

Co-Relational Scrutiny between Dermatoglyphics and Blood Group Patterns Revisited

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Abstract: The bequest of the dermatoglyphic patterns is polygenic. Fingerprint (dactylography / Dermatoglyphics) is well thought-out as the unsurpassed denotes of identification. It was Harold Cummins, 1926 who coined the term dermatoglyphics and provided doorway to many other researchers to explore these ample field. Dermatoglyphics has been widely utilized for formative health both physical and noetic. A range of studies with gender variations Down's syndrome, Schizophrenia, Rubella embryopathy and other genetic disorders have been carried out throughout the orb to prove their coalition with dermatoglyphics. The present study was guided by antecedent researches on a sodality between fingerprint pattern and blood group. The distribution of different pattern of fingerprints in individual fingers withal showed some peculiarities in cognation to blood group. To learn about the relationship between these two perennial attributes and reveals the possibility of applying their pertinence. Hence, an endeavour was made to review the literature on these two facets along with its consequentiality.

Keywords: Fingerprints, Dactylography / Dermatoglyphic, Fingerprint, Blood Group.

I. INTRODUCTION

A communal term coined by Cummins and Midlo for all the integument character, comprehensive of dermal 19th weeks/ 2nd – 3rd month of intrauterine days. It was additionally established by Cummins (1926) that the configurations ridge and fat configuration engagements on the finger bulb, palm and soles is Dermatoglyphics (derma=skin + glyphs=curves) [1, 2]. Development of these engagements is between 13th to of ridge pattern are resolute partially by heredity and partly by contingent or environmental influence, which engender stress and tension in their magnification during uterine life[1].

Fingerprint is defined as an impression of the curved lines of skin at the terminus of a finger which is left on a surface it comes in contact or made by inked fingers on paper. They are distinctive, unique characteristic; patterns use to identify an individual predicated on genetic characters [3, 4]. Dermatoglyphics is laid down during embryogenesis and denote structural substructure was reported by Forest (1930) [5]. Blotegrel and Blotegrel (1934) articulated correlation amid the physical characters and blood group patterns. They showed that there was a sodality between distribution of fingerprint (Dermatographic) pattern and blood groups [6].

A. History of Dermatoglyphics

The history verbalizes through its accounts that fingerprints persisted approximately 400 years ago in the "Fertile Crescent" [7]. The prehistoric Babylonians used finger-bulbs for recording business transactions by pressing them into clay. But the prints taken today are more sophisticated than the antediluvian.

Dr. Nehemiah Grew's (1684) report commenced the observation and characterization of friction ridge skin as he was the first to describe them in detail [8, 9]. **Malpighi (1686)** mentioned in brief that ridge skin enhances traction for ambulating and grasping [8]. The German anatomist **Mayer (1788)** verbalized that skin ridges can never be duplicated, nonetheless the kindred attribute are proximate among some individuals i.e. unique in each individual [1, 10].

Dr. Purkinje (1823) was the first who endeavored systemic categorization and gave nine pattern types that were the precursor to Henry relegation system [11]. **Sir William Herschel (1858)** being the first person to utilize fingerprints for personal identification [12]. Anon after, a Scottish medico **Henry Faulds (1880)** mentioned that the pattern of these papillary ridges remains unchanged in an individual throughout life from birth till death in his publication [13]. A book designated "Fingerprints" that relegated fingerprints into 3 primary patterns viz. arches, loops and whorls was indited by **Sir Francis Galton (1892)** [14]; which in turn availed **Juan Vucetich (1892)** to establish world's first fingerprint bureau [10]. In addition to Galton's technique Sir Edward Henry engendered his own relegation depending on the ridge flow, pattern and characteristics; published in his book in 1893 "The relegation and utilizations of Fingerprints" initiating an incipient epoch for dermatoglyphics superseding the Bertillon age system [15].

Determinately, after years of monotonous studies Cummins and Midlo (1926) coined the term dermatoglyphics for the study of Fingerprint patterns [1]. In view of the fact, dermatoglyphics became imperative for identification, determining physical and noetic health with very high degree of precision.

B. The Anatomy of Fingerprint

It is frequently referred by the therapeutic vocation about the human skin as the most immense organ of the body. Skin bearing friction ridges is found on soles of the feet and the palms of hands.

A Fingerprint is the reproduction of the friction ridges present on the inner surface of a fingertip composed of raised parallel ridge lines and furrows (Valleys).

The skin is composed of 3 anatomical layers, namely, epidermis (Outer layer) – consisting 5 layers, dermis (Inner layer) - consist of 2 layers having connective tissues and hypodermis. The sweat glands (eccrine glands) present in palm are responsible for finding fingerprints on the surface that comes in contact with fingertips. Fingerprint contains unique and aberrant points or discontinuities on ridges and furrows and is called as Minutia [16].

