



Original Research Article

## Comparison of Total Degree of Transversality of Palmar Creases between Students & Labourers Using Novel Method of Digital Photography

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### ABSTRACT

**Objectives:** To estimate the Total degree of transversality (T-DoT) of major palmar creases between students and manual labourers using digital photography.

**Materials and Methods:** Fifty healthy adult volunteers, postgraduate students and constructional labourers were studied. T-DoT was measured by drawing coordinators using digital photographic methods and ADOBE Photoshop. Appropriate statistical tests were applied to determine the tests of significance between the two groups for T-DoT.

**Results:** The mean value T –DoT of students right hand was  $1.21 \pm 0.19$ , left hand was  $1.14 \pm 0.2$ . The mean value of T-DoT of labourer's right hand was  $1.33 \pm 0.34$ , left hand was  $1.30 \pm 0.31$ . No significant difference was found between the right and left hands of the groups (Students ( $p=0.09$ ), labourers' ( $p=0.724$ )). On comparing the T-DoT between the right and left hands of the two groups, statistically significant difference ( $p=0.046$ ) was found between the left hands of the two groups.

**Conclusion:** There was a significant difference in T-DOT in left hand between the two groups. This can be attributed to the equal usage of both hands by labourers which were not the case with the students. So before correlating palmar creases for various diseases with the T-DOT, occupation and hand grip needs to be considered by the clinicians.

**Keywords:** T-DoT, Palmar creases, Hand Grip

### INTRODUCTION

Palmar creases are used in discovering anthropological characteristics and in diagnosis of wide range of genetic and chromosomal diseases. <sup>[1]</sup> These palmar creases have been divided into major and minor types. <sup>[2]</sup> Major types are radial longitudinal crease, proximal transverse crease and distal transverse crease. Dar and Schmidt, <sup>[1]</sup> employed a new method of topographic approach for quantitative

analysis of palmar creases. He measured the Degree of Transversality (DoT) of all three major creases and finally derived the Total Degree of Transversality (T-DoT). T-DoT is considered as one of the useful parameter for evaluating palmar crease patterns in patients with congenital, genetic disorders, and autoimmune disorders like rheumatoid arthritis

Various authors have studied the variation in palmar creases in normal

individuals. [3] The authors have attributed variability of palmar creases to age, gender, hand length, breadth and presence of diseases. Significant differences in palm length and breadth in three groups of sports people has been reported by Barut. [4] The estimated difference has been attributed to the hand grip. To the best of our knowledge there is no reported literature for handgrip influencing the palmar creases; however handgrip and hand length and breadth have been correlated [4] which are by themselves factors for variability of palmar creases. [3,6]

Considering these facts we hypothesize that there is a difference in measurement of palmar creases between students and manual labourers. The present study was planned to estimate the difference in quantitative analysis of palmar creases between students and manual labourers. Quantitative analysis of creases has been done using a novel digital photometric method instead of the routine stamp pad ink roller method. As the study is based on the newer digital photographic evaluation, present study was carried out as a pilot study.

Considering the clinical implications of T-DoT, the objectives of the study were

- a. To estimate the T-DoT in manual labourers and students
- b. To estimate the difference in T-DoT of Rt and Lt hands within each group

- c. To estimate the difference in T-DoT measurements of Rt and Lt hands between the two groups.

## MATERIALS AND METHODOLOGY

After obtaining Institutional Ethical committee approval and informed consent from volunteers, cross sectional analytical study was conducted on 25 male post graduate students of St.John's medical college and 25 male construction workers of St.John's National Academy of Health sciences, aged 20-30 years. The selected subjects were free of surgical intervention & apparent deformities of the hand. All the subjects enrolled were asked to clearly wash the hand with soap and water before the measurement. Then the photographic method was standardized to take images. (Fig.1). A digital caliper was used to measure the palm length and palm width with the hand placed on the table with finger together and thumb out to the side. The breadth of hand was measured at the level of knuckles (Samira, Hossain,et al method), hand kept at a distance of 25cm from the camera, both right and left hand images were captured. Digital canon camera was used for taking photographs. Using ADOBE photoshop a grid of coordination (Fig 2) was drawn on photos of palm, instead of palmar prints as done by Hanna Dar and R.Schmidt. [1]

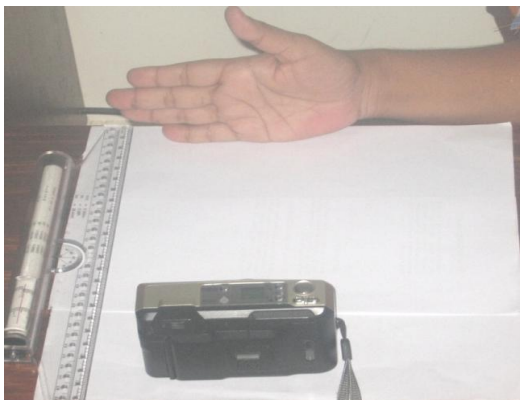


Figure1: Procedure of taking photo.

