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Absence of Fingerprints- A Case Series

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ABSTRACT

Background & objective: Biometric identification with the use of fingerprints being one of the most popular methods in recent times for identity verification all over the world, is extensively used to keep up records and getting through every legislative process in Bangladesh. This newly devised method of identity verification is exposing cases of genetically inherited adermatoglyphia (absence of fingerprints) also termed as, immigration delay disease. The disease is characterized by absence of fingerprints that are seeking legal attention to concerned authorities requiring an alternative standardized method of verification. Only a few isolated cases of the adermatoglyphia, where every offspring has 50% chance of having the disease in an autosomal dominant fashion, have been reported in the whole world till date. Hence an alternative method of verification is required to keep up authentic records for these people and their future generations. This case series study was done on newly identified suspected cases of genetically inherited adermatoglyphia, where six male members from one single-family are suffering from this disease. They are facing problems in everyday life as the absence of fingerprints is restricting them from accessing national ID card, sim card registration, passport, driving license & other services where biometric verification is mandatory to confirm the identity.

Keywords: Absence of fingerprints, immigration delay disease, adermatoglyphia, genetic disease etc.

CASE REPORT

INTRODUCTION:

In recent times some biometric tests are more popular, more accurate and more eligible, like-vascular biometrics and iris biometrics used in human identity verification. Vascular biometrics are relatively newer form of biometric authentication, where vein pattern is captured with infrared ray and special camera from inside of one's fingers or palms. Iris recognition is an automated method, that uses mathematical pattern of recognition technique on video images of one or both of the iris of an individual eyes, whose complex pattern are unique, stable and can be seen from some distances. However, these are costly to use for our mass population. Hence to use fingerprints as biometric is cost-effective for our country. The scientific study of fingerprint or dactylography is the single most widely adopted method for verification of individual identity & authentication.[1,2] Individuals with aderomatoglyphia having loss or absence of fingerprints, face extreme difficulties to gain accessibility through ongoing biometric identification everywhere and little that can be done for these individuals except embracing other means of identification for the affected individual. Loss of fingerprints can be congenital or acquired. Despite manifesting any other underlying causes, individuals with an absolute absence of fingerprints

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as an isolated finding is extremely rare.[3] The present case series study was done on suspected cases of genetically inherited adermatoglyphia, where six male members from one single family are victims of this disease.

CASE PRESENTATION:

History and morphological appearances:

In this case series, a 22-year old man, along with his father and younger brother, presented with absence of epidermal ridges or fingerprints. With no other medical complaints, they brought it under clinical consideration, as because, they were facing difficulties availing the biometric identification due to absence of fingerprints required for getting National ID card and passport and they wanted to have a diagnostic certificate for their condition, to be qualified to avail those legal documents.

None of them gave history of suffering through any significant morbidity. Although, on query they told that, all of them had very tiny numerous white cysts like appearance on their face during their neonatal period, for which they seek medical help but couldn't get any significant management; later on those cysts like appearances disappeared spontaneously accompanied by lack of sweating in the hands.

The paternal grandfather and his father and their ancestors as well as their descendants also had similar manifestations as evident from their history. It didn't seem to be a significant problem for them, for in their age biometric identification process was not in use and hence absence of fingerprints was not of a big concern. Three other family members of the same family tree have similar condition as was found in the present case.

PHYSICAL EXAMINATION:

On examination, all of the affected family members showed absence of epidermal ridges (examined by salt test and magnifying glass test) both in the palm of the hands and sole of the feet along with onychodystrophy (abnormal changes in the shape, color, texture, and growth of the fingernails or toenails), clubbing, contractures of digits, and hyperkeratosis.

