https://doi.org/10.5272/jimab.2023293.5017
Journal of IMAB. 2023 Jul-Sep;29(3)

Journal of IMAB
ISSN: 1312-773X
https://www.journal-imab-bg.org

Original articles

QUANTITATIVE DERMATOGLYPHIC PATTERNS IN FEMALE BREAST CANCER PATIENTS

Tsonka Dimitrova, Galina Yaneva
Department of Biology, Faculty of Pharmacy, Medical University, Varna, Bulgaria.

ABSTRACT

Purpose: Recently, quantitative dermatoglyphic examinations have been intensively carried out for screening purposes in oncology.

Material/Methods: The present study covered 82 women aged between 36 and 80 years with clinically, histologically and mammographically confirmed breast cancer and 60 healthy women aged between 31 and 79 years from the region of Varna, Bulgaria. Two dermatoglyphic methods were applied: i) dactyloscopy of finger ridge count and finger indexes and ii) palmoscopy - palmar ridge count, palmar maximal atd, adt and dat angles, and palmar main lines. Statistical data processing was performed by means of variation analysis, regression analysis, χ^2 test and one-way ANOVA using the SPSS software package, version 19.

Results: The results from the dactyloscopic and palmoscopic examinations revealed several statistically significant differences in these quantitative dermatoglyphic patterns between breast cancer females and healthy ones.

Conclusion: We could conclude that the purposeful examinations of the quantitative dactyloscopic patterns such as total finger ridge count and finger indexes and quantitative palmoscopic traits such as palmar ridge count, maximal adt, atd and dat angles and main palmar lines play a promising role for the cost-effective and trustworthy breast cancer screening in Bulgaria.

Keywords: breast cancer, dactyloscopy, palmoscopy, quantitative dermatoglyphic parameters,

INTRODUCTION

Nowadays, breast cancer epidemiology is comprehensively studied by using modern methods designed for screening purposes. Quantitative dermatoglyphics is also used as a valuable, cost-effective, non-invasive diagnostic and prognostic tool in this socially significant field. The existence of genetic predisposition for breast cancer development is confirmed by the quantitative digital dermatoglyphic analysis in Bosna and Herzegovina [1, 2].

Our aim was to compare some quantitative dermatoglyphic parameters between breast cancer females and healthy controls with a view to their prognostic and screening value.

MATERIALS AND METHODS

Our study investigation was carried out during the period from January 1, 2014, to December 31, 2017. It covered 82 women aged 36-80 years with clinically, histologically and mammographically confirmed breast cancer and 60 healthy women aged 31-79 years of Bulgarian ethnical origin from the region of Varna, Bulgaria. Two basic dermatoglyphic methods were applied: 1) dactyloscopy of finger ridge count and finger indexes and 2) palmoscopy - palmar ridge count, palmar maximal atd, adt and dat angles, and palmar main lines A, B, C, and D [3]. The fingerprints were taken in a passive manner, and the rolling method for printing on high-quality paper was applied [4]. We started with the right hand fifth finger and finished with the left hand one. Variation analysis, regression analysis, χ^2 test and one-way ANOVA were applied for statistical data processing using the SPSS software package, version 19.

RESULTS.

Quantitative dactyloscopic findings

There were significant differences between breast cancer women and healthy ones concerning the finger ridge counts of the left hand index finger (p=0.043) and third finger (p=0.049) as well as of right-hand thumb (p=0.0001) and index finger (p=0.032). Total mean ridge counts of all the fingers of the right hand and both hands were statistically significantly greater in patients than in controls (p=0.027 and p=0.039, respectively). The results from the regression analysis proved a statistically significant correlation coefficient difference (r=0.362 versus r=0.329) in favour of breast cancer patients against healthy controls concerning the ridge count of the homologous third fingers only (p<0.05). The correlation coefficients of the ridge counts of the first finger, index finger and little homologous finger of both hands were smaller in breast cancer patients than in healthy females. The values of the correlation coefficients of the ridge counts of the third and fourth homologous fingers of both hands were higher in breast cancer females than in healthy ones, however, there was a statistically significant difference concerning the third fingers only (p<0.05).

The determination coefficient in terms of the ridge count of the homologous fourth finger was 13.86 times greater (0.291 versus 0.021), while that of the homologous thumb was 2.28 smaller (0.047 versus 0.107) in patients than in controls.

The values of the specific finger indexes, i.e. Dankmeijer index and Poll index of the left hand, right hand and both hands, were considerably smaller, while those of the P. I. I. Cummins index, Geipel index and Furuhata index of the left hand, right hand and both hands were considerably greater in breast cancer patients than in healthy females.

