

Epidemiological Characteristics of Patients with Plantar Warts: a Single-center Retrospective Study

Hoon Choi, Jun Ho Kwak, Bong Seok Shin, Min Sung Kim and Chan Ho Na[†]

Department of Dermatology, Chosun University College of Medicine, Gwangju, Korea

Background: Plantar wart is a common dermatologic disease encountered in outpatient clinics. Clinical trials for the treatment of plantar warts have been conducted, but only a few studies have focused on the epidemiological factors of plantar warts.

Objective: This study aims to analyze the epidemiological factors for plantar warts in Korean individuals at a single institution.

Methods: We retrospectively reviewed the electronic medical records of patients with plantar warts at Chosun University Hospital from January 2019 to December 2022.

Results: A total of 176 patients were included in this retrospective study. Plantar warts are more common in younger ages, and men tend to have higher rates of plantar warts than women (M:F = 3:1). The patients showed a higher incidence of plantar warts during winter (29.0%), of which 74.4% were urban residents. 6.3% of patients had warts after trauma. Plantar warts were also observed in 66 of the 504 household members of the patients. The most common locations of wart lesions were in the forefoot (73.3%), followed by the toes (60.8%), midfoot (22.2%), and heel (18.2%). Moreover, the location of the lesions was almost equal, most often on the right side (34.7%), followed by the bilateral (33.5%) and left sides (31.8%).

Conclusion: This study offers valuable information about the epidemiological factors of plantar warts in South Korea. These contents will be used for lifestyle education to prevent the recurrence of plantar warts.

Key Words: Epidemiology, Plantar warts, Verruca

INTRODUCTION

Plantar wart is one of the most common dermatologic diseases encountered in outpatient practice.

It is caused by human papillomavirus (HPV) infection, which is a deoxyribonucleic acid virus that affects the skin and mucous membranes. In plantar warts, the HPV enters the basal epithelial layer through small cuts or breaks in the skin.

Subsequently, the HPV infects the cells, which consist of stem cells in the basal layer. It can lead to the over-proliferation or excessive growth of skin cells, resulting in the formation of plantar warts^{1,2}. Plantar warts remain difficult to treat, although various clinical trials of treatments have been reported³. The effective management of plantar warts should involve not only treatment but also lifestyle education to reduce the transmission and recurrence of HPV. However,

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[†]Corresponding: Chan-Ho Na, Department of Dermatology, Chosun University Hospital, Pilmundaero 365, Dong-gu, Gwangju 61453, Korea.

Phone: +82-62-220-3130, Fax: +82-62-222-3215, e-mail: chna@chosun.ac.kr

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only a few studies on the epidemiological factors of plantar warts in South Korea have been conducted. This study aims to identify the clinical risk factors of patients with plantar warts at a single institution and suggest measures to prevent the recurrence and transmission of plantar warts.

MATERIALS AND METHODS

The plantar warts were defined as HPV infections that occur on the sole, including the plantar side of the toes. They were clinically diagnosed by four experienced dermatologists via skin biopsy or dermoscopy when the diagnosis was ambiguous. Warts can be clinically diagnosed if pinpoint red or black dots are clearly visible after paring hyperkeratotic lesions. This study retrospectively reviewed the electric medical records of patients who were diagnosed with plantar warts at Chosun University Hospital in South Korea from January 2019 to December 2022.

Demographically, this study investigated several factors, including age, gender, and occupation. Occupations were classified based on the Korean Standard Classification of Occupations (KSCO). However, unemployed individuals and students who were not classified as KSCO were added separately. Moreover, we categorized the occupations into those that involve a high level of activity and those that do not, excluding students. Active occupations were defined as those primarily requiring outdoor or physical activities.

