Little Finger Contour Damage Prevalence among Smartphone Users – Cross Sectional Survey

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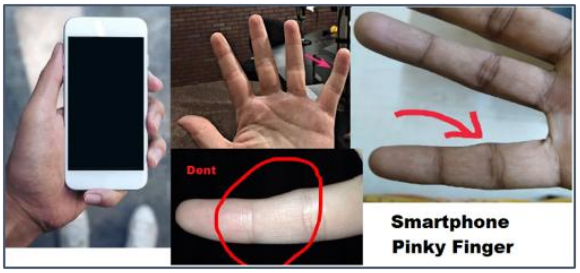
***Abstract*—Question: what is the prevalence of little finger contour deformity (smartphone pinky finger) among regular smartphone users and what usage factors are associated with its occurrence?**
Design: A Descriptive Cross Sectional Survey.
Participants: 574 participants.
Observation: the prevalence of little finger contour damage among mobile phone users, aiming to identify causative factors, potential preventative measures, and remedies for the observed damage.
Outcome measures: a semi-structured questionnaire.
Results: Out of 574 participants, 249 (43.4%) reported little finger contour damage, with 61% being female and 39% male. Age distribution was 25% aged 15-20, 63.5% aged 21-30, 6% aged 31-40, and 3.3% over 40. Mobile phone usage showed 19% used their phones for 2-3 years, 12% for 3-4 years, and 69% for over 4 years. Most (86.5%) used phones weighing 200-250 grams, and 73% had screen time exceeding 5 hours per day. Greater screen time, heavier phone weight, and longer usage duration were significantly associated with little finger contour damage.
Conclusion: The study highlights a strong connection between prolonged mobile phone use and little finger contour damage, underscoring the need for awareness and intervention strategies to mitigate musculoskeletal risks. Further research is required to explore this issue across diverse demographics and regions.

***Index Terms*—Little Finger Counter Damage, Mobile Phone Usage, Musculoskeletal Alterations, Smartphone, Semi-Structured Questionnaire, Cross Sectional Survey.**

I. INTRODUCTION

The pervasive use of mobile devices has raised significant health concerns[1], especially given the dramatic increase in users from 500 million in 2000 to approximately 7.41 billion todays, with projections reaching 7.49 billion by 2025[2]. This rise in mobile phone usage, particularly among younger populations, highlights the urgent need for research into potential health impacts[3].



A study conducted in Maharashtra focused on young adults revealed that instant messaging was the most common activity, consuming nearly five hours daily, followed by listening to music or the radio[4]. This excessive screen time, facilitated by technology, often exceeds recommended limits and contributes to increased smartphone addiction, especially among children and adolescents[5,6]. multi-screening and excessive device use are emerging trends that warrant further investigation due to their potential health implications[7].

In India, a rapidly growing mobile market, university students are notably engaged in extensive mobile phone use. Concerns have been raised about physical health issues linked to prolonged device usage, such as pain and morphological changes in hands and fingers due to ergonomic demands. Specifically, using a single hand to operate a phone, with the little finger providing support, can strain muscles and tendons, potentially altering the Pinky finger's contour. These changes, distinct from congenital conditions like clinodactyly, result from sustained stress and pressure[8,9,10].Previous research indicates that users typically hold phones with their right hand and support the device's weight with the Pinky finger, which has been associated with wrist and hand weakness and an increased risk of musculoskeletal disorders[11,12.] This study aims to assess the prevalence of little finger

contour damage among young adults, particularly college students, by examining how smartphone handling techniques affect the morphology of the little finger. It seeks to identify asymmetries and the ergonomic impacts of mobile device use, providing insights into potential health risks associated with prolonged smartphone use[13].

II. METHOD

Design: The study was a descriptive cross-sectional survey conducted over three months, from June 24 to August 24, at Maharashtra state, India. It received ethical approval from the college's institutional review board. The research aimed to assess the prevalence of little finger contour damage among individuals working with multimedia and college students, focusing on the morphological changes associated with prolonged mobile phone use.

