Adermatoglyphia, A Biometric Identification Nightmare in a Developing Country. A Case Report of Finger Prints Challenge

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ABSTRACT

Objective: The case report describes the biometric finger print challenges faced by adermatoglyphia in a situation that uses only fingerprint as the biometric identifier.
Case Report: A 17-years old girl who presented with complaint of not having fingerprint and as such cannot enroll for her Joint Admission and Matriculation Board examination (JAMB). She claimed to always have peeling of her palms and itching without rash during dry season. Clinical examination revealed near absence of frictional ridges on all her fingers and palms. No other abnormalies detected clinically. Diagnosis of Adermatoglyphia was made and the patient was referred to Center for Forensic Program and DNA Studies where incomplete absence of fingerprint was confirmed. The toe print and lip prints which were completely present were evaluated, captured, classified and suggested to be used as biometric identifiers for this patient.
CONCLUSION: The need to promote awareness of adermatoglyphia among the populace and the inclusion of other biometric identifiers in agencies where biometric identification is required is further emphasize in this case report in order to ameliorate the plight of adermatoglyphia.

Keywords: Adermatoglyphia, finger print, Forensic, Nigeria

INTRODUCTION

Dermatoglyphics (from the roots "derma" for skin and "glyphos" for carvings) is the study of various integumentary ridge patterns that form on fingertips (Dactyloscopy), toes, palms of the hands, and soles of the feet (Sarfraz, 2019). While Adermatoglyphia also known as "immigration delay disease" is medically defined as the congenital or an acquired loss of these integumentary ridge patterns (Burger et al., 2011). This condition may be limited to a few digits or all fingers and may also be partial loss of the ridges (i.e., ridges are unnoticeable on general evaluation but noticed on deeper inspection or under a magnifying len) or a complete absence (depicting complete effacement) of epidermal ridges. Adermatoglyphia can also described the absence of the ridge patterns formed on the plantar aspects of the feet (Sarfraz, 2019). Fingerprinting is the most widely utilized method for human identification and authentication. It forms a vital component of a personal profile and bio data. Most government and private sectors seeking personal biometric information require individuals to be fingerprinted to complete routine biometric record and documentation (Bhat et al., 2014).

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Adermatoglyphia (involving the fingers) can present time-consuming challenges to both the authorities and individual concerned in completing verification process (Sarfraz, 2019).

This article presents a rare case of 17-years old female with congenital adermatoghyphia involving only the fingers and palms and whose toe prints and lip prints (among other biometric identifiers) can serve as alternative prints for biometric identification.

CASE REPORT

A 17-years old female who presented to Oral diagnosis department to see her aunt who is a resident of the department with the chief complaint of not having finger print and this have deprived her from enrolling for Joint Admission Matriculation Board (JAMB) examination as the fingerprinting machine could not capture her finger prints. Several finger print scanners were used but none could capture and as such her biometric information were not recorded. No history of chemical burns/ trauma to the fingers and no known family member with same condition. She claimed to always experience peeling of her palms during dry season and itching without rashes whenever she changes environment or bathing soap. She was never aware of her lack of finger print until she recently had problem in performing her JAMB biometric.

On clinical examination, patient appears clinically fit except near absence of frictional ridges of all her fingers and palms

Figure 1: shows absence of frictional ridges/prints on the fingers .

Figure 2: shows the presence of toe and plantar frictional ridges

A diagnosis of Adermatoglyphia (isolated case) was made. The patient was referred to Center for Forensic Program and DNA Studies (a unit in the Department) where patient's fingerprints were

acquired manually with ink pad, digitally amplified and analyzed. This revealed poorly displayed plain arch fingerprint only at the tip of the fingers.

A diagnosis of INCOMPLETE ADERMATOGLYPHIA was made.

Management was aimed at medically/forensically certifying that this patient has this rare condition (Incomplete adermatoglyphia) and suggest other biometric identifiers that can be used for this patient.

The toe and lip prints were manually acquired, digitalized and analyzed.

An official document stating that the patient has adermatoglyphia and her toes or lip prints should be use whenever there is need for biometrics requiring print and this was sent to JAMB and any other authorities as the case may be.

