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Comparative Dermatoglyphic Study of the Palmar Ridge Count in Breast Carcinoma Patients from Northeast Bulgaria

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The present study was aimed to assess the relationship of quantitative dermatoglyphic analysis of the palmar ridge count and the predisposition for developing of breast cancer.
The study was conducted among 82 women with breast carcinoma diagnosed by histological and mammographic investigations and 60 healthy women for the control group from Northeast Bulgaria. Palmprints were obtained by the ink method. The palmar ridge count was read by the method of Cummins and Midlo. Statistically significant differences were estimated in the total palmar ridge count in b-c and a-d interdigital fields on both hands in cases with breast cancer compared to healthy controls. In a-b and c-d interdigital fields, no statistically significant differences were determined. Statistical significance was examined by SPSS 18.0 software.
The palmar dermatoglyphics is simple, inexpensive, anatomical and non-invasive method and may be used as a reliable tool for screening predisposition of breast cancer.

Key words: dermatoglyphics, breast cancer, total palmar right count, Northeast Bulgaria

Introduction

Dermatoglyphics is a field of science that studies dermal patterns of human hands and feet [15]. Ridges are formed in the early periods of intrauterine development and they remain unchanged throughout the whole period of life. Environmental factors can have an influence only in the period of the ridge formation. The dermatoglyphic pattern reflects congenital and hereditary conditions such as breast carcinoma. Several dermatoglyphic investigations by Bulgarian researchers also represent an undoubted interest, indeed [7-10]. The development of genetic research helps to establish the relationship of certain dermatoglyphic traits with a number of chromosomal aberrations such as Langdon Down syndrome, the Klinefelter syndrome, Turner syndrome, trisomy 17

and 18 [20]. There is evidence for abnormalities in the dermatoglyphic patterns in schizophrenia, congenital heart disease, lupus erythematodes, mental disorders and etc [21]. Carcinoma of the breast is one of the most common and dreadful diseases in Bulgaria as well as worldwide. In 5-10% of the cases breast carcinoma may be hereditary and sporadic, which is due to a mutation during the BRCA1 and BRCA2 genes [16, 19]. The development of the mammary glands starts in the sixth week of embryonic development [13] when the dermal ridges are formed [2]. This suggests that the abnormalities in the mammary glands during this period may be reflected in the dermatoglyphic parameters [3, 22, 12]. One of the most important quantitative dermatological features is the palmar ridge count a-b, b-c, c-d. The palmar ridges (papillary prints) are counted for the first time by Galton in 1895 [5] and the rules for counting the ridges are given by Henry in 1900 [4]. Palmar ridge count consists of the number of ridges that cross or touch the line, drawn from the triradius to the center of the pattern. The triradius is a papillary pattern where three flows of ridges meet.

The aim of the current study is to determine differences in the total palmar ridge count in breast carcinoma female patients compared to healthy controls which may have a prognostic and screening value.

Materials and Methods

The fingerprints were taken by spreading typographic ink over a glass or rubber pad by a roller. Palmprints were recorded in a passive manner on a high-quality paper [14]. For the best print of the central part of the hand the paper was placed on a convex surface. The study was conducted among 82 women with breast carcinoma, diagnosed by histological and mammographic investigations in the Department of Thoracic surgery at St. Marina Hospital in Varna and 60 healthy women as a control group from Northeast Bulgaria.

For reading the palmar prints, we used the basic methodology of Cumis and Midlo [4]. The ridge count between different fingerprint triradii is a quantitative parameter which does not depend on size and age. The ridge count in the interdigital spaces a-b, b-c, c-d is calculated for each hand separately **(Fig. 1)**. The total ridge count is estimated on the left and right hand as well as on both hands. The results were examined with the computer program SPSS 18.0.