The characteristics of warts were explored, encompassing the duration of the disease, previous treatment history, the number of family members with warts, and trauma history, such as removal with nail clippers and contusion. The location and quantity of warts were also determined. The number of warts was categorized as 1, 2~4, and 5 or more. Personal characteristics, including the presence or absence of flat feet, hyperhidrosis, walking barefoot at home, engagement in sports barefoot, the use of public showers, and the most worn types of footwear, were evaluated. Finally, environmental aspects, such as occupation, residence, and the season in which the lesion occurred, were investigated. The residence was divided into urban and rural areas depending on the Korean administrative district. The study approval was obtained from the Institutional Review Board of Chosun University Hospital (IRB No. CHOSUN 2023-12-011).

1. Statistical analysis

In this study, we assessed the correlation between variables across sex and age groups (< 10, 10~19, 20~29, > 30). Chi-

square tests or Fisher's exact tests were used to determine the presence of such relationships. Moreover, multinomial logistic regression analysis was performed, with the number of warts in each group (1 group, 2~4 groups, and 5 or more groups) being the dependent variable. The independent variables included treatment history, trauma history, family members with warts, and hyperhidrosis. Their effect on the number of warts in each group was analyzed. All statistical analyses were conducted using SPSS Statistics ver. 22.0 (IBM Co., Armonk, NY, USA). All *p*-values were two-sided, and statistical significance was set at a *p*-value less than 0.05.

RESULTS

In this retrospective study, a total of 176 patients were included, with an average age of 22 years. No patient was

Table 1. Frequency analysis for patients with plantar warts (n = 176)

Characteristics	Number of patients (%)
Age, years [mean (SD)]	22 (±12.0)
Sex	
Male	132 (75)
Female	44 (25)
KSCO	
None	10 (5.7)
Students	108 (61.4)
Managers	10 (5.7)
Armed forces	5 (2.8)
Agriculture and fishery workers	2 (1.1)
Elementary workers	6 (3.4)
Clerks	21 (11.9)
Service workers	1 (0.6)
Professional workers	12 (6.8)
Sales clerks	1 (0.6)
Occupational activity	
Students	108 (61.4)
Active	21 (11.9)
Non-active	47 (26.7)

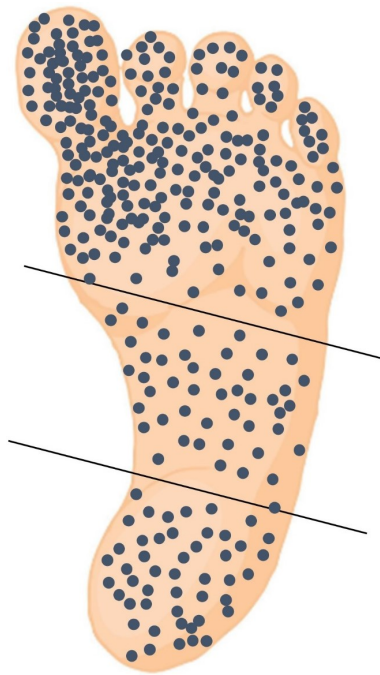


Fig. 1. Mapping of the distribution. The circles are placed on the lesion, and the weight-bearing areas are the more predominant sites.

classified as "immunocompromised", and all patients were immunocompetent. Men tend to have higher rates than women (M:F = 3:1), and students represent the largest group with 108 cases (61.4%) based on the KSCO. Moreover, when classified based on activity level, 21 cases (11.9%) were included in the active occupation group, and 47 cases (26.7%) in the non-active occupation group (Table 1).

When stratified by age, individuals in their teens and twenties accounted for the majority of all cases (73.3%). Moreover, a large proportion of patients (93.2%) had been living with the disease for more than 6 months. Of the 176 patients, 82 (46.6%) had recalcitrant warts, while 94 (53.4%) had no prior history of treatment. 27.8% of the total sample reported a family history of warts, and 33.1% of the patients reported a history of trauma. The most common locations of wart lesions were the forefoot (73.3%), followed by the toes (61.4%), midfoot (22.7%), and heel (18.8%). Fig. 1 shows the clinical characteristics of plantar warts.

