A cross-sectional study on the risk factors and prevalence of common warts

Ravelinda Soriano-Perez, MD; Vanessa S. Naagas, MD; and Camille B. Angeles, MD

Abstract

Introduction Common warts are frequent benign cutaneous and mucosal infections. However, recommendations from previous studies have focused on personal and public factors to prevent warts and reduce its transmission. This study aimed to determine the prevalence of common warts and its relation to individual, family, school, public, and occupational factors.

Methods This is a cross-sectional study wherein the cutaneous surfaces (except the mucosa and genitalia) of residents of Barangay Doña Imelda, Quezon City were examined for the presence of warts. Information on individual, family, school, public, and occupational risk factors was obtained from the respondents themselves, parents or guardian using a data extraction sheet. A PRR of > 1.0 was interpreted as a positive association. Chi-square and Fisher's exact tests were used to test for significance. A p-value of < 0.05 was considered significant.

Results The prevalence of common warts among 315 residents was 7.6 %. The presence of family (PRR = 6.41, 1.91), school (PRR = 1.68), and occupational (PRR = 1.50) factors increased the risk of developing warts. In contrast, a personal history of warts and public factors were not associated with the development of warts.

Conclusion The prevalence of common warts is 7.6%, compatible with the results of previous studies. Having a family member with warts, large family size (more than five family members), having at least one closest school friend with warts, and occupation (fish or meat or poultry vendor) increase the risk of developing warts.

Key words: Common warts, verruca vulgaris, risk factors, prevalence, cross-sectional study

Correspondence:
Ravelinda Soriano-Perez, MD, Section of Dermatology, Department of Medicine, University of the East Ramon Magsaysay Memorial Medical Center, Inc., 64 Aurora Boulevard, Barangay Doña Imelda, Quezon City, PH 1113; Email: ravesoriano@gmail.com

E-Poster, and oral presentation in the Free Paper Presentation during the joint 13th Asia Pacific Environmental and Occupational Dermatology Symposium and 38th Philippine Dermatological Society Annual Convention held in Edsa Shangri-La Hotel, Manila on November 4-6, 2015

Section of Dermatology, Department of Medicine, University of the East Ramon Magsaysay Memorial Medical Center, Quezon City, PH

Verrucae or warts is a benign infection of the cutaneous and mucosal surfaces caused by the human papillomavirus (HPV), a small DNA virus.[1] A high prevalence of warts exists in the general population - 3.28% in adults and 4% to 33% in children with an overall prevalence of 5.3%.[2,3,4] There are 100 HPV types causing varied clinical manifestations.[5] Common and plantar warts are caused by HPV Types 1 to 4; plane warts by Types 3, 28, 29; with poultry and fish vendors affected by Type 7.[6]

Common warts or verruca vulgaris appear as hyperkeratotic scaly dome-shaped papules and nodules appearing singly or in groups commonly on the digits and hands.[1,7] They can be filiform, flat with minimal scales or appear as "cutaneous horns". Plantar warts

appear as hyperkeratotic papules with punctate black dots representing thrombosed capillaries with pain occurring on pressure.[1] The diagnosis is often made clinically and can be confirmed histologically.[1] Transmission occurs through direct contact with individuals having clinical or subclinical infection or through fomites.[2] Development takes several months indicating a long sub-clinical infection.[1]

Previous studies recommended decreasing development and transmission by minimizing exposure within a person or in public and include avoiding touching, picking or scratching warts, avoiding using slippers in pools or public showers and keeping the feet dry.[2,8] Spontaneous clearance occurs in 40% of affected children, however, social stigma and pain warrant treatment.[4] An individual's immune status plays an important role in the spontaneous regression of the wart which may take several years. Susceptibility to infection and recalcitrant treatment is therefore seen in immunocompromised individuals.[5] Increased HPV exposure is said to have a consequent increased wart development.[2] However, studies on the epidemiology and transmission of warts are limited and are centered mostly on school children and occupational meat workers. Also, most studies are focused on warts located only on the hands and feet discounting warts on other cutaneous surfaces. Transmission of warts occur in areas prone to microtrauma with subsequent inoculation into the basal layer of the epidermis.[5] Autoinoculation occurs frequently on adjacent sites such as digits of hands.[1] Several factors such as the number of virions, quality of contact, location and immunity of the patient contribute to disease spread.[1]