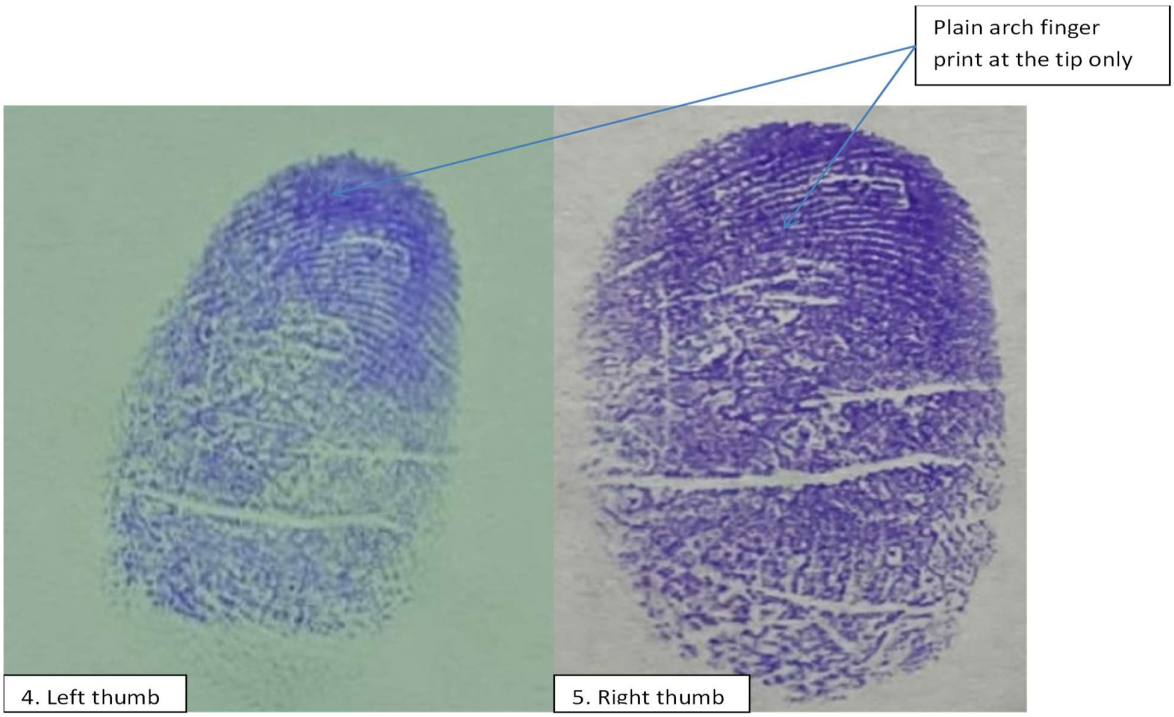

Fig 3: shows poorly displayed plain arch finger prints only at the tip of the finger. (Using Galton–Henry classification)

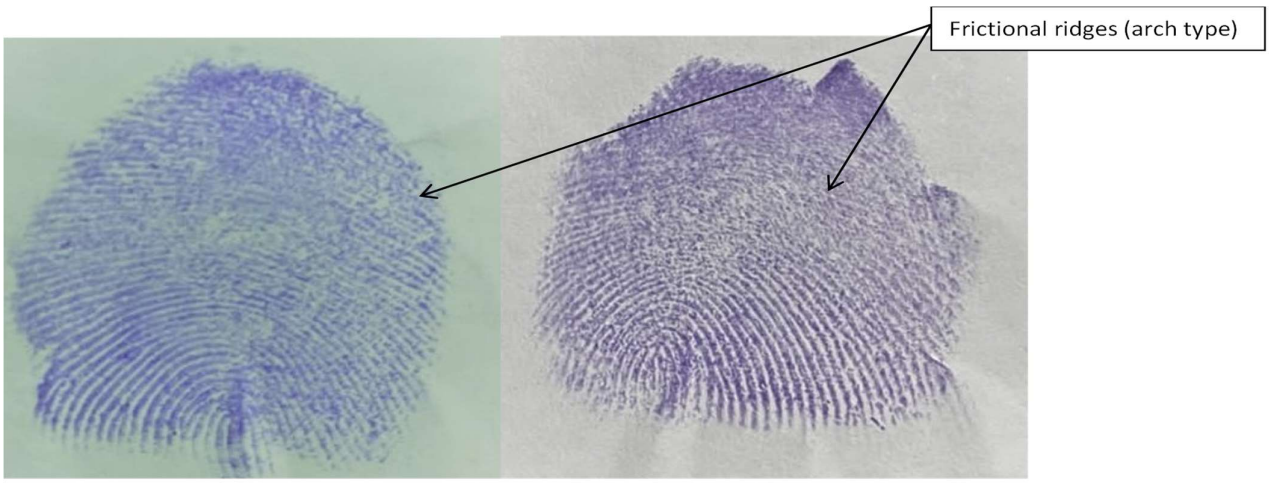

Figure 4: shows plain arch type of the left and right toes prints

The lip print was also obtained with red lip balm, digitalized and analyzed.

Figure 5: shows type 1(complete vertical) lip print using Suzuki & Tsuchihashi (1970) classification of lip print.

DISCUSSION

This biometric system assesses specific attributes related to a person and compares it to already existing library of databases belonging to many people in person's identification (Ross & Jain, 2004). The regularly used physiological biometric identifiers include fingerprint, face recognition, iris, hand geometry, palmprint and gait (Ross & Jain, 2004). Finger prints is an impression of the frictional ridges of a part or all part of the fingers and are genetically determined and remain unchanged till death (Rastogi & Pillai, 2010) They are vital dermatological landmarks with important applications in medicine, forensics, anthropology, and security (Bose & Kabir, 2017; Kanchan & Krishan, 2018).