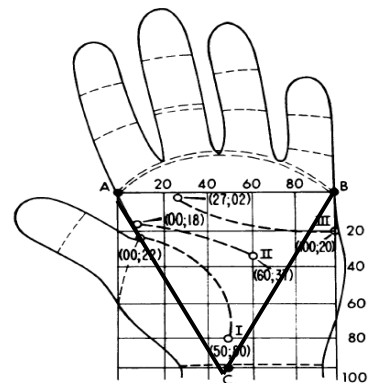


Figure 2: Palm with grid of coordination

1. The initial points A, B and C were marked. Point A and B represent the post axial termination of proximal creases of 2<sup>nd</sup> & 5<sup>th</sup> finger respectively and location of point C is the vertex of an isosceles triangle.
2. The A-B line was divided into 5 equal portions, each representing 20 arbitrary units used as the horizontal co-ordinates, starting as 0 on the radial side to 100 on the ulnar side of the palm.
3. Squares were drawn based on these segments and extended proximally along the palm bordered by point C. The longitudinal co-ordinates are also numbered consecutively, starting from 0 at line AB.
4. Using the above co-ordinates, the starting and terminating points of the main palm creases were marked from ulnar side of the palm and finally the Total Degree of Transversality (T-DOT) was measured. (Fig 3)

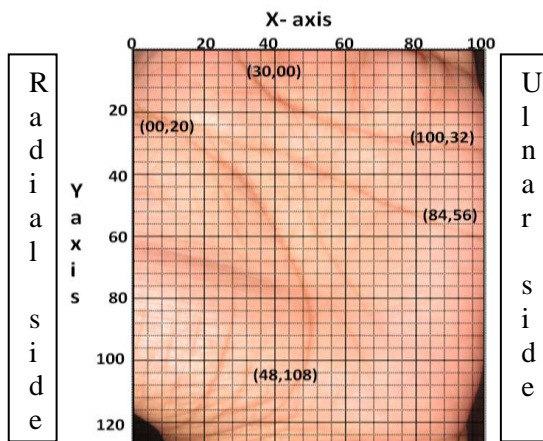


Figure 3: Grids drawn with ADOBE photoshop

T-DOT = Total transverse distance of crease / Total longitudinal distance . [1]

I-Transverse distance (T.d) =48-00

Longitudinal distance (L.d) =108-20

II-T.d=84-00

I.d=56-20

III-T.d=100-30

I.d= 32-00

$$T-DoT = \frac{(48+84+100)-(0+0+30)}{(108+56+32)-(20+20+0)}$$

$$= \frac{232-30}{196-40}$$

$$= 202/156$$

T-DoT =1.2

All measurements were measured by a single investigator.

**Statistical analysis:** SPSS version 16 for windows software was used for analysis of the parameters. Mean and Standard deviation was calculated for numerical variables. Paired sample t-test done to compare T-DoT of right and left side within same group. Independent sample t-test was applied to compare right and left side between the groups. Statistical significance was set  $p < 0.05$ .

## RESULTS

The mean of T -DOT of students' right hand was  $1.21 \pm 0.19$ , left hand was  $1.14 \pm 0.2$ . The mean value of T-DOT of labourers' right hand was  $1.33 \pm 0.34$ , left hand was  $1.30 \pm 0.31$ . Neither in students nor in labourer's, significant difference was found between the T-DoT of right and left hands (students ( $p=0.09$ ), labourers' ( $p=0.724$ )). A significant difference in T-DoT for only the left hand between labourers and students was found ( $p=0.046$ ). (Table 1)

**Table: I. Difference in T-DoT between the two groups by Independent sample t test.**

Total (n =50)	Right palm (n=25)		Left palm (n=25)	
	student	labourer	student	labourer
p value	0.13		0.046*	

\*'p' <0.05

## DISCUSSION

To the best of our knowledge this is the first study which has been used to measure T-DOT using digital photography with ADOBE photoshop. The newer digital photographic method has demonstrated that this method can be utilized easily and effectively with accuracy for analysis of palmar creases, thus replacing the traditional cumbersome ink method. Advantages of this newer photographic method over traditional method being more accurate, less time consuming, good reproducibility and the images can be stored in digital media and retrieved when need.

Hanna dart and R. Schmidt, [1] studied the T-DoT in Down's patient and normal individual in American population. They noted significant difference in T-DoT between the groups i.e., in Down's patients it was  $3.7\pm 1.63$  and in normal people  $2.0\pm 0.38$ . In our study the mean for students and labourer was less than 2 which can be attributed to racial difference.

Jin Seo Park, [2] analysed right and left palm of 3216 volunteers in Korean population. In their study T-DOT value in normal males was  $2.18\pm 0.39$  (Rt.) and  $2.23\pm 0.41$  (Lt.). In people with Simian Crease it was  $2.83\pm 0.88$  (Rt) &  $2.84\pm 0.86$  (Lt). In this study the T-Dot of left hands are more than right hands, but in our study in both the groups T-DoT was more in right hand. This can be a reflection on Indians being mostly right handed. It was also noticed that the T-DoT values were more in Koreans than in Americans.

Sung Bae Hwang, [7] compared T-DoT between normal & rheumatoid arthritis in Korean population. In their study they found that the T-DoT in rheumatoid arthritis ( $< 2.0$ ) was lesser than normal individuals ( $2.2\pm 0.02$ ).

**Limitations of the study:** Being a pilot study, it was conducted on a small group of 25 each so further study can be done with

increased number. The study cannot be generalized to the population considering that only males were included in the study. We recommend that larger studies on both gender be done. Nevertheless we have successfully shown that using a simple effective modern tool, palmar crease can be studied replacing the cumbersome printers ink method.

## CONCLUSION

There is a significant difference in T-DOT in left hand between the two groups. This can be attributed to the equal usage of both hands by labourers which are not the case with the students. So before correlating palmar creases for various diseases the T-DOT, occupation and hand grip needs to be considered. Old cumbersome stamp pad ink method can be replaced by easier digital photographic method.

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