According to Kilkenny a large household of more than five inhabitants increases the chance of spread while those with only one offspring decreases infectivity, similar to the findings of Kasim.[6,9] Van Haalen showed no association between environmental risk factors and wart development.[10] This is in contrast to the presence of warts in the family and class which increased the development of warts. Bruggink confirmed the previous results that the presence of warts in the family and in class were associated with wart development in contrast to a personal history of warts and the use of public pools which had no independent association.[2] Occupational factors also affect the prevalence of warts. Poultry, fish and meat handlers have an increased prevalence of warts on their hands due to trauma and maceration of the skin.[6] Keefe concluded that HPV Type 7 can be attributed to contact with meat which may be a means of transmission from one person to another.[11]

The general objective of the study was to determine the prevalence of common warts and its relation to individual, family, school, public, and occupational factors. The specific objectives are to determine the association of the following characteristics with the development of common warts: personal history of warts; presence of family member with warts and large family size; presence of warts in at least one close school friends; use of public swimming pools and/or public shower; and being a fish/meat/poultry vendor. The researchers included other cutaneous surfaces such as the face, trunk, and extremities aside from the hands and the feet in this study unlike that of Van Haalen who examined only the hands and the feet.[10] This study did not include examination of the genitalia and the mucosa.

Methods

This was a cross-sectional study done in Barangay Doña Imelda, Quezon City in September 7-22, 2014, using simple random sampling. Approval from the UERMMMCI Research Institute for Health Sciences Ethics Review Committee (ERC 0119/e/h/14/26; approved September 4, 2014) was obtained prior to conducting the study proper. Data on individual, family, school, public, and occupational factors were obtained by the principal investigator through one-on-one interviews using a data extraction sheet.

Included in the study were residents of Barangay Doña Imelda, with or without common warts, both male and female, of any age. Those who had warts located on the genitalia or mucosa and those with serious concurrent medical conditions (such as uncontrolled diabetes mellitus, immunocompromised state, positive for human immunodeficiency virus, cancer, chronic kidney disease) were excluded from the study as these groups of individuals are susceptible to the infection. Assuming a 95% confidence interval, level of significance at $p < 0.05$, the sample size was computed at 308 based on an estimated prevalence of 5.3% in the population using Kelsey/Fleiss method.[4] A simple random sampling was done. Household numbers were secured from the Doña Imelda Barangay Hall. The barangay was divided into 12

blocks. Based on the sample size of 308 and assuming that there were five members per household, five to six households per block were picked using a fishbowl technique. The respondents were then picked from each household. A respondent was included in the study if he/she met all the inclusion criteria and had none of the exclusion criteria.

Informed consent and assent, when applicable, were obtained from all eligible participants. Each respondent underwent a one-on-one interview and examination by the principal investigator with a barangay health worker present. Those who were found to have common warts had the lesions were measured in centimeters using a 15-centimeter stainless steel straight ruler. Clinical photographs were obtained for documentation as exemplified by Figures 1 and 2. Electronic pictures of warts were shown to the respondents to help them identify and recall a previous history of warts and the presence of such among household members and closest school friends to minimize information bias.

The study used a data extraction sheet that was developed from a review of related literature. This contained the name, age, sex, marital status, contact number, address, occupation, and level of education of the respondent. Questions regarding personal history of warts, presence of warts in the family, number of family members, presence of warts in at least one of closest school friends, a history of use of public swimming pools and/or public shower, and whether he/she was a fish/meat/poultry vendor, were answerable by yes or no. The questionnaire was in both English and Tagalog to facilitate communication between the principal investigator and the respondent.

