# **Topographic Palmar Crease Analysis at Different Levels** of Academic Performances in College Students

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**Abstract:** Palmar Flexion Creases as part of field of Dermatoglyphics is used for noninvasive investigations of innate abilities and congenital abnormalities. The topographic analysis approach makes Dermatoglyphics a quantitative study rather than merely qualitative descriptions of the palm crease patterns. This study was conducted to assess the topographic variations of the major Palmar Flexion Creases (PFC) at the different levels of Academic Performances of Students in Ogun State College of Health Technology, Ilese Ijebu, Nigeria. The study adopted a descriptive approach where a total of Two Hundred and forty-six (246) students were recruited for the study. Right and left non-inky palmar prints were obtained and the Total degree of Transversality (T-DoT) of major Palmar Creases were determined. Appropriate statistical tests were applied to determine the tests of levels significance for T-DoT at different levels of the students' academic evaluation.

The mean T-Dot of students' left hand was  $1.61 \pm 0.57$ , while the right hand was  $1.66 \pm 0.57$ . In both male and female students, no significant difference was observed between the left and right hand (P = 0.33 (male); p = 037 (female)). No significant statistical association was reported between the Cumulative Grade Point Average (CGPA) of the students and the T. DoT of the left hand (0.785) and right hand (0.834). In conclusion, the study demonstrated the application of topographical Palmar Epidermal configurations at different levels of Academic Performances.

**Keywords:** Academic Performance, Cumulative Grade Point Average, Dermatoglyphics, Students, T-DoT.

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# Introduction

Dermatoglyphs are the ridge constellations seen on the hand palms and foot soles. Dermatoglyphs are formed from the 10th week of pregnancy and by 24th week they remain fully formed. Hence, they had been considered as fossils of a specific period of prenatal life (Okajima, 1975). Over the decades, various Dermatoglyphic variables have been analysed qualitatively and quantitatively in diagnosis of a wide range of chromosomal and genetic

disorders (Cummins and Midlow, 1943; Cotterman, 1951; Okajima, 1975; Misumi and Akiyoshi, 1984). These dermatoglyphic indices include; Finger- and Palmar- Ridge Counts, Palmar Atd-Angle, Ridge Patterns on the Fingertips, and Palmar Flexion Crease Patterns (PFCs) (Adenowo and Dare, 2016).

As the variability and possible clinical significance of palm crease abnormalities receive greater attention, Dar and Schmidt (1976) employed a new method of topographic approach for quantitative analysis of palmar creases. He measured the Degree of Tranversality (DoT) of all three major creases (Radial Longitudinal Crease, Proximal Transverse Crease and Distal Transverse Crease) and derived the Total Degree of Tranversality (T-DoT). T-DoT is considered as one of the useful parameters for evaluating palmar crease patterns in patients with congenital, genetic disorders, and autoimmune disorders like rheumatoid arthritis (Hwang *et al.*, 2005; Uma *et al.*, 2013).

The academic performance of a student is also a product of the student's cognitive (learning) ability (Rohde and Thompson, 2007). Cognitive abilities such as memory, speech and auditory capabilities are functions of the Cerebral cortex of the Brain. The academic performance also indicates the level of reasoning and understanding of the individual; therefore, qualitative and quantitative assessments of the academic performance of students would directly reflect on the students' intellectual Brain function. (Etsey, 2005; Aguilar and Tansini, 2010; Ghazvini and Khajehpour, 2011; Mlambo, 2012).

The ample scientific evidences that suggest the close relationship of the palm prints with Brain functions (Hirsch and Schweighel, 1973) necessitated the approach of this study in assessing the Palmar Dermatoglyphic classifications as bio-indictors for the determining the academic performances of Students of the College of Health Technology, Ilese-Ijebu, Ogun State, Nigeria.