Fingerprints Pattern was relegated Galton [14] into three primary patterns as:

1. Loops [L] (60-65%).
2. Whorls [W] (30-35%).
3. Arches [A] (5%).

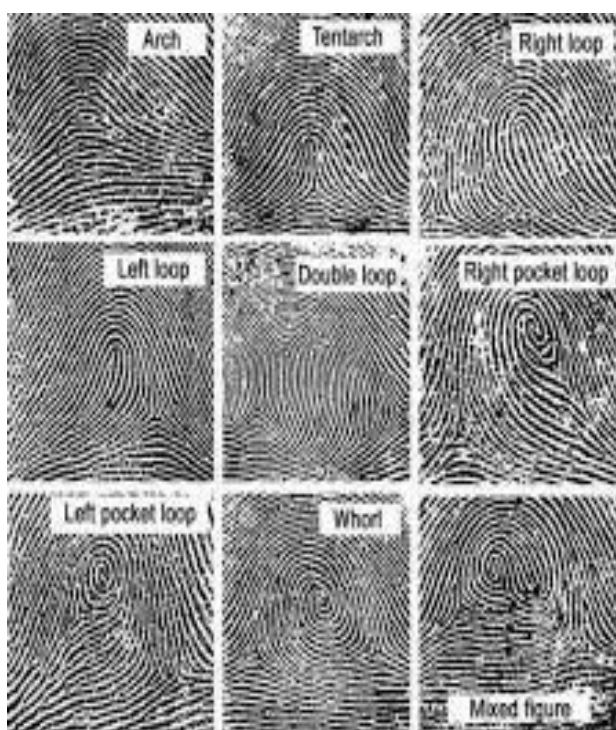


Figure 1: Fingerprint Patterns

Loop is such a pattern in which one or more ridges enter from either-side, re-curve, touch or pass an imaginary line between delta and core, and pass out upon the same side as the ridges entered. They are of 2 types: ulnar or radial loops. **Whorl** is globalized by a typical concentric design. The majority of ridges incline to make a consummate circuit around the core, a pivotal feature in the interior of the pattern. The **arches** are the simplest of all. They are described as patterns in which ridges enter from one side, elevate or curve at the centre and flow out from the antithesis side [17].

There are some exceptional conditions in which there is absence of fingerprints, this condition is termed as adermatoglyphia. This fingerprint loss can be visually perceived in cases of leprosy, patients being treated against cancer, ectodermal dysplasia and in senescence. Exposure of X-ray, acerbic agents and grievous injuries can withal cause harm to the dermal skin possessing prints [18, 19].

II. CORELATION BETWEEN DERMATOGLYPHICS AND BLOOD GROUP PATTERNS

Karl Landsteiner discovered Blood group system in 1901 [20]. 19 major blood groups have been apperceived that vary in frequency distribution amongst sundry races of mankind. Clinically, 'ABO' and 'Rhesus' are of chief consequentiality. The 'ABO' system is supplementally relegated as A, B, AB and O types according to the presence of corresponding antigen present on RBC. The 'Rhesus' system is relegated into 'Rh +ve' and 'Rh -ve' according to the presence/ absence of antigen of 'D' antigen [21].

Blood group O is cognate with loops more and less with whorls than blood group according to a study by **Hahne KW (1929)** [22]. In another study by **Herch M (1932)** he found that there is high frequency of loops in blood group A [23]. **Bloterogel H and Bloterogel W (1934)** articulated that is some relationship between physical characters and blood groups [6].

Geipel (1935) showed there was absence of eminent relationship between dermatoglyphics and blood groups by study on 381 Germans [24]. According to **Nayak SK. & Patel S (1973)** their study revealed that the Furuhat index is highest in blood group AB and lowest in A. It was additionally observed that loops are prevalent in finger II and V and whorls in finger I and II of AB blood group whereas in IVth finger in other groups. It was additionally visually perceived in his study that loops are commonest followed by whorls and arches most infrequent of all [25].

According to a report by **Benes (1993)**, he apperceived that the cognation amongst blood types and particular diseases/malignancies [26]. A consequential sodality was identified for breast cancer patients and blood group in a report in which high risk of death early death was found in patients with blood group B and AB with AB having more preponderant local recurrence risk [27]. From the precedent researches it was pragmatic that there has been some correspondence between dermatoglyphics and blood groups [6]. The studies withal concluded that Loops are the commonest patterns followed by Whorls and Arches are most infrequent.

This study was fortified by a supplemental study on Gowdasaraswat Brahmin community of Karnataka by **Gowda and Rao (1996)**. The study withal found high frequency of loops in Rh +ve and whorls in Rh -ve person [28].

Kshirsagar et al (2001) withal fortified the antecedent studies. He additionally reported that frequency of whorls was higher in blood group O and low in AB. While percentage sagacious blood group AB has arches in high quantity and low in B [29].