The distribution of lesions was almost evenly spread, with 19.4% of all cases having only one wart, while the majority exhibited multiple lesions. Most patients (94.9%) did not have flat feet, while 29.0% had hyperhidrosis. While 85.8% of the patients walked barefoot at home, 18.2% exercised

Table 2. Gender-based differences in plantar warts (n = 176)

Characteristics	Total (%)	Sex		p-value	
		Female (%)	Male (%)		
Age	< 10	14 (8.0)	6 (42.9)	8 (57.1)	0.037
	10~19	64 (36.4)	17 (26.6)	47 (73.4)	
	20~29	65 (36.9)	13 (20.0)	52 (80.0)	
	≥ 30	33 (18.8)	8 (24.2)	25 (75.8)	
Disease duration (month)	< 6	12 (6.8)	3 (25.0)	9 (75.0)	0.937
	6~12	76 (43.2)	20 (26.3)	56 (73.7)	
	> 12	88 (50.0)	21 (23.9)	67 (76.1)	
Previous treatment history	No	94 (53.4)	28 (29.8)	66 (70.2)	0.116
	Yes	82 (46.6)	16 (19.5)	66 (80.5)	
Family member with wart	No	127 (72.2)	26 (20.5)	101 (79.5)	0.026*
	Yes	49 (27.8)	18 (36.7)	31 (63.3)	
Trauma history	No	115 (66.9)	26 (22.6)	89 (77.4)	0.204
	Yes	57 (33.1)	18 (31.6)	39 (68.4)	
Forefoot	No	47 (26.7)	15 (31.9)	32 (68.1)	0.201
	Yes	129 (73.3)	29 (22.5)	100 (77.5)	

Table 2. Gender-based differences in plantar warts (n = 176) (Continued)

Characteristics		Total (%)	Sex		ρ -value
			Female (%)	Male (%)	
Midfoot	No	136 (77.3)	36 (26.5)	100 (73.5)	0.406
	Yes	40 (22.7)	8 (20.0)	32 (80.0)	
Heel	No	143 (81.3)	33 (23.1)	110 (76.9)	0.220
	Yes	33 (18.8)	11 (33.3)	22 (66.7)	
Toes	No	68 (38.6)	21 (30.9)	47 (69.1)	0.153
	Yes	108 (61.4)	23 (21.3)	85 (78.7)	
Direction of lesion	Left	56 (31.8)	11 (19.6)	45 (80.4)	0.343
	Right	61 (34.7)	19 (31.1)	42 (68.9)	
	Both	59 (33.5)	14 (23.7)	45 (76.3)	
Number of warts	1	32 (19.4)	9 (28.1)	23 (71.9)	0.882
	2~4	87 (52.7)	24 (27.6)	63 (72.4)	
	5 or more	46 (27.9)	11 (23.9)	35 (76.1)	
Flat feet	No	167 (94.9)	41 (24.6)	126 (75.4)	0.553
	Yes	9 (5.1)	3 (33.3)	6 (66.7)	
Hyperhidrosis	No	125 (71.0)	34 (27.2)	91 (72.8)	0.291
	Yes	51 (29.0)	10 (19.6)	41 (80.4)	
Walking barefoot at home	No	25 (14.2)	9 (36.0)	16 (64.0)	0.170
	Yes	151 (85.8)	35 (23.2)	116 (6.8)	
Sports barefoot	No	144 (81.8)	35 (24.3)	109 (75.7)	0.652
	Yes	32 (18.2)	9 (28.1)	23 (71.9)	
Use of public showers	No	156 (88.6)	41 (26.3)	115 (73.7)	0.273
	Yes	20 (11.4)	3 (15.0)	17 (85.0)	
The most worn types of footwear	Dress shoes	14 (8.0)	4 (28.6)	10 (71.4)	0.160
	Slippers	29 (16.5)	10 (34.5)	19 (65.5)	
	Safety shoes	11 (6.3)	0 (0.0)	11 (100.0)	
	Sneakers	122 (69.3)	30 (24.6)	92 (75.4)	
Residence	Rural	45 (25.6)	9 (20.0)	36 (80.0)	0.369
	Urban	131 (74.4)	35 (26.7)	96 (73.3)	
Season at the time of onset	Unknown	56 (31.8)	17 (30.4)	39 (69.6)	0.229
	Spring	16 (9.1)	6 (37.5)	10 (62.5)	
	Summer	39 (22.2)	11 (28.2)	28 (71.8)	
	Autumn	14 (8.0)	2 (14.3)	12 (85.7)	
	Winter	51 (29.0)	8 (15.7)	43 (84.3)	