Participants: A total of 574 participants were selected through non-probability convenience sampling, with sample size determined using the Slovin formula for a 95% confidence level and a 5% margin of error to ensure statistical significance. Inclusion criteria were individuals aged 17-40 years who used mobile phones for 3-5 hours or more per day and had been using them for 2 to over 4 years. Both males and females across various departments were considered. Exclusion criteria included individuals over 40 years old, those who used phones for less than 3 hours daily, had less than 2 years of smartphone usage, or experienced numbness and tingling in the ring and little fingers.

Observation with outcome measures: Data were collected via a semi-structured questionnaire administered through Google Forms. The questionnaire gathered information on age, gender, hand dominance, occupation, mobile phone use duration, screen time, daily usage patterns, phone type, grip, pain intensity, phone weight, and little finger contour damage, etc. This tool facilitated the examination of the relationship between mobile phone use and "Smartphone Pinky Finger Syndrome," characterized by morphological changes in the little finger due to phone weight pressure.

Quantitative Data analysis: was performed using the Statistical Package for the Social Sciences (SPSS) version 2024, employing descriptive statistics to summarize the data. A bilateral comparison of the little finger contours was conducted, focusing on the dominant hand, hypothesized to be more affected due to increased pressure and usage. The study adhered to ethical principles, ensuring participant rights, confidentiality, and informed consent, thereby upholding the research's integrity and contributing valuable insights into the ergonomic impacts of mobile phone use on hand health.

III. RESULTS

Table 1: Descriptive statistics for little finger contour damage frequency and percentage in terms of inclusion participant, gender distribution, dominance, age, exclusion participant mobile phone usage in years and screen time duration in hours with weight of the phone.

Category	Frequency	Percentage
Total participant	574	100%
Inclusion participant	555	96.7%
Male	224	39%
Female	350	61%
Dominant		
Right	527	91.8%
Left	47	8.2%
Age 15-20	143	25%
Age 21-30	365	63.5%
Age 31-40	35	6%
Exclusion participant	19 (age more than 40)	3.3%
Mobile phone usage 2-3 years	110	19%
Mobile phone usage 3-4 years	67	12%
Mobile phone usage >4 years	397	69%
Screen time (3-5 hours)	155	27%
Screen time (>5 hours)	419	73%
Weight of the phone 100-200 gm	77	13.5%
Weight of the phone 200-250 gm	497	86.5%
Little finger counter damage	249	43.4%
No little finger counter damage	325	56.6%

Out of the 574 participants, 249 (43.4%) reported little finger contour damage, among those, 61% were female and 39% were male. The age distribution was as follows: 25.00% were between the ages of 15-20,

63.5% between the ages of 21-30, 6.00% between the ages of 31-40, and 3.3% over the age of 40. In terms of mobile phone usage, 19.00% reported using their devices for 2-3 years, 12.00% for 3-4 years, and 69.00% for more than 4 years. 86.5% of the total participants said they were using a phone that weighed between 200 and 250 grams, while 13.5% said they were using a phone that weighed between 100 and 200 grams. Screen time revealed that 27.00% used their phones for 3-5 hours per day, with 73.00% exceeding 5 hours (Table 1). The prevalence of little finger contour damage was found to be significantly associated with greater amount of screen time, weight and duration of mobile phone usage.

IV. DISCUSSION

This study investigates how mobile device use impacts the little finger's shape and explores causes, prevention strategies, and treatments for this damage. Through a comprehensive survey and statistical analysis, the research confirmed that mobile devices contribute to observed finger contour damage, despite the damage often being irreversible. The study highlights that while prevention is feasible, awareness and intervention are crucial.

A case report of a 58-year-old retired soldier with tenosynovitis and swan neck deformity, attributed to 15-16 hours of daily mobile use, supports the study's findings on the link between excessive mobile phone use and hand damage[14]. This aligns with research by Deepak Sharan et al. (2014), which identified tendinitis and myofascial pain syndrome linked to prolonged device use[15]. With 43.4% of mobile users showing little finger contour damage, the study underscores significant real-world effects on hand health. The findings emphasize the negative impact of excessive smartphone use on hand strength and function, particularly in young people. To mitigate these effects, it is essential to balance screen time, weight of the device with activities that enhance hand strength and dexterity. This study contributes valuable insights into the ergonomic consequences of smartphone use, advocating for preventive measures to safeguard hand health.