PATHOPHYSIOLOGY & DIFFERENTIAL DIAGNOSIS:

The epidermal ridges usually develop around 10 to 17 weeks of intrauterine life, and their development is determined by genetic and environmental constituents.4–6 Congenital absence of epidermal ridges or adermatoglyphia can be genetic or can be a symptomatic manifestation of other congenital diseases.[3] The congenital adermatoglyphia mostly caused by ectodermal dysplasias associated with Basan syndrome, Naegeli-franceschetti-jadassohn syndrome, dermatopathia pigmentosa reticularis, reticulate acropigmentation of Kitamura, and Rothmund Thomas syndrome.[1,7,8] Among these diseases, Basan syndrome is an autosomal dominant ectodermal dysplasia, the characteristic feature of which includes rapidly healing congenital acral bullae, congenital milia, lack of fingerprints, hypohidrosis, palmoplantar keratoderma, digit contractures, and nail dystrophy.[3,9] The present cases were featured with almost all of these conditions analogous to that of Basan syndrome which is the primary diagnosis of these subjects. This autosomal dominant condition is linked to a mutation of the SMARCAD1 gene.[2,7,10] SMARCAD1 gene seems to play a crucial role in the formation of dermatoglyphs, which are necessary for the specific patterns of skin ridges on the pads of the fingers that form the basis for each person's unique fingerprints. Further investigations by Genetic Microarray Test are required to rule out the differential diagnoses with an approach to reach the confirmatory diagnosis.

The pattern of distribution of the epidermal ridges, do not alter after formation, except when the skin is damaged to the depth of 1 mm and two individuals never can have the same pattern of distribution not even identical twins.[3] And there is no treatment available to regain the fingerprints.

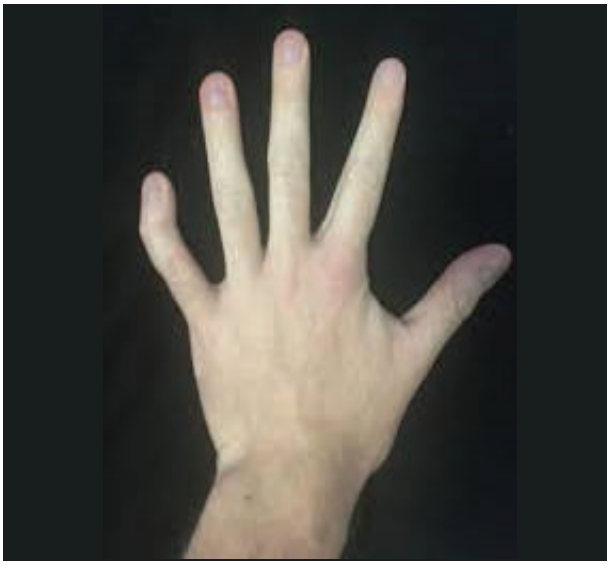
CONCERNING ISSUE:

Absence of fingerprints is associated with various legal issues, such as, availing various licensure identity cards. As this disease is a genetic disease

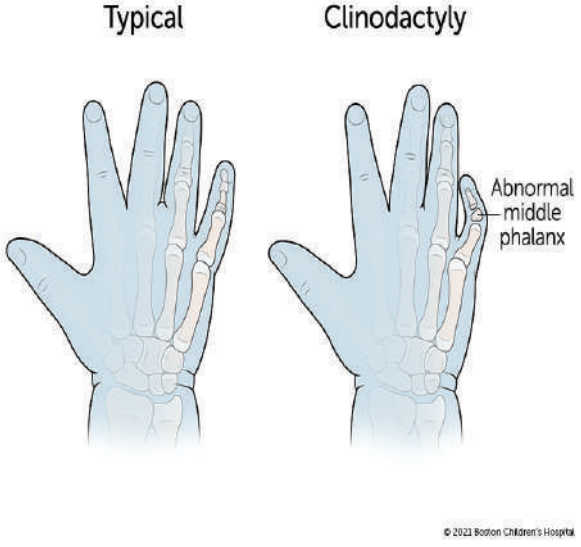
passing into the descendants, the future generation who will be affected may also face similar difficulties. The 3 cases under this study came to Upazila Health Complex, Puthia, Rajshahi with an expectation to find an actionable alternative to access their basic rights, provided by the state through the local authority. Prior to that, they went to the Civil Surgeon Office, Rajshahi for a solution of the same issue and got a medico-legal certificate by an expert team led by Civil Surgeon, Rajshahi. As a result, they could manage NID cards on the back of which written "There is no fingerprints". Although, this NID card was of no help to get passport, driving license, sim card or other services requiring biometric identification. New cases of adermatoglyphia is being identified now, due to the need of fingerprints for authentication in various spectrum of its utility – ranging from handling sensitive digitalized documents and transactions, passing oversea borders, checking in for daily office work, gaining access to electronic devices, and also for keeping criminal records. As genetically inherited loss of fingerprints is also going to be existent among the next generation of this family with every offspring having 50% chance of getting affected by the disease, other methods of verification besides fingerprints are required to be considered for the legislative purposes of identity verification to ensure their civil rights along with proper diagnosis of the underlying causes.

