

# Prevalence of Sydney Creases of Palmar Dermatoglyphic Patterns in Bangladeshi Down Syndrome Patient

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## Abstract

**Context:** The Sydney crease is a proximal transverse crease that extends from beyond the hypothenar eminence to the ulnar margin of the palm. This study was to determine the prevalence of Sydney creases in Bangladeshi Down syndrome patient.

**Material and Methods:** This cross-sectional observational analytical study was conducted in the department of Anatomy, Chittagong Medical College (CMC), Chattogram from January 2018 to January 2019. A total of 200 participants were included by convenient sampling according to inclusion and exclusion criteria. 100 Down syndrome patients were recruited in the study group. 100 medical and dental students of CMC were selected as control irrespective of sex. Dermatoglyphics print was taken by the ink and paper method.

**Result:** Twenty three percent (23%) of patients had Sydney line in comparison to only 2% of the control ( $p < 0.001$ ) in both hand. The frequency of Sydney line in those with Down's syndrome was significantly higher than in the corresponding controls  $p < 0.001$  in both hands.

**Conclusion:** It is revealed that there are significant differences in frequencies of Sydney crease between Down syndrome patient and control group.

**Key words:** Dermatoglyphic, Down syndrome, Sydney crease

## Introduction

Palmar creases are laid down during the first or second trimester of fetal life.<sup>1-3</sup> The Sydney line (SL) was first described by Purvis-Smith and Menser in 1968. Long before Purvis-Smith and Menser's report that the SL was a geographically isolated and new palmar crease abnormality, palmists for centuries had been describing it as a lengthening of the head line (proximal transverse palmar crease) beyond the ring finger Figure 1(c, d).<sup>4</sup> Normally, there are three major or primary palmar creases named Radial Longitudinal Crease (RLC), Proximal Transverse Crease (PTC) and Distal Transverse Crease (DTC). The RLC begins from, with or slightly below the PTC at the radial border of the palm over the metacarpophalangeal joint of the index finger

and runs proximally toward the wrist curving laterally. The PTC begins at the radial side of the palm and runs medially slightly curving proximally to terminate at the medial border of the hypothenar eminence. The DTC begins proximal to the interdigital space between the index and middle fingers and runs to the ulnar side of the palm, showing a slight distal ward concavity. Normally, both the PTC and DTC do not span the entire width of the palm.<sup>5</sup> The Sydney crease represents a very long version of the PTC, which crosses the whole width of the palm, while the DTC appears normal.<sup>6</sup> Sydney creases though very rare, is also associated with several clinical conditions including Down's syndrome and cancer.<sup>7-9</sup> It is also associated with delayed development and learning difficulties.<sup>10</sup>

Dermatoglyphics are the dermal ridge configurations on the digits, palms and soles<sup>11-16</sup>. The pattern formation is completed by the 19th week.<sup>16-19</sup> These findings on ridge development, have been recently confirmed by Penrose & O'Hara and Okijima.<sup>20,21</sup> The dermatoglyphic analysis is now a valuable companion to other methods used for diagnosis of some genetic diseases (e.g., phenylketonuria) and syndromes genetically determined (e.g., Down, Turner or Klinefelter

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syndromes).<sup>4,22,23</sup> Cummin in 1926 first time added the term dermatoglyphics to the field of science.<sup>24</sup> The patterns of ridges that develop in the palm are determined genetically.<sup>25</sup>

Down syndrome can occur due to trisomy 21, Robertsonian translocation or mosaicism.<sup>26</sup> Trisomy 21 is a genetic disorder caused by the presence of all or part of a third copy of chromosome 21.<sup>26</sup> It is typically associated with physical growth delays, characteristic facial features, and mild to moderate intellectual disability.<sup>26</sup> It is associated with advancing maternal age or a new mutation appears in one of the otherwise unaffected parents.<sup>27</sup> Worldwide the incidence of Down syndrome is one in 1000 live births.<sup>28</sup>