*Asterisk indicates statistical significance ($\rho < 0.05$)

Table 3. Differences according to age group (n = 176)

Characteristics	Total (%)	Age				p-value	
		< 10	10~19	20~29	≥ 30		
Disease duration (month)	< 6	12 (6.8)	5 (41.7)	2 (16.7)	3 (25.0)	2 (16.7)	< 0.001*
	6~12	76 (43.2)	7 (9.2)	34 (44.7)	23 (30.3)	12 (15.8)	
	> 12	88 (50.0)	2 (2.3)	28 (31.8)	39 (44.3)	19 (21.6)	
Previous treatment history	No	94 (53.4)	8 (8.5)	34 (36.2)	34 (36.2)	18 (19.1)	0.988
	Yes	82 (46.6)	6 (7.3)	30 (36.6)	31 (37.8)	15 (18.3)	
Trauma history	No	115 (66.9)	13 (11.3)	43 (37.4)	40 (34.8)	19 (16.5)	0.170
	Yes	57 (33.1)	1 (1.8)	21 (36.8)	23 (40.4)	12 (21.1)	
Forefoot	No	47 (26.7)	7 (14.9)	16 (34.0)	14 (29.8)	10 (21.3)	0.166
	Yes	129 (73.3)	7 (5.4)	48 (37.2)	51 (39.5)	23 (17.8)	
Midfoot	No	136 (77.3)	13 (9.6)	49 (36.0)	50 (36.8)	24 (17.6)	0.504
	Yes	40 (22.7)	1 (2.5)	15 (37.5)	15 (37.5)	9 (22.5)	
Heel	No	143 (81.3)	10 (7.0)	59 (41.3)	49 (34.3)	25 (17.5)	0.045*
	Yes	33 (18.8)	4 (12.1)	5 (15.2)	16 (48.5)	8 (24.2)	
Toes	No	68 (38.6)	8 (11.8)	17 (25.0)	23 (33.8)	20 (29.4)	0.005*
	Yes	108 (61.4)	6 (5.6)	47 (43.5)	42 (38.9)	13 (12.0)	
Direction of lesion	Left	56 (31.8)	4 (7.1)	19 (33.9)	17 (30.4)	16 (28.6)	0.148
	Right	61 (34.7)	8 (13.1)	21 (34.4)	23 (37.7)	9 (14.8)	
	Both	59 (33.5)	2 (3.4)	24 (40.7)	25 (42.4)	8 (13.6)	
Number of warts	1	32 (18.2)	3 (9.4)	12 (37.5)	10 (31.3)	7 (21.9)	0.277
	2~4	72 (40.9)	7 (9.7)	25 (34.7)	22 (30.6)	18 (25.0)	
	5 or more	72 (40.9)	4 (5.6)	27 (37.5)	33 (45.8)	8 (11.1)	
Flat feet	No	167 (94.9)	14 (8.4)	60 (35.9)	62 (37.1)	31 (18.6)	0.797
	Yes	9 (5.1)	0 (0.0)	4 (44.4)	3 (33.3)	2 (22.2)	
Hyperhidrosis	No	125 (71.0)	9 (7.2)	43 (34.4)	44 (35.2)	29 (23.2)	0.129
	Yes	51 (29.0)	5 (9.8)	21 (41.2)	21 (41.2)	4 (7.8)	
Walking barefoot at home	No	25 (14.2)	3 (12.0)	8 (32.0)	6 (24.0)	8 (32.0)	0.187
	Yes	151 (85.8)	11 (7.3)	56 (37.1)	59 (39.1)	25 (16.6)	
Sports barefoot	No	144 (81.8)	8 (5.6)	49 (34.0)	57 (39.6)	30 (20.8)	0.016*
	Yes	32 (18.2)	6 (18.8)	15 (46.9)	8 (25.0)	3 (9.4)	
Use of public showers	No	156 (88.6)	11 (7.1)	59 (37.8)	58 (37.2)	28 (17.9)	0.440
	Yes	20 (11.4)	3 (15.0)	5 (25.0)	7 (35.0)	5 (25.0)	
The most worn types of footwear	Dress shoes	14 (8.0)	0 (0.0)	0 (0.0)	5 (35.7)	9 (64.3)	< 0.001*
	Slippers	29 (16.5)	1 (3.4)	16 (55.2)	11 (37.9)	1 (3.4)	

