atd Angle & Gastric Cancer

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Abstract

Among several dermatoglyphic traits, the atd angle has often been used as a prognostic tool for genetic and non-communicable diseases. Gastric cancer is the fourth leading lethal disease in India with a male-to-female ratio of 2:1. This study is an attempt to understand the potential of the atd angle as a dermatoglyphic biomarker for the prognosis of gastric cancer. This study includes 50 histopathologically diagnosed gastric cancer patients and 50 clinically healthy controls from Bengali-speaking communities in Kolkata, West Bengal. The present study showed that the studied participants with gastric cancer have a significantly lower atd value than the controls. Based on the results, it can be assumed that a lower value of the atd angle has the potential to predict early-stage gastric cancer as a biomarker.

Keywords: Dermatoglyphics; atd Angle; Gastric Cancer

Introduction

Presently India owns the title of the Cancer Capital of the world [1]. With 736,000 fatalities from cancer, gastric cancer ranks as the fourth most common cause of cancer-related deaths worldwide (9.7% of all cancer-related deaths) [2]. Compared to Western countries, India has an extremely low incidence rate of gastric cancer; the country now has about 34,000 new cases of gastric cancer, with a 2:1 male-to-female ratio. Gastric carcinoma was found to be the second most common cause of cancer-related fatalities among men and women in India, according to a recent nationally representative survey of cancer mortality [3]. In 2020, there were 1.1 million new instances of stomach cancer worldwide, with men more likely than women to have the disease in several nations, mostly in the East [4]. To improve prevention, gastric cancer- the fourth most common cause of death worldwide- needs immediate attention [5]. The presence of hereditary susceptibility to the development of stomach cancer is asserted by digitopalmar dermatoglyphic features [6]. Around seven months into the fetus's development, the finger and stomach patterns are fully established, having evolved during six to thirteen weeks of embryogenesis [7]. Since many genes contribute to the formation of dermatoglyphic characters, the basic premise is that genes that predispose to familial disease may also influence the ridge patterns through pleiotropy, meaning that specific constellations of dermatoglyphic features may be indicative of a specific disease [8]. In the prognosis of cancer, the dermatoglyphic traits are a notified biomarker [9]. The scientific method to study the volar ridges on the

finger, palm, and sole [10] is known as Dermatoglyphics. Among several dermatoglyphic traits, the atd angle is widely studied [11] and found to be associated with several genetics [12] as well as lifestyle-related disorders [13]. The present study aims to reveal the relation between atd angle and gastric cancer among the Bengali-speaking community of the state of West Bengal, India.

Material and Methods

The present study was conducted on 50 patients with histopathologically confirmed gastric cancer (Male -17;Age- 54.05±9.41, Female -33; Age- 53.15±11.02) from various health clinics in greater Kolkata and 50 controls (Male -26; Age-38.06±8.62, Female -24; Age-36.72±7.76) from the same Bengalee linguistic population of West Bengal. The purposive random sampling is used for participant selection. The bilateral palm prints were taken followed by the standard ink and roller method [10]. All the collected prints were analysed and classified according to standard classification [11]. The atd angle formed by lines drawn from the digital triradius to the axial triradius tends from that t to the digital triradius a, and d. After joining both distal triradius separately from the single source of the proximal palmar triradius t, the angle formed in between the two lines- a-t and t-d was measured. SPSS version 21.0 is used for the statistical analysis, where the cutoff was set at 95% probability limits.
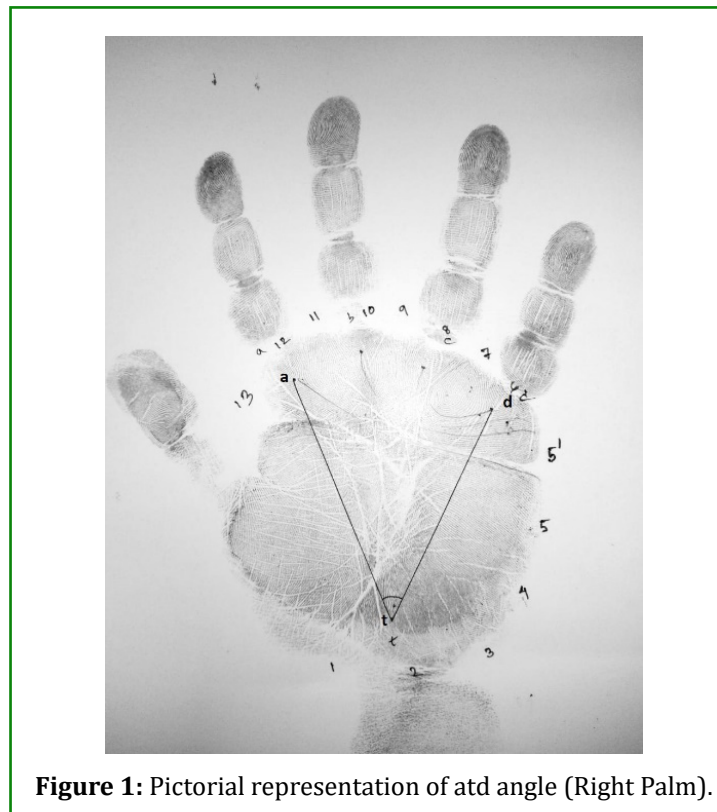

Figure 1: Pictorial representation of atd angle (Right Palm).

