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ASSOCIATION BETWEEN LONGITUDINAL AND TRANSVERSE QUANTITATIVE TRENDS OF DIGITAL TRIRADII *d, c, b, a,* ON PALMS

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In contrast to the study of the qualitative analysis of dermatoglyphics, very few researches have made a definitive probe into the quantitative mode of the longitudinal and transverse trends of digital triradii *d, c, b, a* after Valsik's preliminary but important findings (Valsik 1933 vide 1935: 179—183) aimed at evaluating the variable positioning of the four digital triradii by means of X-ray skeletotopy. Several attempts undertaken so far (Sharma 1963: 218—222; Sharma 1966: 81—92, Biswas and Bhattacharya 1966: 199—206) have not been able to probe into the nature of the exact inter-relationship existing between the variable positioning of digital triradii *d, c, b, a,* which happens to be the main objective in the present study.

PROBLEM

An attempt has been made to assess the independence or association existing between the (i) proximo-distal (longitudinal) and radio-ulnar (transverse) trends of the palmar digital triradii *d, c, b,* and *a* singly (e.g. association between proximo-distal trends of *d* with the radioulnar of *d* and so on for *c, b* and *a*), (ii) the proximo-distal (transverse) trends of *d, c, b, a* in combination of twos(*d* & *c, d* & *b, d* & *a, c* & *b, c* & *a, b* & *a*) using "Deviation Quotient" (Biswas and Bhattacharya 1966: 199—206) as an investigational tool only. The ultimate objective is to find out whether a proximo-radialward shift of the digital triradius *d* is associated with a similar shift of the digital triradius *a* (or *c* or b) or that it is associated with disto-ulnar, proximoulnar or disto-radial shifting of other triradii.

MATERIAL

Bilateral inked palmar prints from 500 adult unrelated males obtained without any bias from the size of the present sample. Individuals above the age of 18 years (Mean = 27.66 ± 0.64; S. D. = = 10.20 ± 0.46) are inclued in the sample mainly because the growth factor, if ignored, can become a serious source of error (Sharma 1963: 222) in any quantitative palmar dermatoglyphic work.

METHODS

The bilateral inked palmar impressions have been obtained in the "unextended" position of digital spreading, a position which is considered apt within the research design of quantitative palmar dermatiglyphics as detailed in the previous studies (Sharma and Taneja 1968: 257—266; Sharma and Taneja, 1969: 121—131; Mainigi and Sharma 1971: 664—665).

Use has been made of certain descriptive symbols like R (radiality), U (ulnarity), P (proximality) and D (distality) in case of all the digital triradii *d, c, b, a* but these anatomical attributes have been determined quantitatively only.

By keeping the scale on the perpendicular OM drawn over the midpoint O (see Fig. 1) of the metacarpo-phalangeal crease of the digit concerned, it is determined whether the digital triradius under study is radial (R) to OM or ulnar (U) to OM.

Proximal (P) and distal (D) limits for the Deviation Quotient *d, c, b, a* have been identified by the "grouping method" applied to the frequency distri-

Longitudinal Trends	Deviation Quotients (= Distance OT)			
	d	*c*	*b*	*a*
Proximal (P) Distal (D)	11 mm & more upto 10 mm	9 mm & more upto 8 mm	9 mm & more upto 8 mm	12 mm & more upto 11 mm

bution of their respective Deviation Quotients (= distance OT) and are given below:

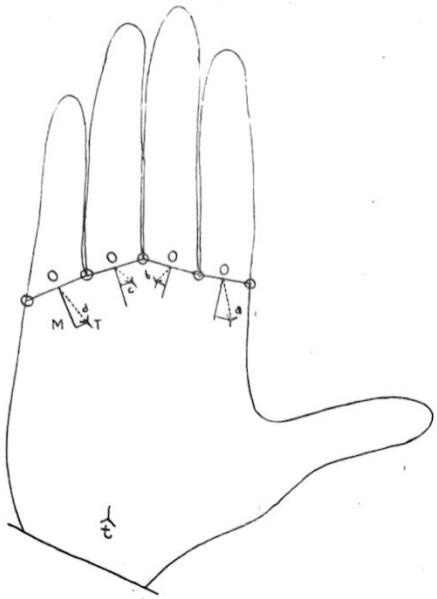

FIGURE-1

PROXIMO-DISTAL(LONGITUDINAL) AND RADIO-ULNAR TRANSVERSE TRENDS OF DIGITAL TRIRADII d, c, b, a AS SHOWN BY DEVIATION QUOTIENTS

DISCUSSION

Table 1 shows the association tests between radio-ulnar (transverse) and proximo-distal (longitudinal) trends for digital triradii *d, c, b, a* separately.

It is clearly inferred from Table 1 that the longitudinal trends of both the digital triradii *d* and *b* are independent of their anatomical positioning in the radio-ulnar direction (non-significant difference). As contrasted to this, in case of both *c* and *a* triradii there is a significant association between their longitudinal and transverse trends. The aforesaid discrepancy in the anatomical positioning of *d* and *b* triradii on the one hand and *c* and *a* on the other may be explained in view of the fact that there is witnessed a bias in favour of radiality in case of *d* triradius and ulnarity in case of *b* triradius. However, no such bias, either in favour of or against radiality or ulnarity is seen in case of *c* and *a* triradii. Thus there will be adequate representation of proximo-radial, proximo-ulnar, disto-radial and disto-ulnar combinations in case of digital triradii *c* & *a* (unlike *d* & *b*). It is this difference in the nature of *c* and *a* that may be advanced as a probable explanation of the discrepancy or difference that is seen in the nature of triradii *d* & *b* showing independence of the two attributes concerned (non-significant differences) whereas, triradii *c* & *a* showing significant association between the two attributes (i) the proximo-distal and (ii) the radio-ulnar trends.