Table 3. Differences according to age group (n = 176) (Continued)

Characteristics		Total (%)	Age				<i>p</i> -value
			< 10	10~19	20~29	≥ 30	
The most worn types of footwear	Safety shoes	11 (6.3)	0 (0.0)	0 (0.0)	9 (81.8)	2 (18.2)	0.072
	Sneakers	122 (69.3)	13 (10.7)	48 (39.3)	40 (32.8)	21 (17.2)	
Season at the time of onset	Unknown	56 (31.8)	2 (3.6)	19 (33.9)	21 (37.5)	14 (25.0)	
	Spring	16 (9.1)	5 (31.3)	4 (25.0)	5 (31.3)	2 (12.5)	
	Summer	39 (22.2)	3 (7.7)	11 (28.2)	18 (46.2)	7 (17.9)	
	Autumn	14 (8.0)	1 (7.1)	7 (50.0)	5 (35.7)	1 (7.1)	
	Winter	51 (29.0)	3 (5.9)	23 (45.1)	16 (31.4)	9 (17.6)	

*Asterisk indicates statistical significance ($p < 0.05$)

Table 4. Multinomial logistic regression analysis according to the number of warts

Number of warts	Characteristics	<i>p</i> -value	OR (95% CI)
2~4	Previous treatment history (No)		
	Previous treatment history (Yes)	0.922	0.958 (-0.901, 0.816)
	Trauma history (No)		
	Trauma history (Yes)	0.093	0.469 (-1.638, 0.125)
	Family member with warts (No)		
	Family member with warts (Yes)	0.414	1.544 (-0.607, 1.475)
	Hyperhidrosis (No)		
	Hyperhidrosis (Yes)	0.237	1.910 (-0.425, 1.720)
5 or more	Previous treatment history (No)		
	Previous treatment history (Yes)	0.030*	0.382 (-1.829, -0.095)
	Trauma history (No)		
	Trauma history (Yes)	0.151	0.519 (-1.551, 0.239)
	Family member with warts (No)		
	Family member with warts (Yes)	0.210	1.951 (-0.377, 1.714)
	Hyperhidrosis (No)		
	Hyperhidrosis (Yes)	0.306	1.775 (-0.524, 1.671)

*Asterisk indicates statistical significance ($p < 0.05$). OR, odds ratio; CI, confidence interval

barefoot. Moreover, 11.4% of the patients frequently used public showers. Most patients (69.3%) wore sneakers, while the others used slippers (16.5%), dress shoes (8.0%), and safety shoes (6.3%). Urban residents comprised most of the patients (74.4%). It was observed that the patients commonly

experienced a higher incidence of the disease during winter (29.0%), followed by summer (22.2%), spring (9.1%), and autumn (7.6%). When analyzing for gender differences using the above variables, no statistical significance was observed, except for family history of warts. However, a significant

relationship was found between family history of warts and gender ($p = 0.026$). The family history of warts was more common in women than in men (Table 2).

