Palmar Dermatoglyphic Traits on Hypothenar and Thenar in Breast Cancer Patients

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Some dermatoglyphic palmar traits such as hypotenar and thenar are relatively rarely investigated in cancer patients. During the period from January 1, 2014 till December 31, 2017, we examined 82 women with clinically, histologically and mammographically confirmed breast cancer as well as 60 healthy women from the region of Varna, Bulgaria. The palmoscopic examination of these palmar traits was accomplished by the basic method of Cummins and Midlo. There were statistically significant differences in terms of the frequencies of the arches and loops in hypothenar as well as concerning the sum frequencies of the arches, loops, whorls and image traces in right-hand hypothenar between breast cancer patients and healthy females. The number and relative share of palmar traits in II-IV interdigital fields in left- and right hand hypothenar differed statistically reliably between both groups. These palmar dermatoglyphic traits could be used within a diagnostic algorithm for breast cancer screening among genetically predisposed population.

Key words: dermatoglyphics, breast cancer, hypothenar, thenar, region of Varna

Introduction

Dermatoglyphic investigations of some palmar traits such as hypothenar and thenar are relatively less popular than those of digital traits. However, they represent an essential component in the diagnostic and prognostic armamentarium of disease-oriented dermatoglyphics, too.

The true hypothenar patterns as a component of dermatoglyphic traits are analyzed in 386 individuals, 182 males and 204 females aged between 10 and 18 years from the central Rhodopes in South Bulgaria [10]. There is a hypothenar radial arch in 2,07% of the males and 2,82% of females in a sample of 2130 Bulgarians [9]. A well-expressed tendency of the hypothenar radial arch towards symmetrical occurrence is disclosed through the ratio between the actual and expected frequency of its bilateral occurrence.

There are several papers dealing with analyses of a palmar dermatoglyphics in children with acute lymphoblastic leukemia (acute lymphoblastic leukemia [3], larynx cancer [12], gastric cancer [18], ovarian cancer [4], uterine cervix and endometrial cancers [1] and other neoplasms.

The environmental and hereditary influence on tumour development using digito-palmar dermatoglyphic traits is assessed in 126 patients of both genders with pituitary tumors (60 non-functional and 66 functional pituitary tumour patients) in comparison to a control group of 400 phenotypically healthy individuals [8]. The use of these traits as screening markers of predisposition to pituitary tumour development facilitates the earlier detection of patients in addition to standard methods, possibly earlier treatment and higher survival rate.

Some papers are devoted to the peculiarities of digital [2, 7] and palmar dermatoglyphics [6, 13, 14] in breast cancer patients, too.

The purpose of this study was to comparatively analyze some peculiarities of hypothenar and thenar traits in female breast cancer patients and healthy women with a view of their possible diagnostic significance.

Material and Methods

The present investigation was performed during the period from January 1, 2014 till December 31, 2017. It covered 82 women with clinically, histologically and mammographically confirmed breast cancer as well as 60 healthy women from the region of Varna, Bulgaria. Breast cancer patients were aged between 36 and 80 years while healthy females were aged between 31 and 79 years. All of them were of Bulgarian ethnical origin.

The palmoscopic examination of palmar traits on hypothenar and thenar was accomplished by the basic method of Cummins and Midlo [5] as already described by us elsewhere [16]. Variation analysis and χ^2 test were applied. Statistical data processing was done by means of SPSS software package, version 19.

Results

Our results were presented on one table and four figures.

The number and relative share of palmar traits on hypothenar and thenar between breast cancer patients and healthy females were compared on **Table 1**.

Table 1. Number and relative share of palmar traits on hypothenar and thenar in breast cancer patients and healthy females

Palmar traits	Breast cancer patients (n=82)		Healthy females (n=60)		χ^2	p
	n	%	n	%		
Left hand						
hypothenar	31	37,8	13	21,7	4,220	**0,040**
thenar	6	7,3	3	5,0	0,366	0,545
Right hand						
hypothenar	38	46,3	16	26,7	5,691	**0,017**
thenar	5	6,1	3	5,0	0,230	0,632

The sum frequency of the palmar patterns including arches, loops, whorls and image traces on left- and right hand hypothenar was illustrated on **Fig.1** and **Fig. 2**.