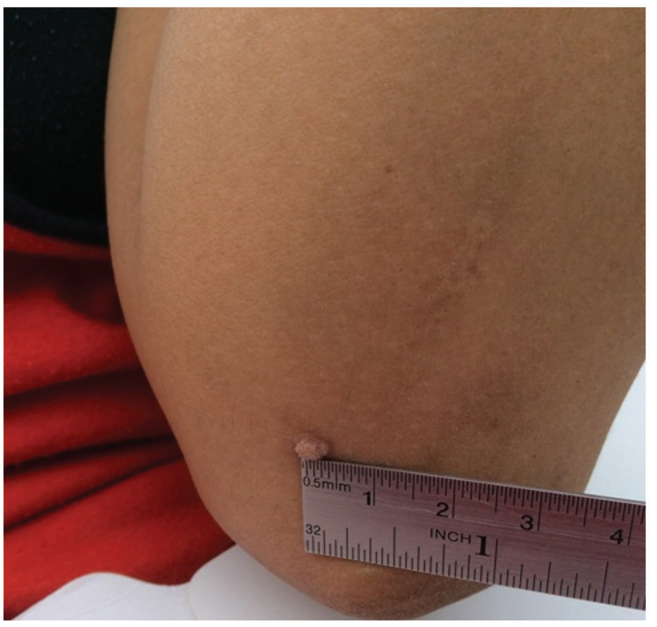

Figure 1. A 0.3 cm hyperkeratotic papule on the left forearm, of four years duration, in a 13-year-old, female.

Figure 2. A 0.2 cm hyperkeratotic papule on the right hand, of one year duration, in a 45-year-old, male.

The dependent variable in this study was the number of patients with common warts seen in Barangay Doña Imelda. Microsoft Excel© was used encode the data and to plot the graphs. Data analyses were done using GraphPad Prism version 5© statistical software. Percentage, mean, standard deviations and range were reported to describe the population characteristics. The prevalence rate ratio (PRR) was used to determine association. A PRR of > 1.0 was interpreted as a positive association. Chi-square and Fisher's exact tests were used to test for significance. A p-value of < 0.05 was considered significant.

Results

There were 315 respondents seen and assessed, with a mean age of 27.4 years; there were more women (203 vs 112). There was no statistically significant difference in terms of baseline demographics between those with common warts and those without as shown in Table

1. The overall prevalence was 7.6% and was highest in the 10-14-year age group (16%) compared with the other age brackets (5.13%, 4%, 9.09%, respectively). The sex specific prevalence rate was twice as high in females (9.36% vs 4.46%). Among those with common warts, the mean duration of the lesions was 2.5 years, the average number of lesions was 1.5, and the mean diameter was 0.4 cm. Around 95% of common warts were noted in the hand, trunk/extremities, and foot (45.8% 29.2%, and 20.8%, respectively) as shown in Table 2.

Having a family member with warts was associated with a six-fold increase in the risk of developing warts (PRR = 6.4; 95% CI 2.94, 13.99; $p < 0.001$). Having more than five family members with warts (PRR = 1.9, 95% CI 0.84, 4.34), a close friend in school with warts (PRR = 1.7, 95% CI 0.08, 33.5), and being a fish, meat or poultry vendor (PRR = 1.5, 95% CI 0.54, 4.16) increased the risk for developing warts but were not statistically significant. A previous history of warts may decrease the risk by 36% (PRR = 0.64, 95% CI 0.23, 1.81; $p = 0.465$). The use of public swimming pools and/or shower had minimal effect on the risk of developing warts (PRR = 0.92; 95% CI 0.43, 1.99; $p = 0.84$). These results are shown in Table 3.