V. CONCLUSION

the study confirmed a significant prevalence of little finger contour damage among mobile device users, with pronounced asymmetric changes mainly in the dominant hand. This damage is closely linked to phone holding techniques, highlighting a new concern in hand health. The findings reveal a notable gap in literature, particularly regarding younger populations. This underscores the need for further research across diverse age groups and regions to better understand, prevent, and manage little finger contour damage. The discussion includes a comprehensive review of strengths, weaknesses, limitations, and recommendations, offering a well-rounded perspective on the research.

REFERENCES

[1] Mushroor S, Haque S, and Riyadh AA, “The impact of smart phones and mobile devices on human health and life,” International Journal of Community Medicine and Health, vol. 1, pp. 9–15, 2020.

[2] A. Schmidt, P. Holleis, J. Häkkilä, E. Rukzio, and R. Atterer, Eds., “Mobile phones as tool to increase communication and location awareness of users,” in Proceedings of the 3rd International Conference on Mobile Technology, Applications & Systems, 2006.

[3] J. Fowler and J. Noyes, “A study of the health implications of mobile phone use in 8–14s,” Digital Health, vol. 84, no. 200, pp. 228–233, 2017.

[4] F. Samkange-Zeeb and M. Blettner, “Emerging aspects of mobile phone use,” Environmental Health, vol. 2, no. 1, pp. 70–82, 2009.

[5] M. Kwon, J.-Y. Lee, W.-Y. Won, J.-W. Park, J.-A. Min, C. Hahn, et al., “Development and validation of a smartphone addiction scale (SAS),” PLoS One, vol. 8, no. 2, p. e56936, 2013.

[6] A. A. Akanferi, L. K. Aziale, and A. Asampana, “An empirical study on mobile phone usage among young adults in Ghana: From the viewpoint of university students,” International Journal of Computer Applications, vol. 98, no. 5, 2014.

[7] M. Henderson, A. Benedetti, T. A. Barnett, M.-E. Mathieu, J. Deladoëy, and K. Gray-Donald, “Influence of adiposity, physical activity, fitness, and screen time on insulin dynamics over 2 years

in children," The Journal of Pediatrics, vol. 170, no. 3, pp. 227–235, 2016.

[8] Y. L. Reid Chassiakos, J. Radesky, D. Christakis, M. A. Moreno, C. Cross, D. Hill, et al., "Children and adolescents and digital media," Pediatrics, vol. 138, no. 5, 2016.

[9] C. A. Magee, J. K. Lee, and S. A. Vella, "Bidirectional relationships between sleep duration and screen time in early childhood," JAMA Pediatrics, vol. 168, no. 5, pp. 465–470, 2014.

[10] S. Lemola, N. Perkinson-Gloor, S. Brand, J. F. Dewald-Kaufmann, and A. Grob, "Adolescents' electronic media use at night, sleep disturbance, and depressive symptoms in the smartphone age," Journal of Youth and Adolescence, vol. 44, no. 2, pp. 405–418, 2015.

[11] J. Falbe, K. K. Davison, R. L. Franckle, C. Ganter, S. L. Gortmaker, L. Smith, et al., "Sleep duration, restfulness, and screens in the sleep environment," Pediatrics, vol. 135, no. 2, pp. e367–e375, 2015.

[12] D. Vickers, "Clinodactyly of the little finger: A simple operative technique for reversal of the growth abnormality," Journal of Hand Surgery, vol. 12, no. 3, pp. 335–342, 1987.

[13] A. Osailan, "The relationship between smartphone usage duration (using smartphone's ability to monitor screen time) with hand-grip and pinch-grip strength among young people: An observational study," BMC Musculoskeletal Disorders, vol. 22, pp. 1–8, 2021.

[14] H. M. Gökmen, İ. G. Gökmen, B. Dilek, S. Gülbahar, and E. Akalın, "Addiction of smartphones and related finger deformities: A case report," Turkish Journal of Physical Medicine and Rehabilitation, vol. 66, no. 4, p. 476, 2020.

[15] J. S. Rajkumar, D. Sharan, M. Mohandoss, R. Ranganathan, and J. Jose, "Musculoskeletal disorders due to hand-held devices: A major problem at hand," Indian Journal of Physiotherapy and Occupational Therapy, vol. 8, no. 4, 2014.