DISCUSSION:

Only a few cases of this isolated form of adermatoglyphia inherited in an autosomal dominant kind have been recorded to date.[11–15] A female patient from Switzerland, presented with missing epidermal ridges on the fingers, palms, toes, and soles as an isolated feature which was found to be inherited over 4 generations of her family in an autosomal dominant fashion. Due to which she faced problem during biometric verification. The researchers called this disease as "Immigration Delay Disease"[11] On examination, mild hyperkeratosis on the hands, calluses on weight-bearing areas, clubbing of nails, mild clinodactyly (A finger that curves to one side usually affecting the little finger but can affect other fingers as well) of both fifth fingers and hypohydrosis (a condition in which the sweat glands make little or no sweat) of the palm of the hand have been observed (Pic-1).



Pic. 1: A severe case of Clinodactyly (Source: Wikipedia)



Pic. 2: Showing abnormal middle phalanx of little finger

Family history revealed that there were 10 affected individuals in 4 generations.11 In 1964, cases of complete absence of epidermal ridges were found in Philadelphia. Thirteen affected members from three

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generations of the family have been studied, who showed bilateral partial flexion contractures of the fingers and toes, bilateral webbing of the toes, and transient congenital milia.[12] On follow up study, 2 new members of that family showed similar appearances.13 In 1983, another report on complete absence of epidermal ridges among five generations in another Irish-American family have been published.[14] The features among the affected individuals were, lack of dermatoglyphic patterns, sweat pores, and ability to sweat of the fingertips, palms, and soles, abnormalities in nails, single transverse palmar creases, heat insensitivity along with history of congenital milia and blisters on the fingertips and soles at birth.[14] Another report with similar features have been reported in 1993 in California.[15] Nousbeck and colleagues[16] in their study, confirmed the role of SMARCAD1 gene to cause this autosomal dominant type of adermatoglyphia. The most recently reported case of adermatoglyphia has been studied in Saudi Arabia, where a male, aged 60 years presented with no epidermal ridges on his hands and feet with no history of exposure to long-term medication or environmental factors17. The patient was detected with c. 378+1G > T transversion in the skin-specific isoform of the SMARCAD1 gene through Sanger sequencing and confirmed the role of SMARCAD1 gene causing the absence of epidermal ridges.[17]

CONCLUSION & RECOMMENDATION:

Absence of fingerprints can be acquired or congenital. Confirmatory diagnosis is required, for if the disease shows autosomal dominant type, then absence of fingerprints is also going to be existent in their precedents. An alternative actionable means of biometric identification method by the concerned authorities should be adopted so that people with loss of fingerprints, can be brought under the National Database of Citizens that can be helpful to ensure their basic right they deserve as well as exercising legal procedures on them if it is deemed necessary. Similar cases all over the country should be identified to include them in the legal system exercised by the government.

