Original Research Article

Gender Differences on Data of Palm Sweat Pores in Myanmar and Cambodian Nationality

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Abstract

The sweat pore is helpful in terms of identification like minutiae. This research aims to study the differences in the number of sweat pores, types of sweat pores, and the size of sweat pores in male and female volunteers of Myanmar and Cambodian nationality. The researcher has studied the differences in sweat pores data to explore differences between the genders. This research consists of 100 volunteers aged 20-60 years. The results found no significant differences between the genders of the two nationalities. This research revealed that men had more sweat pores than females. In Myanmar nationality, males have an average number of sweat pores at 112.8±1.6, while females have 110.6±0.9 sweat pores. In Cambodian nationality, males found an average number of 131.2±0.8 sweat pores and 130.72±1.9 in females. Studies on the types of sweat pores have found them to be more closed than open sweat pores. Except for female volunteers of Myanmar nationality, more open sweat pores were found than closed sweat pores. Besides, the size of sweat pores in Myanmar was small in both genders, followed by medium and large. Meanwhile, the Cambodian found similar findings in male volunteers. The exception was female volunteers with the same small and medium-sized sweat pores and found the least large sweat pores. Studying data on sweat pores on the palms of different nationalities is very important in forensic science.

Keywords: Pore, Gender differences, Myanmar, Cambodian

Introduction

Fingerprint identification is a widely employed method encompassing fingerprints, palm prints, and sole prints[1]. All three types can be utilized to verify an individual's identity through consistent verification principles[2]. Examining an Automated Fingerprint Identification System (AFIS) is a common practice for identifying perpetrators in various cases, as the system relies solely on fingerprints and minutiae for testing. Nevertheless, verifying an individual's identity can be approached through three critical characteristics of a fingerprint: Feature 1 involves the overall pattern of the fingerprint, Feature 2 encompasses the distinctive characteristics of the lines, and Feature 3 includes sweat pores, incipient ridges, and other permanent details[3,4].

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Sweat pores constitute a distinctive third level of fingerprint features arranged in rows on the fingerprint's surface[5]. They begin forming in the 5th and 6th weeks of gestation and reach full development by the 21st week[6]. Like pattern and minutiae, sweat pores serve as a viable means of identification due to their specificity, durability, and abundance compared to other unique characteristics. In a one-inch area, as many as 23-45 sweat pores can be present[7,8]. In 1912, Edmond Locard pioneered utilizing sweat pores for identification. He conducted extensive studies on their patterns and proposed four criteria—size, shape, types, and density of sweat pores.[9,10,11]

This research serves as an initial exploration of sweat pores in the right and left palms among Myanmar and Cambodian volunteers. The primary objective is to underscore the significance of sweat pores in the context of identification. The study aims to analyze discrepancies in sweat pores between male and female participants, emphasizing on the number, types, and size of sweat pores.

Material and Methods

This research consists of 50 Myanmar volunteers (25 men and 25 women) and 50 Cambodian volunteers (25 men and 25 women). All samples were randomly sampled with volunteers aged between 20 and 60. All volunteers are foreign workers under the MOU with the Thai government. Regarding collecting palm print samples, all volunteers read the agreement and sample collection procedures carefully and signed consent before starting the process. The samples were collected by washing hands thoroughly. Before, the palm print was stamped with black forensic ink onto a newly created form specifically for use in research. The form does not include the volunteer's signature but is instead coded not to reveal the volunteer's information.

The outer area of the palm print was chosen to study the characteristics of sweat pores, and a rectangular region measuring 5x5 mm² was determined (Figure1). The selection of this analysis area follows the Acree method[12]. All data presented in the results are the combined average outcomes. The research utilized a DCS4 (Foster + Freeman) eyewitness camera set to a focus level of 0.314 and a resolution of 1000 dpi.