The sum frequency of the palmar patterns including arches, loops, whorls and image traces on left- and right hand thenar was illustrated on **Fig. 3** and **Fig. 4**.
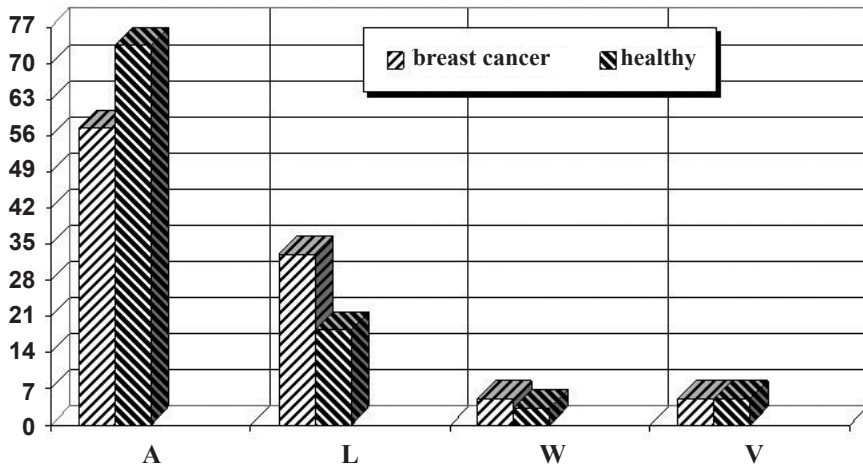

Fig. 1. Relative share of left hand palmar traits on hypothenar in breast cancer patients and healthy females
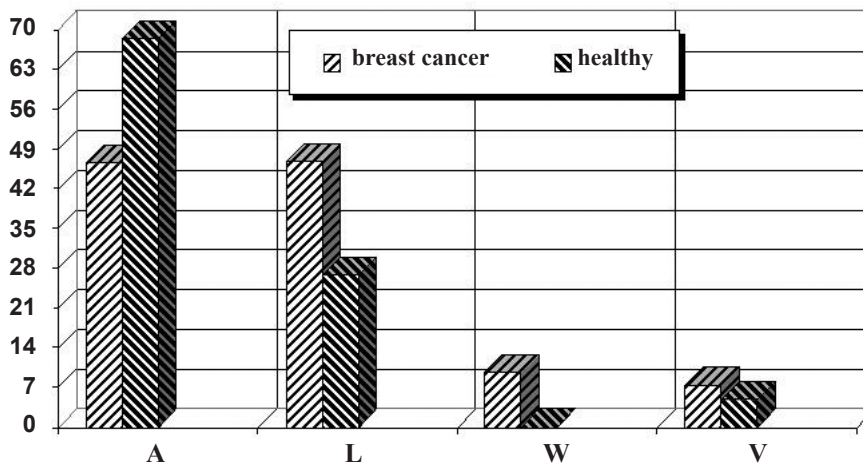

Fig. 2. Relative share of right hand palmar traits on hypothenar in breast cancer patients and healthy females

Fig. 3. Relative share of left hand palmar traits on thenar in breast cancer patients and healthy females