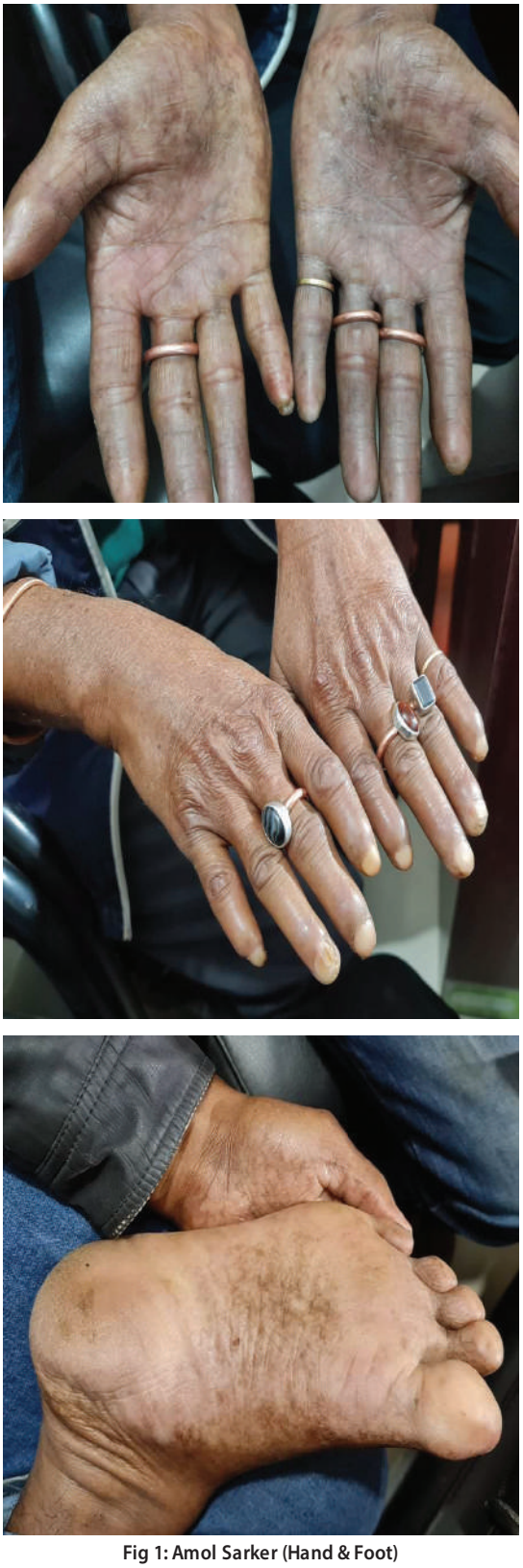

Fig 1: Amol Sarker (Hand & Foot)

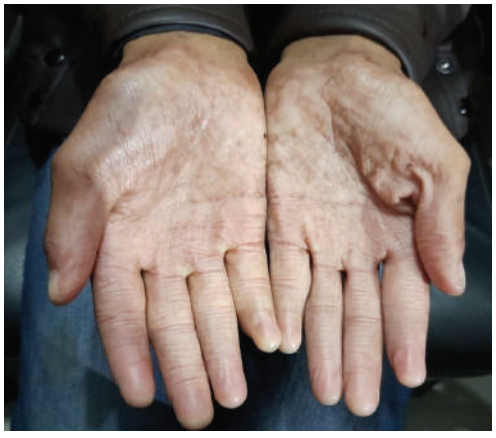

Fig 2: Apu Sarker (Hand)

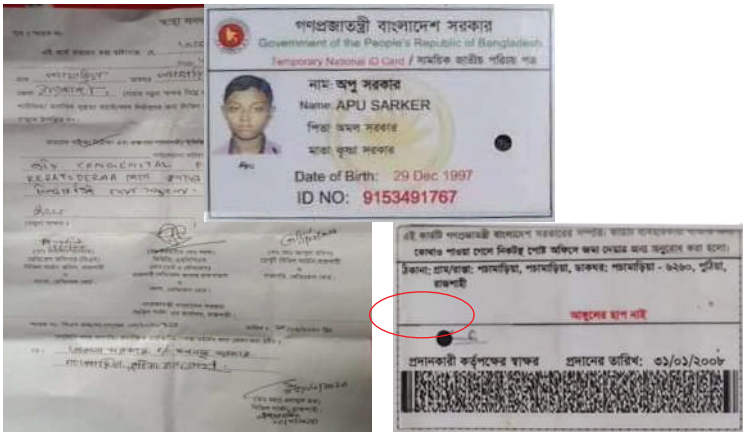

Fig 3: Confirmed Declaration about the rare disease by Govt Medical Team

Fig 5: NID Apu Sarker

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