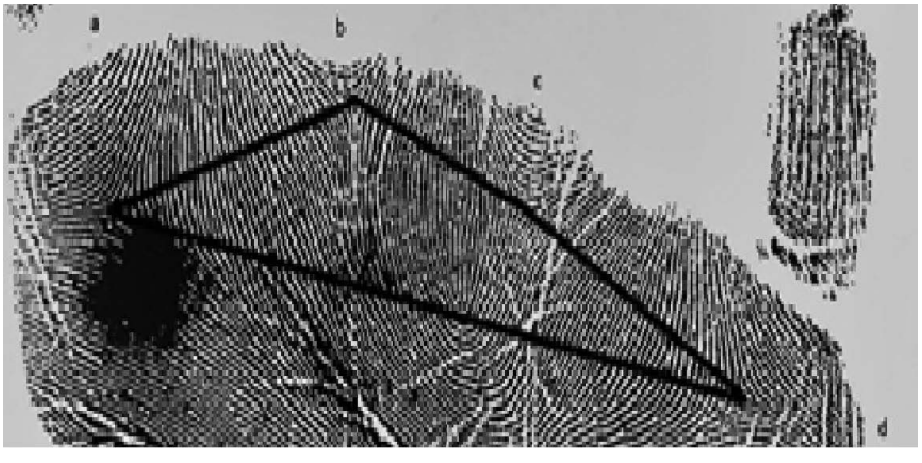

Fig. 1 Palmar ridge count and its calculation in basic a-b, b-c, c-d triradii

Results and Discussion

As it is seen on **Fig. 2**, similar values of the palmar ridge count in the a-b interdigital palmar field on the left hand in women with breast cancer and in control group were observed **(Fig. 2)**. In breast carcinoma patients the palmar ridge count in the c-d interdigital field showed slightly reduced values compared to the control group. Elevated values in the b-c ridge count in breast carcinoma women were established in relation to the control group with statistically significant difference ($p<0.001$). The total ridge count in a-d on the left hand in breast carcinoma patients showed statistically significant differences compared to the control group ($p<0.05$).

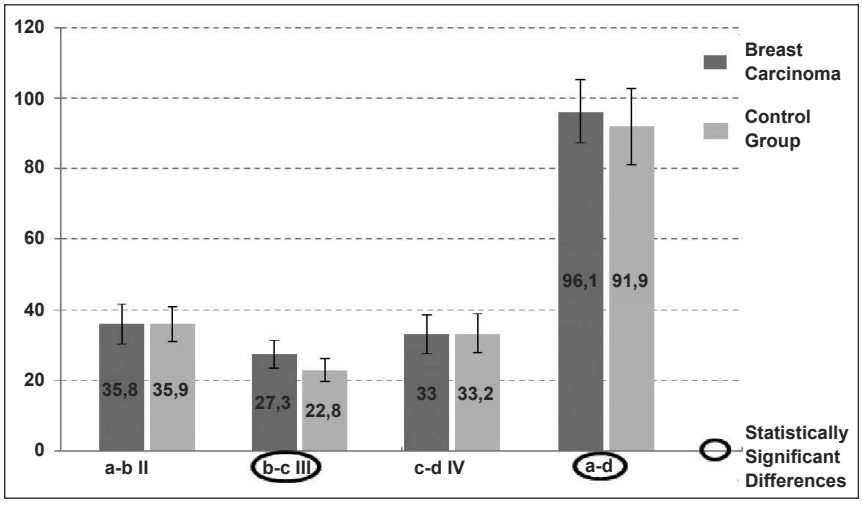

Fig. 2. Average values and standard deviations for palmar ridge count in breast carcinoma patients and control group on the left hand

Slightly elevated values of palmar ridge count in the a-b interdigital field on the right hand were estimated in breast carcinoma patients and the control group, which did not reach statistical significance **(Fig. 3)**.

In women with breast cancer the palmar ridge count in the b-c interdigital field showed increased values in comparison to the control group and the differences were statistically significant ($p<0.001$). No statistically significant differences were found but rather a trend in higher values of the ridge count in c-d interdigital field in women with breast carcinoma compared to healthy controls. In the women patients the values of total ridge count in the a-d field on the right hand demonstrated statistically significant difference in comparison with the healthy controls ($p<0.001$)

Marked interdigital fields on **Fig. 4** indicated higher bilateral differences in the ridge count for women with breast carcinoma compared to the control group (Fig. 4).

