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Original Article

Non-genital warts among primary school students in Bilkas District, Egypt: Prevalence and associated factors

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Abstract

Background Warts are common skin disease among children and adolescent due to various behavioral, environmental and hygienic factors. The present study aims to estimate the prevalence of non-genital warts and its independent predictors in primary school students in Bilkas District, Egypt.

Methods A cross-sectional study was done on 1304 primary schools pupils. Data collected included sociodemographic characteristics and hygienic practices. Students were clinically examined for presence of warts, their number, site, duration and history of recurrence. Cases were referred for treatment at Dermatology clinic, Mansoura University Hospital.

Results About 10% of students had one or more non-genital warts. The logistic regression analysis revealed that the independent predictors of presence of warts, were low and middle socioeconomic status (AOR=14.5 and AOR=8.7; respectively), students in rural residence (AOR=2.5), students sharing shoes (AOR=2.8) and students from grade 1 to 3 (AOR=2.1).

Conclusion The prevalence of non-genital warts was relatively high among primary school pupils in Bilkas District. The risk is higher in low and middle socioeconomic status, rural residence and sharing shoes. Health education about personal hygiene and the other preventive measures is important.

Key words
Non-genital, warts, prevalence, students.

Introduction

Wart is a contagious skin disease caused by Human Papillomavirus (HPV). It spreads by contact with infected person or infected materials. Multiple exposures might be enhanced by sharing personal clothes and barefoot activities including swimming, public showers and sporting barefoot.[1,2]

There are many types of warts including common warts usually grow on toes and fingers, but can appear elsewhere; planter warts grow on the soles; flat warts grow on the face, arms and thighs; filiform warts grow mostly around the mouth or nose and periungual warts that grow under and around the toenails and fingernails.[3]

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About one-third of children and adolescents are estimated to have warts, but only 3-5% of adults. This is probably because the immune system becomes better able to prevent their development over time. People with a weakened immune system are likely to have warts.[4] Warts are very common in primary school students with overall prevalence ranging from 0.84% to 33% in different countries.[5-8] Few studies from Egypt reported wart prevalence rate of 2.3% and 10.3%.[9,10] However, knowledge on wart epidemiology and its risk factors are unknown in Bilkas District. This study aims to estimate the prevalence of warts in primary school students in Bilkas District and its associated risk factors.

Methods

This cross-sectional study was done in primary schools of Bilkas District, Egypt during the academic year of 2019/2020. Bilkas District is a predominantly conservative rural population located about 170 Km north of Cairo.

Sample size was calculated using Medcalc 15.8 (https://www.medcalc.org/). The primary outcome of interest is the per cent of warts among primary school students. A previous study found that was 10.3% of students have warts.[10] With alpha error of 5%, study power of 80%, 3% precision and design effect of two due to stratified cluster sampling technique, then the sample size is 1304 students. A total of 1434 questionnaire were distributed with a response rate of 90.9%.

Students were selected using stratified cluster sampling technique. First schools were stratified into urban and rural. Then urban schools were stratified into private and governmental schools. Out of 138 schools six (Al-Imam Al-Shafey, Mahfouza, Mohamed Awad, Rashid language, Al-Nahda and Dimelash primary school) were selected by systematic random sample from the list of all schools. The sample of students was distributed proportionally between the different strata. Within each school one or more cluster (class) was selected from each educational grade. All students within the selected classes were included. There were no exclusion criteria.

An Arabic questionnaire was developed after reviewing literatures and consulting experts, where the questionnaire was amended based on their comments. The following data were collected:

1. Sociodemographic data e.g. age, sex, residence, type of school and educational year. The family socioeconomic status (SES) was assessed according to El-Gilany, et al.[11]
2. Hygiene regarding number of bathes, existence of animals within houses, sports, barefoot activities such as swimming and practicing sports barefoot.

Data collection approach: The questionnaire with an informed written consent of acceptance of external examination of the student were sent to be filled out by children' parents at home. Each child was clinically examined for presence of non-genital warts. The following data were recorded for the affected students: number of warts, site, type (common, plane, planter, filliform), duration and history of recurrence. Cases were referred to treatment at Mansoura University Dermatology clinic.

Ethical considerations: Study protocol will be approved by IRB of Mansoura Medical College (MS.19.12.973.R1- 2019/12/29). Official approvals were obtained from the school authority. Parents signed an informed written consent before completing the questionnaire after assuring confidentiality of data.

Data analysis: Data underwent analysis by SPSS program for Windows (Standard version 24).

Chi-square tested categorical data significance. Crude Odds Ratio (COR) and its 95% Confidence Interval (CI) was calculated. Significant associations in univariate analysis were included in a logistic regression model. Adjusted Odds Ratio (AOR) and its 95% CI was calculated to find out the independent predictors of warts. A result was considered significant when $p \leq 0.05$.

Results

Table 1 shows that 9.97% of students had one or more non-genital warts. Warts were more prevalent among students of governmental schools than private schools (OR=4.1); students from grade one to three than grade 4 to grade 6 (OR=1.9); students of rural than urban residence (COR=1.7) and those very low/low and middle SES than high SES (COR=10.5 and 6.8; respectively).

Table 2 shows that the risk of warts was significantly higher in students sharing shoes (COR=2.4), sharing clothes or towels (COR=1.7) and bare foot activity (COR=1.9).

The logistic regression analysis revealed that the independent predictors of presence of warts, were low SES (AOR=14.5), middle SES (AOR=8.7), students in rural residence (AOR=2.5), students sharing shoes (AOR=2.8) and students from grade 1 to 3 (AOR=2.1) **(Table 3)**.