According to **Bharadwaja et al (2004)** blood group AB (Rh positive 43.34%, Rh negative 60%) had more whorls while blood group A (Rh positive 54.26%, Rh negative 60%) contains more loops; exhibiting cognation between dermatoglyphics and blood group. The total finger ridge count (TFRC) was significantly more preponderant in blood group B [30, 31].

A supplemental study by **Prateek and Keerath (2010)** revealed high frequency of arches and low of whorls in A – negatives [32]. Another study withal fortified the above studies that were conducted on people of Maiduguri. The study showed that in those population males had high distribution of loops while females had arches. While in case of African Americans; females had higher frequency of loops and arches whereas males had higher incidence of whorls. The study additionally fortified the past observations about the highest incidence of loops followed by whorls and arches in all blood groups. These distribution patterns were withal obtained among Indian subpopulations and African Americans [31, 33, 34, 35].

In a study conducted by **Mehta and Mehta (2011)** on 200 medicos they reported that Loops were highest in blood group O, whorls in B and arches in AB. The total finger ridge count was greatest in B blood group that was paramount to Prateek et al [36]. **Sangam et al (2011)** conducted study on 506 students from Guntur to find sodality between fingerprint and blood group. Statistics showed that thumbs had more whorls in blood group A +ve while index and ring finger had high whorls in case of A +ve and AB blood group. It was additionally reported that blood group O was dominated by loops; AB with whorls and B with arches [37]. **U. N. Umaraniya et al (2011)** in his study on 304 MBBS students from B. J. Medical College, Ahmedabad concluded that majority of students had blood group O and least was AB. The study withal reveals higher frequency of loops in blood group A and whorls in blood group AB [38].

The studies by **Desai et al (2013)** concluded that in their study that loops were dominating every blood group as well as Rhesus group while whorls showed ascendance in O negative group. Loops and Arches were found in high frequency in Females while whorls in males; this was the sole connection found between gender and fingerprint from the study [39]. In another study for connecting fingerprint patterns in relation to gender and blood students of Delta State University, Nigeria were taken as subjects and their fingerprints were taken. The study did not show any significant association between gender and fingerprints showing high frequency of loop in female and whorls in male. Also they did not find any significant association between ABO blood group and fingerprint patterns. However, there has been found association between fingerprint patterns and ABO Rhesus blood group, with loops in higher frequency compared to arch and whorl, except for O negative blood group having high whorls [40].

In another study conducted by **Meril Ann Soman et al (2013)** on 300 medicos of Yenepoya Medical College, Mangalore; it was reported loops were ascendant in females while whorls and arches were ascendant in males. Loops were visually perceived

in highest amount in O +ve blood group [41]. **Kavita Pahuja et al (2013)** from their study on 100 breast cancer patients concluded that whorl pattern was pre-ascendant in blood group A, AB & O compared to loop in both hands of patients ($P < 0.05$ & 0.001) while tented arches is pre-ascendant in left hand of blood group A [42]. Subsequent study on Maiduguri metropolis revealed that rhesus +ve have the highest number of individuals with blood group O +ve having more than 50% of the population [43, 44].

Another study by **A. D. Patil et al (2014)** on 785 medicos showed high frequency of blood group O and low of AB. Statistical measures led to a conclusion that occurrence of ulnar loops and whorls in males and females showed paramount difference suggesting the sodality between gender and fingerprints [45]. According to **Govindarajul et al (2014)** reported that O +ve is the most prevailing blood group and AB –ve least. The fingerprint patterns were distributed in the order high frequency of loops, moderate amount of whorls and lowest was arches w.r.t blood group A, B, AB and O respectively [46]. **Deepa et al (2014)** conducted a study on 150 MBBS students from Haldwani which proved to be compassionate with subsequent researches on establishing sodality between fingerprints and blood [47]. A recent study from Nigeria by **Ekanem A.U. et al (2014)** on 400 individuals found that majority of the subjects belonged to O group. It was withal reported that blood group O was pre-dominantly associated to loops while least to AB. The presage of gender was made possible as it was revealed that loops and whorls were commonest among males while arches in females. Hence, concluding the sodality between gender, fingerprints and blood group [48].

A recent review article relating Fingerprint and Blood groups also fortified the fact [49]. Thus, it was verbally expressed that there subsists co-relational scrutiny between dermatoglyphics and blood group patterns.

CONCLUSION

This Meta analysis answers that for auxiliary aspects to establish the scrutiny between more features of dermatoglyphics patterns with the blood group an effort can be made to verify the ridge width and ridge density of Fingerprint patterns and correlate with that blood group.

These may avail to effortlessly narrow down the approach of identification by revenue of fingerprint. To fortify such work as described there shall be accumulation of ample amount fingerprint samples thereafter they shall undergo microscopic examination for studying minutia and quantification of the ridge width and density for correlating it with the blood group.

Acknowledgement

Our sincere thanks to Director R & D, Raksha Shakti University and Dr. S. R. Tripathi for their incessant inspiration and Raksha Shakti University as a whole for providing me a valuable platform.

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