Table 2 shows the assocation tests between the radio-ulnar (transverse) trends of digital triradii *d, c, b, a,* in combinations of twos.

TABLE 1

Chi-square Values Showing Association or Independence of Radio-Ulnar (Transverse) and Proximo-Distal (Longitudinal) Trends of Digital Triradii *d, c, b, a*

Longitudinal Trends of digital triradii *d, c, b, a*	Transverse Trends of digital triradii *d, c, b, a*			Total	Remarks on Chi-square Values
Triradius *d*	Triradius *d*				
		R	U		
	P	403	26	429	2.003 : *df* = 1 : .20 > P > .10 : Non-significant
	D	523	48	571	
	Total	926	74	1 000	
Triradius *c*	Triradius *c*				
		R	U		
	P	259	157	416	7.282 : *df* = 1 : .01 > P > .001 : Significant
	D	392	164	556	
	Total	651	321	972*	
Triradius *b*	Triradius *b*				
		R	U		
	P	15	315	330	1.316 : *df* = 1 : 30 > P > .20 : Non-significant
	D	42	624	666	
	Total	57	939	996**	
Triradius *a*	Triradius *a*				
		R	U		
	P	374	134	508	24.256 : *df* = 1 : P < .001 : Significant
	D	290	202	492	
	Total	664	336	1 000	

* Number of indeterminate (? or 0) cases is 28/1 000.
** Number of indeterminate (? or 0) cases is 4/1 000.

The non-significant nature of results in case of both the pairs *c* & *b* and *b* & *a* implies that the radio-ulnar (transverse) trends of *b* are independent of the radio-ulnar (transverse) trends of *c* as well as *a*. Rest of the four combinations show a significant association between the concerned attributes.

This is probably not difficult to explain if we keep in mind Valsik's (1933 vide 1935: 181) original findings "*that the positions of triradius b are comparatively the least variable, those of triradius d the most variable of the glyphogenous triradii a and c are in that sense a median between two extremes*" (underscoring mine). Valsik clearly draws our attention to "comparatively the least variability of b"

and the "median" variability of *a* & *c;* note that in the combinations (*b* & *c*) *and* (*b* & *a*) the digital triradii involved are *b, c, a* and no *d;* c and a being located towards the ulnar and radial side of b respectively. This probably explains the independence of the two attributes (i) the radio-ulnar trends of *b* with (ii) the radio-ulnar trends of *c* and *a* separately in pairs (*b* & *c*) *and* (*b* & *a*).

TABLE 2

Chi-square Values Showing Association or Radio-Ulnar (Transverse) Trends of Digital Triradii *d, c, b, a* in Combinations of twos

Combinational Pairs	Transverse trends of Digital Triradii	Transverse Trends of Digital Triradii		Total	Remarks on Chi-square values
d & *c*	Triradius *d*	Triradius *c*			29.819 : $df = 1$: P < .001: Significant
		R	U		
		R 624	275	899	
		U 27	46	73	
		Total 651	321	972*	
d & *b*	Triradius *d*	Triradius *b*			9.107 : $df = 1$: .01 > P > .001: Significant
		R	*U*		
		R 46	876	922	
		U 11	63	74	
		Total 57	939	996**	
d & *a*	Triradius *d*	Triradius *a*			22.169 : $df = 1$: P < .001: Significant
		R	U		
		R 598	328	926	
		U 66	8	74	
		Total 664	336	1000	
c & *b*	Triradius *c*	Triradius *b*			3.469 : $df = 1$: .10 > P > .05: Non-significant
		R	U		
		R 31	620	651	
		U 25	296	321	
		Total 56	916	972*	
c & *a*	Triradius *c*	Triradius *a*			43.593 : $df = 1$: P < .001: Significant
		R	U		
		R 391	260	651	
		U 259	62	321	
		Total 650	322	972*	
b & *a*	Triradius *b*	Triradius *a*			1.430 : $df = 1$: .30 > P > .20: Non-significant
		R	U		
		R 42	15	57	
		U 621	318	939	
		Total 663	333	996**	

* Number of Indeterminate cases (? or 0) is 28/1000.
** Number of Indeterminate cases (? or 0) is 4/1000.

SUMMARY

While assessing the independence or association existing in between the longitudinal and transverse trends of the palmar digital triradii, it has been inferred that the triradii *d* & *b* show independence of the two attributes concerned (non-significant differences) whereas, *c* & *a* show significant association between the two attributes (Table 1). (ii) between the transverse trends of digital triradii *d, c, b, a* in combinations of twos, it is found that combinational pairs *c* & *b* and *b* & *a* show a non-significant difference whereas, rest of the pairs *d* & *c*, *d* & *b*, *d* & *a*, *c* & *a* show a significant association (Table 2). This has been explained in view of Valsik's (1933) findings "that the positions of triradius *b* are comparatively the least variable those of triradius *d* the most variable of the glyphogenous triradii *a* and *c* are in that sense a median between two extremes". — note that in the combinations (*b* & *c*) and (*b* & *a*) *the* digital triradii involved are *b, c, a,* and not *d*.

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