand, with the hypertensive group exhibiting fewer lines.

In addition to a statistically significant difference in LU of MET5, MDT4 and MDT5, they appeared more in the hypertensives, showing the existence of a rare marker in these patients revealed by dermatoglyphics, demonstrating its use as an additional parameter for identifying individuals with this disease. It is suggested that complementary studies involving more hypertensive subjects be conducted to corroborate the possibility that these differences are related to genetic abnormality in these individuals and to determine the incidence of the aforementioned factors.

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