Discussion

The results of this cross-sectional study reveal that the prevalence of common warts in Barangay Doña Imelda, Quezon City is 7.6 %, with 2.2% occurring in children and 5.4% in adults. This was almost similar to a previous study with an overall prevalence of 5.3%,

Table 2. Characteristics of warts.

Characteristic	n (%)
Disease duration (year)	
< 1	8 (33.3)
1	7 (29.2)
2	5 (20.8)
10	4 (16.7)
Mean	2.49
Number of lesions	
1	14 (58.3)
2	8 (33.3)
3	2 (8.33)
Mean ± SD	1.5 ± 0.66
Location	
Hand	11 (45.8)
Foot	5 (20.8)
Hand and foot	1 (4.2)
Trunk or extremities	7 (29.2)
Size (cm)	
Mean ± SD	0.40 ± 0.20

Table 1. Patient demographics and characteristics of warts.

	With warts (n = 24)	Without warts (n = 291)	All patients (n = 315)	Prevalence rate (%)	p-value
AGE (years; mean ± SD)	35.5 ± 20.7	26.7 ± 19.3	27.37 ± 19.60	Age specific prevalence rate (%)	
0 – 11 months	0	6	6	0.00	
12 – 23 months	0	6	6	0.00	
2 – 4 years	0	27	27	0.00	
5 – 9 years	2	37	39	5.13	
10 – 14 years	4	21	25	16.00	
15 – 19 years	1	24	25	4.00	
20 years and over	17	170	187	9.09	
GENDER, n (%)				Sex specific prevalence rate (%)	
Male	5 (19%)	107 (37%)	112 (36%)	4.46%	
Female	19 (81%)	184 (63%)	203 (64%)	9.36 %	0.127+

+Fisher's Exact Test

Table 3. Factors in developing common warts.

Factor	With warts (n = 24)	Without warts (n = 291)	PRR (95% CI)	p-value
Personal history of warts	4/20	71/220	0.64 (0.23, 1.81)	0.466+
Family history	15/9	50/241	6.41 (2.94, 13.99)	< 0.001*
> 5 family members with warts	16/8	145/146	1.9 (0.84, 4.34)	0.113*
Close school friend with warts	0/24	3/288	1.68 (0.08, 33.51)	1.00+
Use of public swimming pool and/or shower	13/11	164/127	0.92 (0.43, 1.99)	0.84*
Fish/ meat/ poultry vendor	4/20	33/258	1.50 (0.54, 4.16)	0.504+

+ Fisher's Exact Test *Chi-square test

having 3.28% in adults and 4% to 33% in children.[2-4] Common warts was found to be most prevalent among the 10-14-years age group which was consistent with the studies of Kilkenny, Pragya, Kasim, and Van Haalen.[6,7,9,10] Moreover, it was more prevalent in females unlike the findings of Bruggink, Kilkenny, and Kasim.[2,6,9] However, a similar female preponderance was noted by Pragya owing to the increased awareness of unpleasant lesions on their face.[7] The hand was the most commonly involved site (45.83 %) which was consistent with the results of Pragya owing to its direct skin-to-skin contact transmission and trauma-prone location.[8]

Though the result of this study is not statistically significant, it supported the findings of Bruggink that there is no association between personal history of warts and development of warts. This could be because HPV exposure, host susceptibility, immunogenicity, and host immune status are important factors to consider in the development of warts.[2] That having a family member with common warts and having more than five family members with common warts increased the risk six- and two-fold, respectively, are consistent with previous studies.[2,6,9,10] This could be explained by a higher degree of exposure and crowding.[8] The higher risk of developing common warts among those with at least one close school friend correlates with the findings of Bruggink.[2] The findings regarding the use of public swimming pools and showers are consistent with previous studies.[2,10] Being a fish, meat or poultry vendor was associated with a higher risk of developing warts, consistent with a previous study which explained it on the basis of the meat, fish or poultry being a means of transmission of the virus.[6] The respondents' or parent or guardian's assessment and recall of a personal history of warts, presence of warts in at least one closest school friend, and environmental risk factors may have influenced the outcome of the study leading to information bias.