#### Methods

The study was conducted among the Students of Ogun State College of Health Technology, Ilese-Ijebu, Ogun State, Nigeria. The study employed a descriptive-cross sectional design to establish the relationship between the Students' Palmar Dermatoglyphic profiles, and Academic Performances. Ethical approval from the College's management was obtained following the World Health Organisation's Ethical Guidelines on Demographic studies. Individual consents were also obtained from the Subjects after the significance of the study was well explained to them. A total of Two Hundred and Forty-six (246) Students were selected using Inclusive and Exclusive Techniques.

**Inclusive Criteria:** All students who gave their consents willingly and were with no Gross Anatomical deformities or family history of such deformities.

**Exclusive Criteria**: Subjects who refused to give their consents or those observed with Gross Anatomical defects and those with the family history of structural deformities were excluded from the study.

#### **Procedures for Palmar Epidermal Print Configurations**

Palm prints were taken using a non-inky method (HP Deskjet 2100 Scanner and Digital Camera (Nikon Corp. Japan)). The respondents were asked to place their slightly flexed hands on the scanner. While holding the hand still, the Palmar Epidermal Prints were scanned successfully. The scanned images were converted to Portal Document Format (PDF). If

images turned out blurred, the images were rescanned using the aforementioned method. Both right and left palmar print configuration of the respondents were analysed.

#### **Determination of the Total Degree of Transversality**

A grid was drawn on Palmar prints obtained from the respondents in the manner that the zero point (0, 0) of the grid was drawn on the distal and radial end of the Palm, and the X-axis endpoint (100, 0) of the grid was drawn on the distal and ulnar end of the palm (A).

The values of X and Y coordinates of Radial Longitudinal Palmar Flexion crease (I), Proximal Transverse Palmar Flexion crease (II), Distal Transverse Palmar Flexion crease (III), and Total Degree of Transversality (T-DoT) were determined (Figure 1) (Park, 2010).

$$T - DoT = \frac{(The sum of X - axis distances of I, II, III)}{(the sum of Y - axis distances of I, II, III)}$$



Figure 1. A grid drawn on the palm in the manner that the zero point (0, 0) of the grid was drawn on the distal and radial end of the palm, and the X-axis end point (100, 0) of the grid was drawn on the distal and ulnar end of the palm (Park *et al.*, 2010).

#### **Determination of the Levels of Academic Performances**

The different levels of Student's Academic Performances were assessed by reviewing the following Academic details of the students from the Institution's database: The Cumulative Grade Point Average scores were also graded as follow: Distinction (3.50-4.00); Upper Credit (3.00-3.49); Lower Credit (2.50-2.99); Pass (2.00-2.49) and Probation (< 2.00).

#### **Data Analyses**

Data were analysed using Statistical Packages for Social Sciences (SPSS) for Windows version 21 (IBM Corporation WY, USA). All data recorded were collated in this study and subjected to both descriptive and inferential statistics using Analysis of Variance (ANOVA) and the Pearson's correlation (r) between the Palmer Dermatoglyphic Profiles and Academic Standing of the students were also subjected to statistical co-efficient. The levels of significant were pegged at P < 0.05.

#### Results

The mean T- DoT of the male students (27.2%) was  $1.55 \pm 0.70$  (Left hand) and  $1.66 \pm 0.71$  (Right hand). While, the mean T- DoT of the female students (72.8%) was  $1.63 \pm 0.52$  (Left hand) and  $1.70 \pm 0.55$  (Right hand) (Table I). No significant difference was observed in T– DoT value of the right and left hands of the students (P = 0.13).