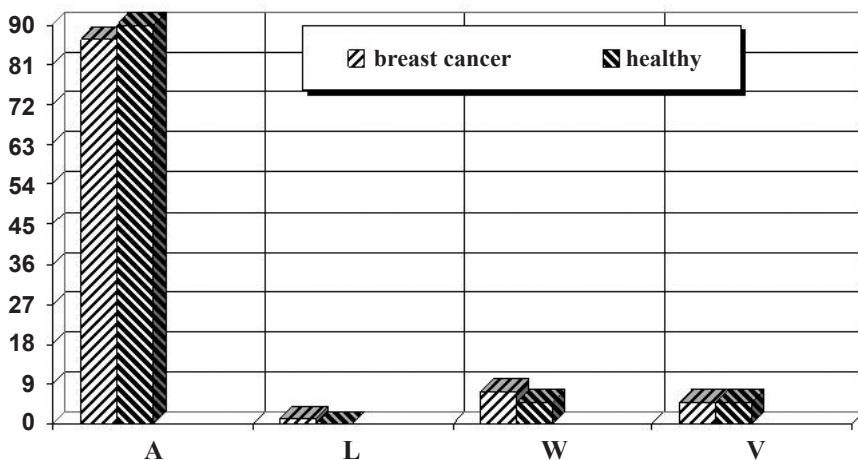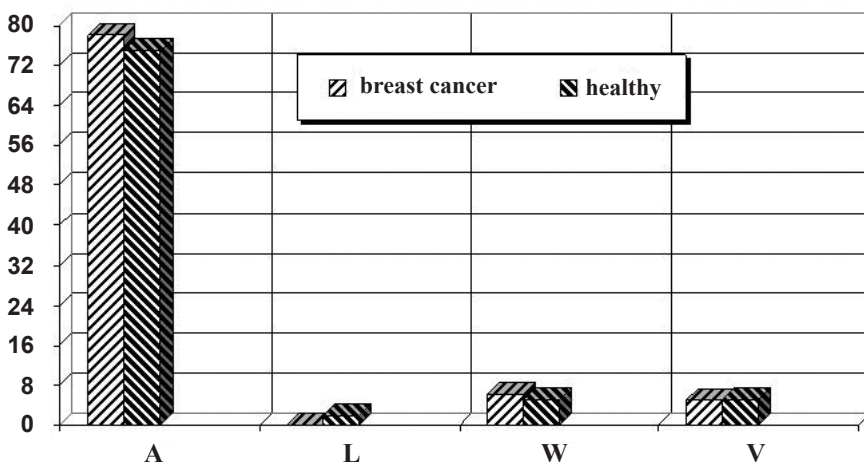**Fig. 4.** Relative share of right hand palmar traits on thenar in breast cancer patients and healthy females

There was a statistically significant difference between breast cancer patients and healthy females in terms of the mean value of palmar thenar fields only (p=0,006).

There was a statistically significant difference in favour of breast cancer patients against healthy females in terms of the number and frequency of the palmar patterns in the interdigital fields of the hypothenar of the left hand (χ^2=4,220; p=0,040) and right hand (χ^2=5,691; p=0,017) only.

The frequencies of the arches in left hand (*t*=2,025; p<0,05) and in right-hand hypothenar (*t*=2,700; p<0,01) were statistically significantly less in breast cancer patients than in healthy females. The frequency of the loops in left hand hypothenar

(t=2,028; p<0,05) was statistically significantly higher in breast cancer patients than in healthy females.

The sum frequencies of the palmar patterns including arches, loops, whorls and image traces in right hand hypothenar differed statistically significantly between breast cancer patients and healthy females (χ^2=3,228; p=0,006) while that in left-hand hypothenar did not at all (χ^2=3,328; p=0,072). The corresponding frequencies in both right- and left hand thenar did not differ statistically significantly between breast cancer patients and healthy females (χ^2=0,172; p=0,678 and χ^2=0,327; p=0,568, respectively).

There was a statistically reliable difference concerning the number and relative share of palmar traits in II-IV interdigital fields in left- (χ^2=4,220; p=0,040) and right hand (χ^2=5,691; p=0,017) hypothenar between breast cancer patients and healthy females only. The corresponding difference in the thenar was, however, statistically insignificant (χ^2=0,366; p=0,545).

Discussion

Our results clearly indicate some statistically significant differences concerning certain hypothenar traits between the breast cancer patients and healthy females. Obviously, further research of larger samples is needed to warrant the suggested diagnostic potential of this parameter for breast cancer risk assessment as an additional screening marker.

The hypothenar patterns do not demonstrate any significant differences between breast cancer patients and healthy controls [17].

As a functional plug-in of the dermatoglyphic analysis and detection system, the template-based image preprocessing including histogram redistribution, ridge orientation, and skeletonization is effectively used for the automatic identification of palmar traits [11]. The method is feasible and can be applied as an auxiliary diagnostic tool for breast cancer and other diseases.

Palmar dermatoglyphics is simple, inexpensive, anatomical and non-invasive method [15, 16]. It may be used as a reliable indicator for screening of high-risk population in terms of breast cancer.

Conclusion

We establish statistically significant differences concerning the frequencies of the arches and loops in hypothenar as well as concerning the sum frequencies of the palmar patterns including arches, loops, whorls and image traces in right hand hypothenar between breast cancer patients and healthy females. The number and relative share of palmar traits in II-IV interdigital fields in left- and right hand hypothenar differ statistically reliably between breast cancer patients and healthy females only.

These palmar dermatoglyphic traits could be included in a diagnostic algorithm for breast cancer screening among genetically predisposed population, too.

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