Quantitative palmoscopic findings

The results from the independent *t*-test demonstrated that mean values of left-hand palmar ridge counts b-c III (t=7.07; p=0.0001) and a-d (t=2.53; p=0.012) as well as of right-hand ones (p=0.0001 and p=0.0001, respectively) were significantly higher in patients than in controls. Left-hand palmar ridge counts a-b II (p=0.982) and c-d IV (p=0.801), as well as right-hand ones (p=0.487 and p=0.489, respectively), did not differ reliably between patients and controls. Mean values of palmar ridge counts of both hands b-c III (t=9.21; p=0,0001) and a-d (p=0.001) were statistically significantly greater in patients than in controls.

By using one-way ANOVA of the ridge counts of a-b, b-c and c-d, we proved the presence of a statistically significant difference between intergroup variation, on the one hand, and residual (not explained) variation, on the other hand, concerning the ridge count of b-c (F=77.134; p=0.0001) only. The mean values of the maximal atd, adt and dat angles of right-hand palms and left-hand ones were unreliably smaller in patients than in controls.

The frequencies of left-hand palmar mainline A (χ^2=14.96; p=0.0001), A 3(+4) (p<0.001) and A 5(5'+5"+6) (p<0.001) and of palmar mainline D (χ^2=32.86; p=0.0001), D 9(+10) (p<0.0001) and D 11(+12+13) (p<0.0001) were statistically reliably different between the patients and controls [5, 6]. There were statistically significantly different frequencies in terms of the palmar mainline A (χ^2=22.51; p=0.0001), A 3(+4) (p<0.001), A 5(5'+5"+6) (p<0.001), palmar mainline D (χ^2=15.65; p=0.0001), D 9(+10) (p<0.001), D 11(+12+13) (p<0.001), palmar mainline B (absence) (p<0.05) as well as of palmar mainline C (absence) (p<0.02) of the right hand between both groups [5].

DISCUSSION

In 30 breast cancer women, mean right-hand and left-hand ridge counts are 10.4 and 12.4, while in 30 controls, these counts are 18.4 and 19.6, respectively [7, 8]. In three equal groups of 50 women each, there are statistically reliable differences in terms of total and absolute finger ridge counts between breast cancer females and high-breast cancer risk ones, on the one hand, and healthy women, on the other hand (p<0.05) [9]. Mean finger ridge counts of the left hand and right hand are smaller in 60 women with pathohistologically proven breast cancer than in 60 age-matched healthy women (12.4±2.33 versus 18.4±4.58; p<0.05 and 12.4±1.62 versus 19.64±4.67; p<0.03, respectively) [10]. Finger ridge counts in each digit of both hands are greater (p<0.001) in 100 breast cancer women aged 30-60 years than in 100 age-matched controls in India [11]. There are statistically reliable differences concerning the total right-hand finger ridge count (60.97±14.09 versus 47.41±14.11; p=0.001) and the left-hand one (59.36±14.54 versus 47.48±14.01; p=0.001) between these patients and controls.

The mean total finger ridge count is smaller in 40 breast cancer women than in 40 healthy ones in India (89.88±13.26 versus119±10.4; p<0.001) [12]. The total finger ridge count is greater (p≤0,001) in 100 women with pathohistologically proven breast cancer women aged 30-50 years than in 100 age-matched controls in India [13], but it is smaller in 20 women aged 20-60 years with malignant breast diseases than in 25 age-matched controls in Nigeria (12.76±0.21 versus 15.51±0.68) (p<0.05) [14]. Mean values of the absolute finger ridge count are statistically reliably greater in 100 breast cancer females aged 30-60 years than in 100 age-matched controls in India (p<0.003), too [11]. The absolute finger ridge count in 100 breast cancer women at a mean age of 45.6±11.0 years differs statistically significantly from that in 100 healthy women at a mean age of 33.3±14.96 years (χ^2=12.22; p<0.002) [15]. The mean values of right-hand finger ridge count (11.42 versus 13.54; p≤0.045) and of left-hand one (11.58 versus 13.98; p≤0.043) are statistically significantly smaller in 30 breast cancer females than in 30 healthy ones in India [16]. The mean total finger ridge count is smaller in patients than in controls (115 versus 137.6; p≤0.040), too.