Gender	Frequency (%)	T. DoT – Left	T. DoT –	
		hand	<b>Right hand</b>	
Male	67 (27.2)	$1.55\pm0.70$	$1.66\pm0.71$	p = 0.33
Female	179 (72.8)	$1.63\pm0.52$	$1.70\pm0.55$	p = 0.37
Total	246 (100)	$1.61 \pm 0.57$	$1.69 \pm 0.60$	P = 0.13

## Table 1. Mean ± SD T- DoT of Right Hand and Left Hand

Table 2 showed that the mean T-DOT  $(1.49 \pm 0.40)$  was the least while the highest mean T – DoT  $(1.84 \pm 0.74)$  and was observed on the Left Hand and Right Hands of students with the Distinction grade. However, there was no significant difference in T – DoT value of the right and left hands of these students (P = 0.44). No significant difference in mean T – DoT value was equally in relation to the Left Hand (P = 0.785) and Right Hand (P = 0.834).

	Table 2. Mean ±	SD T- DoT	of Right Hand	and Left Hand at	different levels of CGPA
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CGPA grade	Frequency	T - DoT -	T - DoT -	
	(%)	Left Hand	<b>Right Hand</b>	
Probation	46 (18.7)	$1.62\pm0.50$	$1.63\pm0.54$	p = 0.93
Pass	70 (28.5)	$1.54\pm0.60$	$1.66\pm0.64$	p = 0.25
Lower Credit	78 (31.7)	$1.65\pm0.69$	$1.66 \pm 0.71$	p = 0.93
Upper Credit	48 (19.5)	$1.61\pm0.50$	$1.76 \pm 1.49$	p = 0.20
Distinction	4 (1.6)	$1.49\pm0.40$	$1.84\pm0.74$	p = 0.44
Total	246 (100)	p = 0.785	p = 0.834	

#### **Discussion of Findings**

Palmar Flexion Creases are used in diagnosis of wide range of genetic chromosomal diseases. From this study, the mean value of T–DoT observes in this study was  $1.61 \pm 0.57$  (Left Hand) and  $1.68 \pm 0.60$  (Right hand). This is a pointer to the use of T–DoT in determining population distribution. A mean T–DoT value of  $2.0\pm0.38$  was observed by Dar and Schmidt (1976) among American population. Park (2010) analysed Right and Left palms of 3216 volunteers in Korean population and observed the mean T–DoT value of  $2.21 \pm 0.40$ . In another study between Koreans a T–DoT of  $2.2 \pm 0.02$  was observed (Hwang *et al.*, 2005). From this study, the mean value of T–DoT was higher on the Right Hand ( $1.61 \pm 0.57$ ) compared to the Left Hand ( $1.69 \pm 0.60$ ).

This is in line with the study of Uma *et al.*, (2013) who equally observed a T–DoT mean value of Right Hand  $(1.21 \pm 0.19)$  higher in comparism to the Left Hand  $(1.14 \pm 0.20)$ . In contrast, Park *et al.*, (2010) observed a higher proportion in T–DoT values on the Left Hand (2.23 ± 0.41) in comparism to Right Hand (2.18 ± 0.39). This was linked to the handiness by Uma *et al.*, (2013). Majority of the observed students in this study were mostly right handed.

Generalized ridge directions on the palm, either transverse or longitudinal is known to have clinical significance (Cummins and Midlo, 1961). In this study, no significant difference was found at the different levels of Academic Performances. Although the least difference was observed in the Left Hand of students with the Distinction grade (1.60%); it can be not be statistically proved with the sample size under study.

Earlier studies by Hwang *et al.*, (2005) observed a lower T–Dot compared to the normal individuals while Dar and Schmidt (1976) observed a higher value of T–Dot in patients with Down syndrome. Both studies were carried out using a case-control study, where the cases (observations) were carefully selected. This is in contrast to a cross sectional survey of the kind this study adopted.

### Conclusion

As the variability and possible clinical significance of the palmar creases in discovering anthropological characteristics and innate abilities increases, an accurate and objective method for evaluating the palmar creases variations is required. This study demonstrated the use of a topographic approach to evaluate the different levels of Academic performances among College students. This study provides a baseline record in the use of the topographic approach to determine the innate abilities of the palmar creases. It also shows the limitations of a cross-sectional design in the study of this nature. It therefore recommends a larger case control study involving all the different levels of academic performances.

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