Higher values were observed in a-b ridge count on the left and right hand in women with breast carcinoma compared to controls. The b-c ridge count was characterized by relatively high bilateral differences **(Fig. 4)** and reached statistical significance compared to those of the control group ($p<0.001$). The c-d palmar ridge count, on the contrary, showed higher values on the right hands in the patients group compared to the left hands, but did not reach statistical significance in comparison with those of the control group.

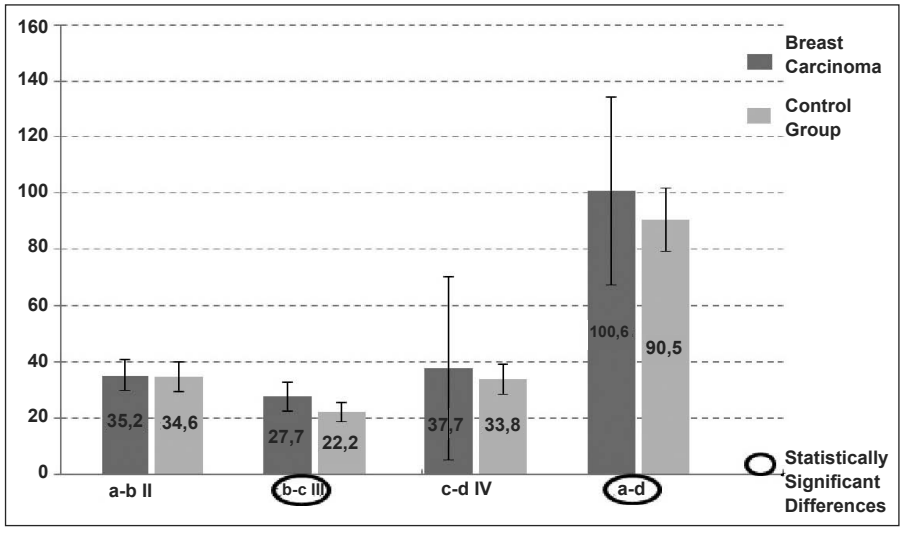

Fig. 3. Average values and standard deviations for palmar ridge count in breast carcinoma patients and control group on the right hand

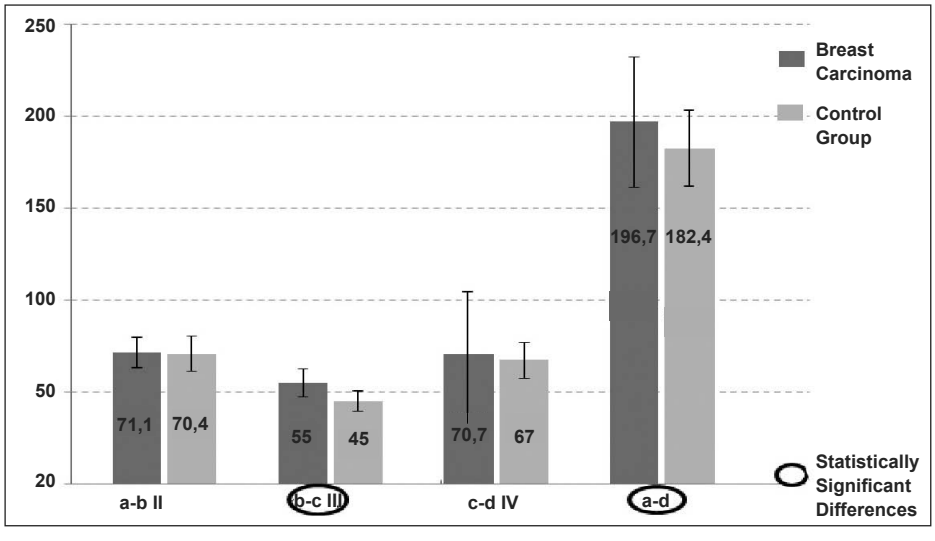

Fig. 4. Average values and standard deviations for palmar ridge count in breast carcinoma patients and control group on the right and left hand

Statistically significant differences were observed in the total ridge count in the a-d interdigital fields on both hands in cases with breast carcinoma compared to healthy controls ($p<0.001$).