Based on the overall response regarding age, of the total of 176 participants, 14 (8.0%) were under the age of 10, 64 (36.4%) were in their teens, 65 (36.9%) were in their 20s, and 33 (18.8%) were in their 30s or older. A significant relationship between age and disease duration was also observed ($p < 0.001$). Participants under 10 years of age had a higher response rate than those with a disease duration of less than 6 months. Moreover, a significant relationship between the presence of heels and age ($p = 0.045$) was observed, indicating that individuals in their 20s were more likely to have lesions on their heels. Similarly, a significant relationship was observed between the presence of toes and age ($p = 0.005$), with individuals in their 30s or older showing a higher response rate for not having lesions on their toes. Furthermore, a significant relationship was observed between the presence of barefoot exercise and age ($p = 0.016$), with a higher response rate observed in those under 10 years of age. A cross-analysis revealed a significant relationship between the most worn types of footwear and age ($p < 0.001$). Teenagers predominantly wear slippers, whereas those in their 20s were more likely to wear safety shoes. Conversely, those in their 30s and older were more likely to wear dress shoes. Table 3 shows the conducted analysis according to age group. Moreover, after identifying the variables that had a significant effect on the number of warts (5 or more), treatment history was found to have a statistically significant effect ($p = 0.030$) (Table 4). Statistical analysis showed no significant differences in the location of plantar warts for any of the variables under investigation.

DISCUSSION

While plantar warts are more common in children and adolescents than in adults, they can occur at any age^{1,4-7}. However, it rarely occurs before the age of 5 years. The prevalence increases with age, reaching a peak distribution at 10~14 years⁶. Ghadgepatil et al.⁵ reported that the second decade were the most common group with 40% of palmo-plantar warts. Individuals in this age group are particularly susceptible to such skin lesions. They engaged in barefoot activities, which cause microtrauma of the skin and provide a risk of transmission^{6,8}. This study also considers the second and third decades as the most affected age groups. With regard to gender, more males were affected than females as observed in this study. However, the findings on gender

predominance vary¹. Students were considered the most commonly affected occupational group, emphasizing their significant representation in plantar wart diagnoses. This may be associated with their heightened susceptibility due to inappropriate immune responses and the risk of epidermal barrier penetration⁹.

Patients with hyperhidrosis tend to have a higher risk of secondary infection, including plantar warts^{1,10}. The overall risk of verruca plantaris/vulgaris is about twofold greater in individuals with hyperhidrosis¹⁰. In our study, 29.0% of the patients were identified as having hyperhidrosis. Moreover, hyperhidrosis may act as a risk factor if it is not treated well or recurred. Regulating sweating could potentially reduce the risk of HPV infection, and patients with hyperhidrosis tend to exhibit a poorer response to treatment in our clinical experience. Therefore, treating hyperhidrosis may be a crucial aspect in both the prevention and treatment of plantar warts.

Infections with HPV types are typically acquired through micro-injuries of the skin⁸. HPV transmission can occur directly from person to person. This often happens through direct skin-to-skin contact, particularly in areas where the skin is damaged. Moreover, HPV might be transmitted via contaminated objects, such as gloves, shower floors, and shoes^{8,11,12}. Understanding these modes of transmission is crucial to preventing the spread of HPV and minimizing the risk of developing skin warts. The transmission of warts within families and school classes is likely associated with its increased prevalence⁷. Recommendations should emphasize certain strategies to limit the transmission of HPV within the family⁷. Notably, in this study, 27.8% of the patients reported having family members with warts, with a significantly higher prevalence among women ($p = 0.026$). It is recommended to avoid contact with other family members with warts. This also emphasizes the importance of prompt treatment for individuals with warts to prevent further spread within the family. Moreover, approximately half of the patients in this study did not receive treatment. Among those with a history of treatment, the odds ratio of having five or more lesions compared with cases without a history of treatment was 0.382, which is considered statistically significant ($p = 0.030$). This highlights the importance of early treatment. If someone has warts, initiating early treatment can be crucial in preventing the transmission of the virus among family members.