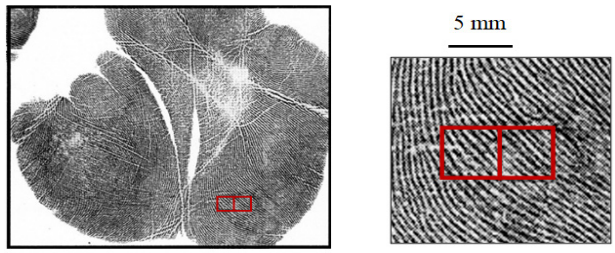

Fig 1: Example of palm print and square size 5x5 mm²

Sweat pore data from the right and left palm prints of males and females were scrutinized to determine the quantity of sweat pores. The total number of sweat pores in a 25 mm² area was tallied, and this value was then presented as the overall average number of sweat pores. Besides, other characteristics were analyzed, including type categorization. Types were classified as open and closed, as illustrated in Figure 2. The size of the sweat pores was also examined, with categorization into small, medium-sized, and large sweat pores. This analysis followed the principle of comparing sweat pores with the largest one in a 25 mm² area, utilizing the method outlined by Bindra et al[9].

All collected data underwent statistical analysis using SPSS version 11. The mean values of the right and left palms on the outer mound were subjected to a T-test at a significance level of p-value < 0.05. Subsequently, differences among subjects, specifically males and females, were assessed using Independent-Samples T-test statistics.

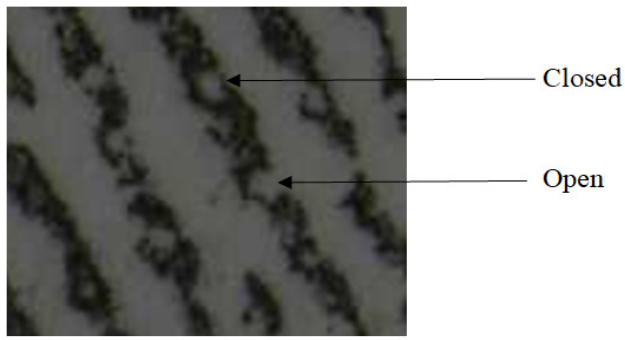

Fig 2: Types of pores.

Results and discussion

This research investigated the quantity, types, and dimensions of sweat pores on the outer surface of the right and left palms, each covering an area of 25

mm², among volunteer foreign workers of Myanmar and Cambodian nationality. The study encompassed 100 volunteers, aged between 20 and 60, evenly distributed with 50 individuals from each nationality (25 men and 25 women). Statistical analyses were conducted to discern patterns in sweat pore types and sizes among men and women of Myanmar and Cambodian nationality, presented in Tables 1 and 2, respectively. For individuals of Myanmar nationality, the number of sweat pores within the 25 mm² area ranged from 96 to 125 for males (mean = 112.8, S.E. = 1.6052) and 102 to 119 for females (mean = 110.6, S.E. = 0.9815). In the case of Cambodian nationality, males exhibited 122 to 138 sweat pores (mean = 131.2, S.E. = 0.8327), while females displayed 118 to 145 sweat pores (mean = 130.72, S.E. = 1.9643). Despite the observed higher frequency of sweat pores in males, no statistically significant differences were identified between genders in both nationalities.

Table 1: Descriptive statistics: number of pores in males and females in Myanmar population.

Descriptives	Male	Female
Mean	112.8	110.6
Standard error of mean	1.6052	0.9815
Median	114	110
Mode	109	110
Standard deviation	8.0260	4.9075
Sample variance	64.417	24.0833
Range	29	17
Minimum	96	102
Maximum	125	119
Sum	2820	2765

Table 2: Descriptive statistics: number of pores in males and females in Cambodian population.

Descriptives	Male	Female
Mean	131.2	130.772
Standard error of mean	0.8327	1.9643
Median	131	130
Mode	131	120
Standard deviation	4.1633	9.8214
Sample variance	17.3333	96.46
Range	16	277
Minimum	122	118
Maximum	138	145
Sum	3280	3268

The results of the comparative analysis, evaluating the disparity in the quantity of sweat pores within the 25 mm² area between males and females in both Myanmar and Cambodian nationalities, revealed no statistically significant difference. For Myanmar nationals, the p-value was 0.2492; for Cambodian nationals, the p-value was 0.8234, as mentioned in Table 3.