Bilateral differences in the ridge count in specific fields and the total ridge count were significantly strongly manifested in the patients group compared to the control group. Right hands showed higher b-c ridge count, while a-b ridge count had almost equal values for both hands. B-c ridge count was higher on the both hands and reached statistically significant difference **(Fig. 5)** ($p<0.001$) respectively.

The overall dermatoglyphic assessment of the patients could be interpreted as an expression of caryotype abnormalities, similar to the chromosomal aberrations that are accompanied by certain dermatoglyphic changes [1, 20]. Data from literature shows a-b ridge count higher values in breast carcinoma women in comparison to the control group [11, 17]. The results of our study did not demonstrate statistically significant differences between the patients group and the controls in the a-b interdigital field. The differences in the values of palmar ridge count in breast carcinoma women could be attributed to dysontogenetic effects which interfere before the time of the formation of the papillary patterns in b-c interdigital field.

Each peristatic factor inducing oedema of the cells such as infectious or inflammatory process could be the basis of the increase of the palmar ridge count [6, 18]. Changes in the dermatoglyphic status of the breast carcinoma patients could possibly be an expression of the excessive effect of genetic and exogenous factors. Higher values of palmar ridge count could be taken as an indication of a disruption of the genetic control in the formation of papillary patterns in women with breast carcinoma or for some breaches in the homeostasis of their organisms.

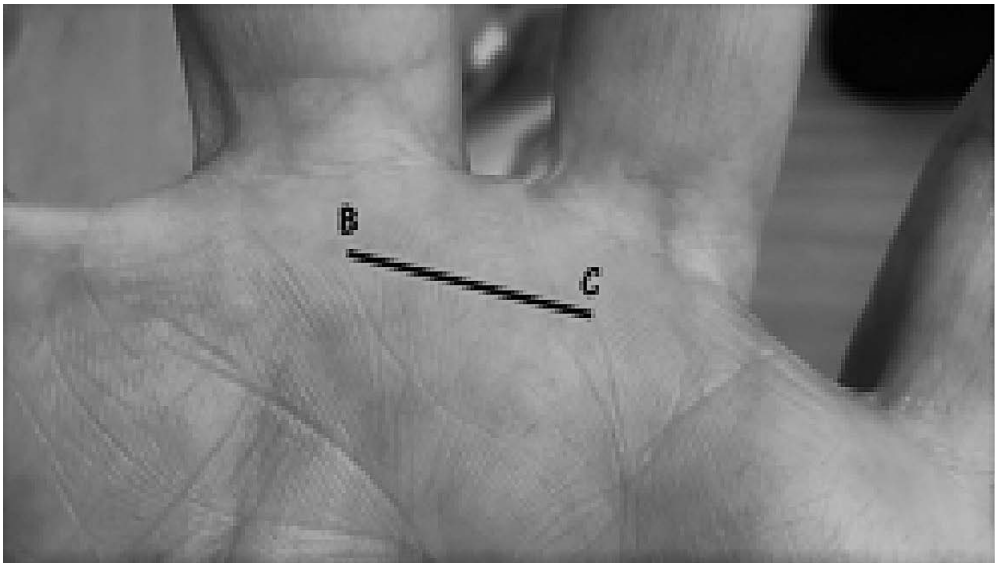

Fig. 5. b-c ridge count triradii

Conclusion

The use of dermatoglyphics is rather, unique approach at low cost for identifying predisposition for malignancy. This relatively noninvasive anatomical technique could reasonably be used for screening breast cancer on selected non-symptomatic women as part of definitive risk assessment strategy and for guiding future research. Palmar dermatoglyphics may have a future role in identifying women at increased risk with breast cancer.

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