Some studies have suggested a potential relationship between barefoot activities and the transmission of HPV among individuals^{1,13-15}. Public shower users have been shown to have a higher risk of developing plantar warts¹⁵. Although Haalen et al.⁷ reported that HPV transmission among children

mainly transmits within families and school classes, their research did not consider barefoot activities as a significant risk factor for the development of plantar warts. In our study, barefoot exercise was common among patients in the younger age group under 10 years, most patients walked barefoot at home, 18.2% of the patients engaged in barefoot exercises, and 11.4% used public showers. Such behaviors might increase the exposure to HPV. The transmission of warts is complex, and the association between barefoot activities and wart development is unclear. Nevertheless, limiting barefoot activities may be a practical measure to reduce the transmission of warts.

Deep plantar warts, also known as myrmecia warts, are characterized by their occurrence on weight-bearing areas or pressure points of the feet⁶. In this study, the location of the lesions was a weight-bearing portion, which mainly occurred in the forefoot, followed by the toe. Interestingly, occurrences on the heel, despite being a weight-bearing area, were less frequent. This could be due to the thicker and harder skin on the heel compared with the rest of the foot¹⁶. The authors suggest that plantar warts tend to develop in areas of increased pressure points, although lesions occur less frequently on the heel. It is thought that weight-bearing portion areas are considered susceptible to HPV infection because they tend to cause microtrauma which then leads to HPV invasion^{1,8}. When comparing the location of the lesions by age, toe lesions were found to be more common in those in their 20s, and sole lesions were less common in those in their 30s or older. However, since the walking habits of each patient were not assessed, these observations cannot be conclusively confirmed. Therefore, further epidemiological studies are needed to confirm these findings.

Cutaneous warts may exhibit seasonal variations¹⁷. Among them, the incidence of plantar warts is reported to rise during the winter months¹. In Korea, to our knowledge, no study has focused on seasonal differences in plantar warts; it has also been reported that the incidence of verruca plana tends to be higher in August¹⁸. In contrast to these observations, our study suggested that patients commonly experience a peak incidence of the disease during winter, followed by summer, spring, and autumn. This seasonal variation may be attributed to the potential reduction in the efficiency of the immune system during winter, rendering individuals more susceptible to HPV infection¹⁹. In a previous study, most patients with plantar warts were commonly found in rural areas, while another study reported a prevalence skewed toward urban areas^{20,21}. However, these studies did not explicitly define rural and urban areas. In the present study, we observed a predominant occurrence in urban areas. The

hospital where this study was conducted is situated in an urban area, potentially resulting in a higher proportion of patients living in urban areas. Moreover, given the higher concentration of educational facilities in urban areas in Korea, it is thought that the increased number of children residing in urban areas is attributed to the higher frequency of hospital visits. These varying trends emphasize the importance of additional epidemiological studies to comprehensively determine the factors influencing plantar wart distribution across diverse geographic landscapes.

However, this study has several limitations. First, this study has single-center retrospective design. The number of patients was relatively small. Studies with larger sample sizes are needed to calculate the prevalence. Moreover, the absence of a control group made it challenging to calculate the attributable risk associated with the development of plantar warts.

CONCLUSION

In conclusion, this descriptive study has determined the epidemiological factors associated with plantar warts in South Korea. This study emphasizes the need for research to develop prophylactic measures in preventing plantar wart occurrence and HPV transmission. These findings encompass various factors influencing plantar wart incidence. This study might offer valuable information about the epidemiological factors of plantar warts. Furthermore, these findings can contribute to lifestyle education to prevent the transmission and recurrence of plantar warts.

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CONFLICT OF INTEREST

In relation to this article, we declare that there is no conflict of interest.

DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Hoon Choi: 0000-0001-8514-3550
 Jun Ho Kwak: 0000-0002-1341-7986
 Bong Seok Shin: 0000-0001-9618-1763
 Min Sung Kim: 0000-0002-8102-6653
 Chan Ho Na: 0000-0001-5259-5382

ETHICAL APPROVAL STATEMENT

The study was approved by the Institutional Review Board of (IRB No. CHOSUN 2023-12-011). This study was conducted in accordance with the principles of the Declaration of Helsinki.

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