The mean right-hand a-b ridge counts are 36.79±7.51 in 100 breast cancer patients and 31.40±4.91 in 100 age-matched controls, while the mean left-hand a-b ridge counts are 35.18±5.94 and 29.74±5.53, respectively (p<0.001) [11]. There is a smaller mean right-hand a-b ridge count (30.83 versus 36.53; p≤0.0015) and left-hand one (32.70 versus 39.16; p≤0.0003) in 30 breast cancer females than in 30 healthy females [16] as well as right-hand and left-hand count (p≤0.001) in other 100 patients aged 30-50 years against other 100 age-matched controls in India [13]. The mean right-hand a-b ridge count (37.08±2.58 versus 33.63±1.97; p<0.001) and the mean left-hand one (37.05±2.93 versus 34.45±2.98; p<0.001) are greater in 40 breast cancer women than in 40 healthy ones in India [12]. In 150 Indian women divided into three equal groups of 50 women each, there are statistically significant differences concerning the a-b ridge count between breast cancer women and high-

breast cancer risk ones, on the one hand, and healthy women, on the other hand (p<0.05) [9]. There is a higher mean intensity index of the finger papillary traits in 60 breast cancer females than in 60 age-matched healthy women (12.91 versus 11.33; *t*=2.10; p<0.03) [10] as well as of PII Cummins finger index in 30 patients than in 30 age-matched controls (13.73±4.9 versus 11.26±4.45; p≤0.0046) [16].

The examination of the palmar dermatoglyphic traits of three equal groups of 50 women each indicates statistically significant differences in terms of atd angle between breast cancer females and high-breast cancer risk ones, on the one hand, and healthy women, on the other hand (p<0.05) [9]. There is a higher incidence of an increased atd angle and b-c ridge count in breast cancer patients in Bosna and Herzegovina [17].

The mean value of the right-hand atd angle is smaller (38.78º±2.08º versus 42.44º±2.18º; p<0.05) while that of dat angle is greater (62.90º±2.85º versus 58.20º±2.60º; p<0.05) in 20 women aged 20-60 years with malignant breast diseases than in 25 healthy women in Nigeria [14]. The significant quantitative palmoscopic differences between 50 breast cancer females and 50 healthy ones aged 25-60 years in India present with greater atd angle values of the left hand (p<0.05) and of both hands (p<0.05) as well [18]. The mean atd angle values of the left and the right hand are smaller (41.5º versus 44.43º; p≤ 0.021 and 41.6º versus 44.56º; p≤ 0.036, respectively) among 30 breast cancer females than among 30 healthy women in India [16].

Mean atd angle values in 70 randomly selected breast cancer women and 70 healthy women aged 18-66 years in India are 48º and 39º, respectively [19]. The mean right-hand atd-angle value (42.65±4.14 versus 37.18±2.58; p<0.001) and left-hand one (42.93±3.93 versus 38.15±2.68; p<0.001) are greater in 40 breast cancer women than in 40 healthy ones in India [12]. There are statistically reliably smaller left-hand and right-hand atd angle values in 100 females with pathohistologically confirmed breast cancer aged 30-50 years (p≤ 0.005) than in 100 age-matched healthy females in India [13]. There are reliable differences in terms of the right-hand adt angle (77.75±4.75 versus 79.30±5.43; p=0.028) and left-hand one (77.61±3.89 versus 79.41±4.72; p=0.004) as well as concerning the dat angle (58.34±4.99 versus 56.14±4.97; p=0.002) between 100 breast cancer females aged 30-60 years and 100 age-matched controls in India [11]. The patterns of the atd angle demonstrate a significant difference between the left and right palms of breast cancer patients in Bosna and Herzegovina, and this palmar parameter identifies women with increased breast cancer risk [20].

CONCLUSION

Based on our own results and convincing literature data available, we could draw the conclusion that the purposeful examinations of the quantitative dactyloscopic patterns such as total finger ridge count and finger indexes and quantitative palmoscopic traits such as palmar ridge count, maximal adt, atd and dat angles and main palmar lines play a promising role for the cost-effective and trustworthy breast cancer screening in Bulgaria.

REFERENCES:

1. Musanovic J, Metovic A, Pepic E, Kapic D, Cosovic E, Rebic D, et al. Predictive values of quantitative analysis of finger and palmar dermatoglyphics in patients with breast cancer for Bosnian-Herzegovinian population. *J Evol Med Dent Sci*. 2018 Jun;7(24):2855-2860. [Crossref]

2. Yaneva G. Breast cancer epidemiology in Northeast Bulgaria. *Sci Works Union Sci Bulg Plovdiv*. 2019; 22:394-397.

3. Cummins H, Midlo C. Finger prints palms and soles. An introduction in dermatoglyphics. Blakinston, Philadelphia, New York, 1943, Reprinted Dower, 1961. 319 pp.

4. Purvis-Smith SG. Finger and palm printing techniques for the clinician. *Med J Aust*. 1969 Jul 26; 2(4):189-191. [PubMed]

5. Yaneva G, Ingilizova G. Main line patterns of palmar dermatoglyphics in female breast cancer patients. *MOJ Anat Physiol*. 2018 Nov 16; 5(6):345-347.