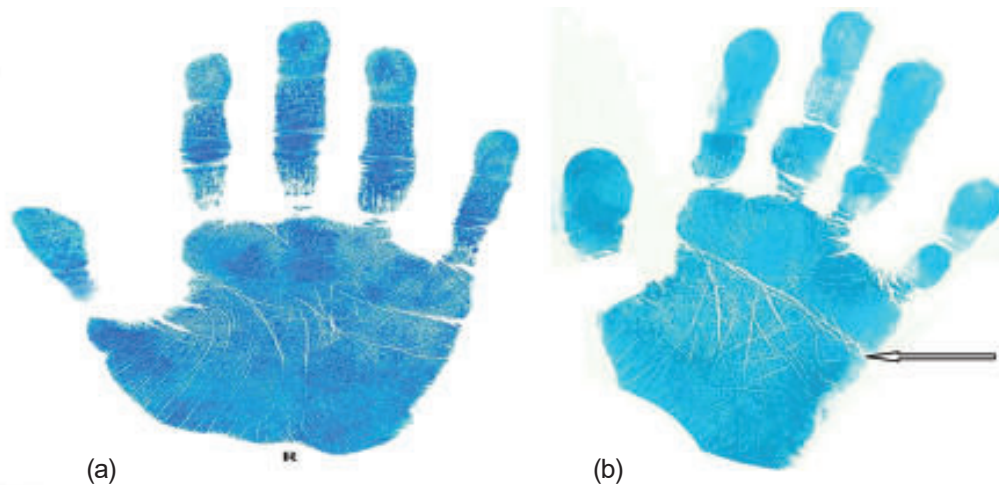
**Materials and Methods**

**Study Design:** This cross sectional analytical study was done in the department of Anatomy, CMC, Chattogram from January 2018 to January 2019. Convenient sampling method was adopted to select 200 participants. Hundreds of them were Down syndrome patient, and the rest hundred participants were students of both sexes enrolled in MBBS and BDS course at Chittagong Medical College as the control group fulfilling the inclusion and exclusion criteria with informed consent. Confirmed Down syndrome patients were collected from different centers in Bangladesh- Down syndrome society of Bangladesh, Prerona School, Ashar Alo School, Proyas School and Society for the Welfare of the Intellectually Disabled, Bangladesh (SWID Bangladesh). Detailed personal information was

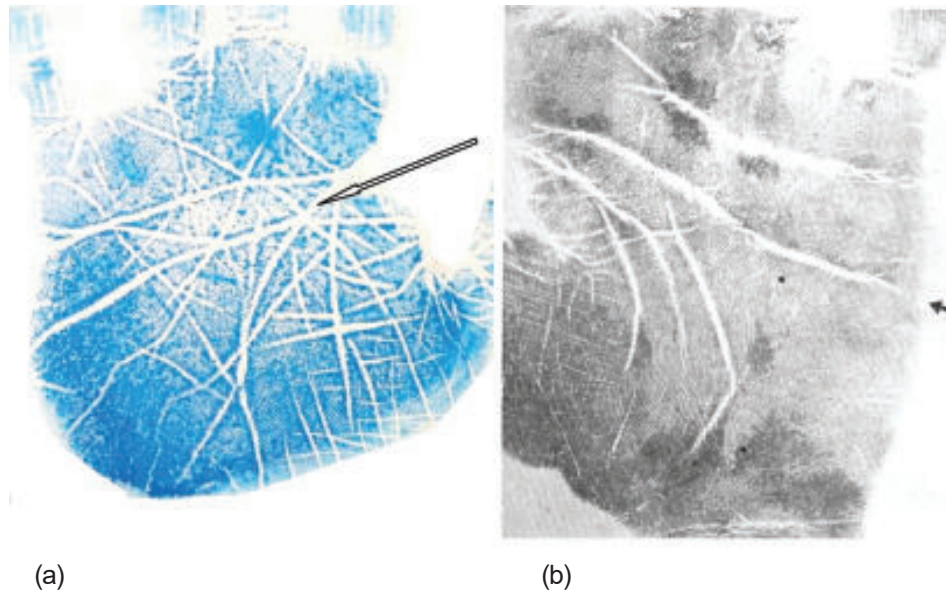
recorded in a pre-fixed questionnaire from all the RPs who participated voluntarily. Age was verified from birth certificates, national identity cards or students' ID cards.