Adermatoglyphia can be congenital or acquired. The congenital form (primary type) is extremely rare genetic disorder caused by mutations in the SMARCAD1 gene. It can present as isolated case or associated with other conditions like certain type of ectodermal dysplasia (Nousbeck et al., 2014). While the acquired form can be due to dermatological conditions such as eczemas (e.g., contact dermatitis), blistering diseases (e.g. pemphigus vulgaris), disorders of keratinization (e.g., psoriasis) and infections (e.g leprosy) or non-dermatological causes which include trauma, burns, amputations and use of potent corticosteroids (Sergeant et al., 2012). This patient had the isolated congenital form as there was no other associated medical condition or any history of being involved in conditions that can cause adermatoglyphia.

There is paucity of information on the prevalence of this condition in the literature as most reported cases are isolated cases with challenges with biometric process involving the use of finger print such as the case being reported. The first reported case in Nigeria was in Benue state, where a Christian pilgrim was denied the e-passport by the Nigeria Immigration (Onyemocho et al., 2015). And in this case, a female Nigerian have been denied enrolment of the Joint Admission and Matriculation Board (JAMB) examination which is necessary for her to continue her tertiary education due to this condition.

Adermatoglyphia can present as be partial loss of the ridges (i.e., ridges are unnoticeable on general evaluation but detectable on deep inspection or under a magnifying lamp) or a total absence of epidermal ridges (Sarfraz, 2019). This patient had a

partial loss as few epidermal ridges (though very faint) were noticeable only at the tip of the fingers and the print acquired with the use of ink pad.

Sufferers of this condition such as in this case have challenges in completing biometric process involving the use of finger print for biometric identification and verification hence it has being termed "immigration delay disease" by Professor Peter Itin after his first patient had trouble traveling to the USA due to failure to get finger printed (Burger et al., 2011).Biometric method using fingerprinting is the most generally used method for human identification and authentication by most government and private sectors in this part of the world. Persons who cannot be finger printed are faced with serious challenges such as postponement, interruption or even rejection when dealing with identification and verification process. These challenges can become a nightmare to the sufferers if alternative biometric identifier is not used for them. Hence the need to increase awareness of adermatoglyphia among the populace and especially personnels working in these agencies that deals with biometric identification and verification. Also, alternatives such as lip print, toe print or other biometric identifiers acquisition machine that can be used for these individuals.

CONCLUSION

Challenges associated with adermatoglyphia are not only limited to the sufferers alone, but also the authorities involved especially in the absence of other alternatives. Hence, through this communication, there is need for more public awareness of this rare condition and promotion of all aspects of biometric architecture that human beings possess that can be used as alternative biometric identifier in case of failure of any components. This will ameliorate the challenges faced by persons with adermatoglyphia

REFERENCES

Bhat GM, Mukhdoomi MA, Shah BA, Ittoo MS (2014): Dermatoglyphics: in health and disease – a review. Int J Res Med Sci.; 2(1):31-37.

Bose PK, Kabir MJ (2017). Fingerprint: A unique and reliable method for identification. J. Enam Med. Coll; 7(1):29-34.

Burger B, Fuchs D, Sprecher E, Itin P (2011): The immigration delay disease: Adermatoglyphia inherited absence of epidermal ridges. J Am Acad Dermatol; 64(1):974-980.

Henry, E (1900).: Classification and Uses of Finger Prints. Routledge, London.

Kanchan T, Krishan K (2018). Loss of fingerprints: Forensic implications. Egyptian J. Forensic Sci; 8(1): 19-11.

Nousbeck J, Sarig O, Magal L, Warshauer E, Burger B, Itin P, et al (2014). Mutations in SMARCAD1 cause autosomal dominant adermatoglyphia and perturb the expression of epidermal differentiation-associated genes. Br J Dermatol; 171(1):1521-1524.

Onyemocho A, Omala E, Onum E, Anigilaje E (2015). Adermatoglyphia; A cause of serious delay in issuance of Immigration e-passport to a christian pilgrim in Nigeria: A case report. Int J Adv. Case Reports; 2(12):732-735.

Rastogi P, Pillai KR (2010). A study of finger prints in relation to gender and blood groups. J Indian Acad Forensic Med; 32(1):11-14.

Ross A, Jain AK (2004). Biometrics: When Identity Matters. In: Li S.Z, Lai J, Tan T, Feng G, Wang Y. (eds) Advances in Biometric Person Authentication. SINOBIOMETRICS. Lecture Notes in Computer Science, vol 3338. Springer, Berlin, Heidelberg.

Sarfraz N (2019). Adermatoglyphia: Barriers to Biometric Identification and the Need for a Standardized Alternative. Cureus; 11(2): e4040. doi 10.7759/cureus.4040.

Sergeant A, McPhee N, Holme SA (2012). Acquired loss of fingerprints: Do topical corticosteroids play an aetiological role? Clin Exp Dermatol; 37(1): 679-680.

Suzuki K, Tsuchihashi Y (1970) New attempt of personal identification by means of lip print. J Indian Dent Assoc; 42(1): 8-9.

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