6. Yaneva G, Petrova N, Ivanov D. Finger papillary traits in Bulgarian female breast cancer patients. *J of IMAB*. 2020 Jan-Mar;26(1):2998-3004. [Crossref]

7. Chintamani AD, Khandelwal R, Mittal A, Saijanani S, Tuteja A. Quantitative dermatoglyphic traits in patients with breast cancer - A preliminary report of an ongoing study. *J Int Med Sci Acad*. 2006;19(1):69-70.

8. Yaneva G, Dimitrova Ts, Cherneva D, Ivanova N, Maslarski I, Sivkov S, et al. Comparative dermatoglyphic study of the palmar ridge count in breast carcinoma patients from Northeast Bulgaria. *Acta Morphol Anthropol*. 2018; 25(1-2): 86-92. [Internet]

9. Lavanya J, Vijayakumar J, Prathap S, Alagesan J. Digital and palmar dermal ridge patterns in population with breast carcinoma. *Biomedicine* (*India*). 2014;34(3):315-321.

10. Chintamani, Khandelwal R, Mittal A, Saijanani S, Tuteja A, Bansal A, et al. Qualitative and quantitative dermatoglyphic traits in patients with breast cancer: a prospective clinical study. *BMC Cancer*. 2007 March 13;7:44. doi: 10.1186/1471-2407-7-44. [PubMed]

11. Sridevi NS, Delphine Silvia CR, Kulkarni R, Seshagiri C. Palmar dermatoglyphics in carcinoma breast of Indian women. *Rom J Morphol Embryol*. 2010; 51(3):547-50.

[PubMed]

12. Gul S, Jabeen N. Gupta S, Raina S. Palmar dermatoglyphic and breast cancer: A possible correlation. *Int J Med Hlth Res*. 2018;4(2):53-55. [Internet]

13. Madhavi D, Dorairaj S, Dorairaj SSJ, Kommuru H. Dermatoglyphic study in breast carcinoma patients. *Int J Sci Res*. 2016; 5(10):837-840. [Internet]

14. Oladipo GS, Paul CW, Bob-Manuel I F, Iboroma AD, Fawehinmi HB. Study of digital and palmar dermatoglyphic patterns of Nigerian women with malignant mammary neoplasm. *J Appl Biosci*. 2009;15:829-834.

15. Raizada A, Johri V, Ramnath T, Chowdhary D, Garg R. A cross-sectional study on the palmar dermatoglyphics in relation to carcinoma breast patients. *J Clin Diagn Res*. 2013 Apr;7(4):609-612. [PubMed]

16. Lavanya J, Saraswathi P, Vijayakumar J, Prathap S. Analysis of dermatoglyphic traits in patients with breast cancer. *J Pharm Biomed Sci*. 2012; 23(24):1-5. [Internet]

17. Musanovic J, Metovic A, Husremovic F, Bejic S, Haskovic A, Babic A, et al. Digital dermatoglyphics in the evaluation of the genetic basis of breast cancer in Bosnian-Herzegovinian population - quantitative analysis. *Med Glas* (*Zenica*). 2020 Feb 1;17(1):1-6. [PubMed]

18. Sukre SB, Laeeque M, Mahajan A, Shewale SN. Dermatoglyphics in the identification of women either with or at risk of breast cancer. *Int J Basic Med Sci*. 2012; 3(5):160-165.

19. Yaneva G, Dimitrova Ts, Cherneva D, Ivanova N, Fialkovska N, Vachkov I, et al. Quantitative dermatoglyphic study of the finger ridge count in breast carcinoma patients from Northeast Bulgaria. *Scr Sci Salut Publ*. 2018;4:51-55. [Crossref]

20. Metovic A, Musanovic J, Alicelebic S, Pepic E, Sljuka S, Mulic M. Predictive analysis of palmar dermatoglyphics in patients with breast cancer for small Bosnian-Herzegovinian population. *Med Arch*. 2018 Nov;72(5):357-361. [PubMed]

Please cite this article as: Dimitrova T, Yaneva G. Quantitative dermatoglyphic patterns in female breast cancer patients. *J of IMAB*. 2023 Jul-Sep;29(3):5017-5020. [Crossref - https://doi.org/10.5272/jimab.2023293.5017]

Received: 31/01/2023; Published online: 06/07/2023

Address for correspondence:
Tsonka Dimitrova, BS, PhD
Department of Biology, Faculty of Pharmacy, Medical University of Varna
84 Tsar Osvoboditel Blvd., Varna-9002, Bulgaria
E-mail: tsonka72@abv.bg