Table 3: Comparison of pore characteristics between both sexes in Myanmar and Cambodian population.

Pore characteristics/ 5x5 mm² square		Myanmar population			Cambodian population		
		Male	Female	P	Male	Female	P
Number of pores		112.8±8.03	110.6±4.91	0.2492	131.2±4.16	130.72±9.82	0.8234
Types :	Closed	26%	23%	0.0621	26%	27%	0.0706
	Open	24%	26%	0.0802	24%	23%	0.0532
Size :	Small	28%	29%	0.1574	21%	21%	0.3489
	Medium	13%	14%	0.2491	18%	21%	0.3783
	Large	9%	7%	0.4035	10%	9%	0.1514

Table 3 provides a comprehensive overview of sweat pore data, facilitating a comparison of gender differences in Myanmar and Cambodian nationalities. The investigation into types of sweat pores discerns between closed and open sweat pores, revealing a consistent prevalence of closed sweat pores over open sweat pores in both genders. This alignment with the findings of Bindra et al[9] reinforces the notion that closed sweat pores tend to outnumber open sweat pores. Notably, an exception is observed among females of Myanmar nationality, where more open sweat pores (26%) are identified compared to closed sweat pores (23%). Further analysis of closed sweat pores between males and females in Myanmar (p=0.0621) and Cambodian (p=0.0706) nationalities yields non-significant differences. Similarly,

examining open sweat pores in Myanmar (p=0.0802) and Cambodian (p=0.0532) nationalities indicates no statistically significant gender disparities. These outcomes align with the research conducted by Nagesh et al[10] corroborating the absence of discernible differences in sweat pore types between genders.

According to the study of the size of sweat pores on hypothenar of the right and left palms in both nationalities In Myanmar, small sweat pores were found the most in both males and females (28% in males, 29% in females). Below are medium-sized sweat pores (13% in males, 14% in females) and the least number of large sweat pores (9% in males, 7% in females). Meanwhile, in the Cambodian nationality, males found sweat pores. The most common were small (21%), followed by medium-sized sweat pores (18%), and the least common were large sweat pores (10%). However, small, and medium-sized sweat pores were found in equal percentages in females, 21%, and large sweat pores were found in 9%. In all three sizes of sweat pores between males and females of Myanmar nationality, it was found that there was no significant difference. In the Cambodian nationality, the results of the research between males and females found that there were no significant differences as well. The results are consistent with the study of Nagesh et al[10] which found that gender differences do not affect the size of sweat pores.

Conclusions

This research delved into the quantitative and qualitative aspects of sweat pores, encompassing their number, types, and size on the hypothenar of the right and left palms among male and female volunteers from Myanmar and Cambodian nationality. The findings underscored a higher frequency of sweat pores in males than females within a 25 mm^2 area, a consistent trend across both nationalities. Examination of sweat pore types revealed a predominance of closed sweat pores, except for females from Myanmar, where open sweat pores surpassed closed ones. Regarding sweat pore size among Myanmar nationals, both males and females exhibited a prevalence of small sweat pores, followed by medium-sized sweat pores, while large sweat pores were the least common. Similar results were observed in Cambodian males, with a distribution of small, medium-sized, and large sweat pores. In contrast, Cambodian females displayed an equal occurrence of small and medium-sized sweat pores, followed by large sweat pores. Gender-based analyses yielded no significant differences in the number, types, or size of sweat pores in Myanmar and Cambodian nationalities. The implications of these findings are particularly noteworthy in the context of forensic science, suggesting potential advancements in fingerprint identification in Thailand by incorporating sweat pores alongside distinctive features.

Ethical Clearance: This study has ethics committee approval Ref. No : REC 63.1019-126-1198 from Silpakorn University Research, Innovation and Creativity Administration Office.

Conflict of interest: None

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