**Data Collection Procedure:**

Dermatoglyphics prints were taken by the Ink & Paper method described by Cummins and Midlo.<sup>30</sup> Procedure started with hands of the individual washed with liquid soap before inking to remove dirt from the hands. Then hands were wiped with paper towel. Two white papers were fixed on clip board to take fingerprint of right and left hand. Then clip board was placed on a wooden table. The required amount of ink was poured into a clean and dry flat bottom container. Hand roller was moved in the ink until the ink was spread thinly and homogenously in the roller. Both hands were painted with the help of the roller. The thin film of ink was applied on the palm by passing the inked roller uniformly over the palm. After ensuring that palm inked properly, hand print was taken on the white paper fixed on clip board. First of all, the palmar aspect of the wrist was placed on the paper. Then slowly the palm was placed on the paper from proximal to distal end. The palm was then lifted from the paper in reverse order, from distal to proximal end. Then the individual were asked to clean both hands with turpin oil, liquid soap under running tap water and dried with paper towel. The painted papers were examined with magnifying glass (4 x & 6 x). Magnifying glass was used to zoom in the palmar prints. In this study dermatoglyphics pattern of Sydney creases were recorded separately of both hands in data sheet (Figure-1c&1d).



**Fig. -1: (a) Showing right hand print of Control (proximal and distal palmar crease). (b) showing right hand print of Down syndrome (Simian crease/Single transverse palmar crease -arrow marked)**



**Fig.1 :** (c) Showing Sydney crease (Arrow marked) in Down syndrome patient, (d) Showing Sydney crease/ Extended proximal crease (Arrow marked) in Down syndrome patient

Data was analyzed for statistical significance by Chi-square test, by using a computer-based program SPSS-23. P value was considered significant if it is < 0.05 at 95% level of confidence.

**Ethical Approval**

The protocol of this study was approved by the members of the Ethical Review Board (ERB) of Chittagong Medical College, Chattogram and received a certificate of ethical clearance of ERB.

**Results**

**Comparison of Frequencies of Sydney crease:**

The incidence of Sydney line, on right hands of the patients and controls, is given in Table-I. Twenty three percent (23%) of patients had Sydney line in comparison to only 2% of the control (p<0.001). The frequency of Sydney line in those with Down’s syndrome was very significantly higher than in the corresponding controls (p<0.001 in each cases)

**Table I**  
*Percentage frequencies of Sydney crease in right hand in Down’s syndrome and in controls*

Sydney line	Down syndrome (n=100)	Control (n=100)	P value
Absent	77 (77%)	98 (98%)	<0.001
Present	23 (23%)	2 (2%)	

The incidence of Sydney line, on left hands of the patients and controls, is given in Table-II. Twenty three percent (23%) of patients had Sydney line in comparison to only 2% of the control (p<0.001). The frequency of Sydney line in those with Down’s syndrome was very significantly higher both than in the corresponding controls (p<0.001).

**Table II**  
*Percentage frequencies of Sydney crease in left hand in Down’s syndrome and in control*

Sydney line	Down syndrome (n=100)	Control (n=100)	P value
Absent	77 (77%)	98 (98%)	<0.001
Present	23 (23%)	2 (2%)	

**Discussion**

23% of patients had Sydney crease in comparison to only 2% of the control. The frequency of Sydney crease in those with Down’s syndrome was very significantly higher both in male and female than in the corresponding controls. Purvis-Smith<sup>31</sup> in his study observed that, 16% had at least one Sydney crease (bilateral in 4%).<sup>31</sup> In the study conducted by Jameela<sup>32</sup> the Sydney crease is seen more in

female Down syndrome Children than males. Dar et al<sup>2</sup> made an analysis of palmar crease variants in group of "at risk" newborns, without any congenital anomaly. A significantly higher frequency of abnormal creases was found. In their findings there was, as expected, a significant excess of Sydney creases among the Down's patients ( $P < 0.001$ ). Plato et al<sup>33</sup> obtained dermatoglyphic data from 265 cytogenetically confirmed patients of Down's syndrome. The data were correlated and compared with 407 controls. Sydney line patterns occurred more frequently in the patients that is 37.9% in male and 51.7% in female and in case of control group 19.7% in male and 21.1% in female.<sup>33</sup>

### Conclusion

Study findings revealed that there are significant differences in frequencies of Sydney creases in both hands between Down syndrome patient and control. The frequency of Sydney creases in both hands of Down syndrome cases was very significantly higher than in the corresponding controls ( $p < 0.001$  in each cases).

### Conflicts of interest

The authors report no conflict of interest.

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