Results

The Person's t-test and F ratio are used for data analysis. According to the t-test, the cancer-affected females (40.00±3.31) and males (38.00±4.32) in the left palm had significantly (p<0.05) lower counts of atd angle compared to the healthy controls. In the right palms, the cancer-affected females (39.00±2.35) and males (39.00±3.38) also revealed a significant (p<0.05) lower value of atd angle than that of the controls. In comparison to the controls, the cancer-affected participants had a significantly (p<0.05) reduced bimanual distribution of the atd angle observed in the left (39.18±3.71) and right (39.00±2.69) hands according to this study. Nonetheless, the F ratio (5.144) in the right hands demonstrated a significant (p<0.05) difference in the atd angle between females afflicted by cancer and control females. A significant (p<0.05) difference in the F ratio (2.286) was also seen in the right-hand atd angle between the male cancer patients and the control group. Based on the F ratio, the atd angle revealed significant (p<0.05) differences between the cancer-affected subjects and healthy controls on the right hand (3.809). This indicates a substantial (p<0.05) relation between Gastric cancer and the lower count of the atd angle of the right palm among the Bengali-speaking linguistic group.

Bimanual Distribution of atd angle							
Group	n	atd angle	x̄±SD	p	F ratio	df	p
Cancer affected females	33	Left Hand	40.00±3.31*	0.0001	1.189	55	0.3200
Female Controls	24	Left Hand	44.00±3.61				
Cancer affected Female	33	Right Hand	39.00±2.35*	0.0000	5.144*	55	0.0000
Female Controls	24	Right Hand	45.00±5.33				
Cancer affected Males	17	Left Hand	38.00±4.32*	0.0000	1.071	41	0.4542
Male Controls	26	Left Hand	43.00±4.47				
Cancer affected Males	17	Right Hand	39.00±3.38*	0.0000	2.286*	41	0.0449
Male Controls	26	Right Hand	43.00±5.11				
Cancer affected subjects	50	Left Hand	39.18±3.71*	0.0000	1.215	48	0.2487
Controls	50	Left Hand	43.74±4.09				
Cancer affected subjects	50	Right Hand	39.00±2.69*	0.0000	3.809*	48	0.0000
Controls	50	Right Hand	44.24±5.25				

Table 1: The bimanual distribution of atd angle among the gastric cancer-affected subjects and healthy controls. (*$p<0.05$).

Discussion

Dermatoglyphic traits are unalterable and followed by polygenic inheritance [12]. Due to having less environmental dependency dermatoglyphics is studied as the prognostic trait of several genetic alterations [14]. Among several traits, the atd angle is frequently used as the most prominent quantitative dermatoglyphic trait [13]. The potentiality of the higher value of atd angle as a prognostic trait for trisomy 21 was first reported three decades earlier to the discovery of the chromosomal mutation of Trisomy 21 [10]. The higher value of the atd angle is already associated with E-β thalassemia [14], Type 2 Diabetes Mellitus [8], and Autism [12] within the Bengali-speaking linguistic groups. Global data reported that the lower value of atd angle has an association with breast cancer [15,16], oral cancer [17], prostate cancer [18], and mammary neoplasms [19]. Previous documentation has reported that the significant ($p<0.05$) lower value of the atd angle was found in the right palm of Gastric cancer-affected persons in comparison to the phenotypically healthy controls [20]. That same study also reported that the left palms of Gastric cancer-affected persons have a significantly ($p<0.05$) higher value of the atd angle than the controls [20]. The present attempt revealed that Gastric cancer-affected males have significant ($p<0.05$) lower atd values in both hands than the control males. However, the Gastric cancer-affected females also have significant ($p<0.05$) lower atd values in both hands than the control females. The atd angle is the proxy measure of the dispersion of the palmar axial triradii (t) [12]. A person's dermatoglyphic characteristics are formed at their interuterine life and do not alter over the course of their lifetime. It is utilized as a biomarker because the environmental effect on it is minimal. Clinical research has ideally examined the atd angle worldwide, demonstrating its possible correlation with several diseases [11]. Through the measure of atd angle, it can be possible to early prediction of Gastric cancer. Therefore, the present study suggested that the significantly ($p<0.05$) lower value of the atd angle has a relation with Gastric cancer among both sexes and can be useful as a potential biomarker for the early prognosis of Gastric cancer.

Ethical Clearance

The University of Calcutta granted ethical permission (No. CU/BIOETHICS/HUMAN/2304/2022). Written and verbal consent was obtained from the studied participants as and when applicable.

Acknowledgment

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