A high prevalence of common warts was found in Barangay Doña Imelda, Quezon City wherein the highest age specific prevalence rate was seen among children 10-14 years, with females having the highest sex-specific prevalence rate. The results of the study correlate well with previous studies done in other countries or communities. A personal history of warts and use of public swimming pools and/or public shower were not associated with the development of warts. On the other hand, having a family member with warts, large family size (more than five family members), having at least one closest school friend with warts, and occupation (fish or meat or poultry vendor) increased the risk of developing warts. Based on the findings, the researcher recommends that measures to limit the spread of warts be directed to the family, school and specific occupations.

Acknowledgement

The authors would like to express their deepest gratitude to Dr. Jose Ronilo G. Juangco for helping them with the sampling and statistics.

References

1. Androphy EJ, Lowy DR. Warts. In: Wolff K, Goldsmith LA, Katz SI, Gilchrest BA, Paller AS, Leffell DJ (eds). Fitzpatrick's Dermatology in General Medicine. 7th ed. New York, New York: McGraw-Hill; 2008. Pp 1914–23.
2. Bruggink SC, Eekhof JA, Egberts PF, Sophie CE, van Blijswijk, Assendelft W, Gussekloo, J. Warts transmitted in families and schools: A prospective cohort. Pediatrics [Internet]. 2013 May; 131(5): 928-34. doi: 10.1542/peds.2012-2946

3. Kwok CS, Holland R, Gibbs S. Efficacy of topical treatments for cutaneous warts: A meta-analysis and pooled analysis of randomized controlled trials. Br J Dermatol [Internet]. 2011 Aug; 165(2): 233-46. doi: 10.1111/j.1365-2133.2011.10218.x
4. Kyriakis KP, Pagana G, Michailides C, Emmanuelides S, Palamaras I and Terzoudi S. Lifetime prevalence fluctuations of common and plane viral warts. J Eur Acad Dermatol Venereol [Internet]. 2007 Feb; 21(2): 260-2. doi: 10.1111/j.1468-3083.2006.01833.x
5. Cardoso JC, Calonje E. Cutaneous manifestations of human papillomaviruses: A review. Acta Dermatovenerol Alp Pannonica Adriat [Internet]. 2011 Sep; 20(3): 145-54.
6. Kilkenny M, Marks R. The descriptive epidemiology of warts in the community. Australas J Dermatol [Internet]. 1996 May; 37(2): 80-6. doi: 10.1111/j.1440-0960.1996.tb01010.x
7. Kushwaha P, Singh S, Kumar H, Mohan A, Kaur S, Kaur S. Warts – Spectra of different clinical presentation. IOSR-JDMS [Internet]. 2014 Aug; 13(8): 62-4.
8. American Academy of Dermatology. Warts: Tips for managing [Internet] [cited 16 February 2014] Available from: http://www.aad.org/dermatology-a-to-z/diseases-and-treatments/u---w/warts/tips
9. Kasim K, Amer S, Mohamed M, Abdel-Wahed A, Allam H. Some epidemiologic aspects of common warts in rural primary school children. ISRN Epidemiology [Internet]. 2013 November [cited August 07, 2013]. Available from: http://www.hindawi.com/journals/isrn/2013/283591/ref/
10. van Haalen FM, Bruggink SC, Gussekloo J, Assendelft WJ, Eekhof JA. Warts in primary schoolchildren: prevalence and relation with environmental factors. Br J Dermatol. 2009 Jul; 161(1): 148-52. doi: 10.1111/j.1365-2133.2009.09160.x
11. Keefe M, al-Ghamdi A, Coggon D, Maitland NJ, Egger P, Keefe CJ, Carey A, Sanders CM. Cutaneous warts in butchers. Br J Dermatol [Internet]. 1994 Jan; 130(1): 9-14. doi: 10.1111/j.1365-2133.1994.tb06874.x