Table 4 shows that 6.2% of students reported that their warts are recurrent, 56.9% had warts of <8 months duration, 36.9% received medical treatment, 92% had one wart, 49.2% of warts were plantar and 49.2% of warts were in the sole.

Discussion

In this study, the whole prevalence of warts was 9.97%. This is comparable to 10.3% in Tema District, Sohag, Egypt[10] and 9.04% in Saudi Arabia.[8] In contrast lower prevalences were reported from different localities in Egypt. The prevalence was 4.7% among primary school children in Fayoum; 7.4% Cairo city and 2.3% in the hands only in lower Egypt.[9,13]

Table 1 Prevalence of non-genital warts and its variations according to socio-demographic data.

	Total	*Students with warts*	*χ2 (p value)*	*COR (95% CI)*
Overall	1304	130 (9.97)		
Age	744	82 (11.0%)	2.14(0.14)	1.3 (0.9-1.9)
≤ 9 y	560	48 (8.6%)		1 (r)
> 9 y				
Sex				
Male	583	58 (9.9%)	0.001(0.98)	1 (r)
Female	721	72 (10.0%)		1.0 (0.7-1.4)
Type of school				
Governmental	1231	128 (10.4%)	4.50(0.034)	4.1 (1.01-16.9)
Private school	73	2 (2.7%)		1 (r)
Residence				
Rural	705	85 (12.1%)	7.5(0.006)	1.7(1.2-2.5)
Urban	599	45 (7.5%)		1 (r)
Grade				
G1 to G3	637	82 (12.9%)	11.69(0.001)	1.9 (1.3-2.8)
G4 to G6	667	48 (7.2%)		1 (r)
SES				
Low	343	55 (16.0%)	42.1(≤0.001)	10.5 (4.5-24)
Middle	625	69 (11.0%)	26 (≤0.001)	6.8 (2.9-15.9)
High	336	6 (1.8%)	-	1 (r)

Table 2 Variations of non-genital warts according to students' behaviors.

	Total	*Students with warts*	*χ^2 (p value)*	*COR (95% CI)*
Child suffering from hyperhidrosis				
Yes	101 (7.7%)	15 (14.9 %)	2.9 (0.09)	1.6 (0.9-2.9)
No	1203 (92.3%)	115 (9.6%)		1 (r)
Family history				
Yes	76 (5.8%)	11 (14.5 %)	1.8 (0.17)	1.6 (0.8-3.1)
No	1228 (94.2%)	(%)		1 (r)
Favorite sports				
Swimming (r)	82 (6.3%)	3 (3.7 %)	-	1 (r)
Football	441 (33.8%)	46 (10.4 %)	3.7 (0.06)	3.1(0.9-10)
Basketball	53 (4.1%)	6 (11.3 %)	3.0 (0.08)	3.4 (0.8-14)
Running	728 (55.8%)	75 (10.3 %)	3.7 (0.06)	3.0 (0.9-9.8)
Child labor				
Yes	20 (1.5%	2 (10.0 %)	0.001(0.9)	1.0 (0.2-4.4)
No	1284 (98.5%)	128 (10.0%)		1 (r)
Raising animals or birds				
Yes	503 (38.6%)	58 (11.5 %)	2.2 (0.14)	1.3 (0.9-1.9)
No	801 (61.4%)	72 (9.0%)		1 (r)
Sharing shoes				
Yes	173 (13.3%)	32 (18.5 %)	16.2 (≤0.001)	2.4 (1.5-3.7)
No	1131 (86.7%)	98 (8.7%)		1 (r)
Sharing clothes				
Yes	308 (23.6%)	44 (14.3 %)	8.4 (0.004)	1.7 (1.2-2.6)
No	996 (76.4%)	86 (8.6%)		1 (r)
Exposure to water canal swimming, fishing				
Yes	43 (3.3%)	7 (16.3 %)	1.9 (0.16)	1.8 (0.7-4.1)
No	1261 (96.7%)	123 (9.8%)		1 (r)
Swimming in pools				
Yes	61 (4.7%)	5 (8.2 %)	0.22 (0.6)	0.8 (0.3-2.1)
No	1243 (95.3%)	125 (10.1%)		1 (r)
Bare foot activity				
Yes	196 (15%)	31 (15.8 %)	8.8 (0.003)	1.9 (1.2-2.9)
No	1108 (85.0%)	99 (8.9%)		1 (r)
Scratches or wounds on the child skin				
Yes	150 (11.5%)	21 (14.0 %)	3.1 (0.08)	1.5 (0.9-2.6)
No	1154 (88.5%)	109 (9.4%)		1 (r)

r= reference group, COR=crude odds ratio, CI=Confidence interval,

A much lower rates were reported in different countries e.g. 2.8% in Taiwan, 4.5% in another Saudi study and 6.9% in Romania.[14-16] A higher prevalence of 13.1% was reported in Kuwait.[17] The highest prevalence was 33% in Dutch countries.[7] This wide variation in prevalence of warts among different studies could be attributed to variations of sociodemographics and risk factors, as well as availability and utilization of health facilities among studied populations.[7] The availability of adequate school health services help in early diagnosis and treatment for the affected children, which shorten the wart duration and moderate the prevalence.[18,19]

The socioeconomic status (SES) has a clear effect on the prevalence of warts in this study. The low and middle SES of families are independent predictors of the prevalence of warts.

Similar findings were reported in Taiwan, in the Netherlands and in Saudi Arabia.[6,8,20]

Table 3 Multivariable logistic regression analysis of independent predictors of presence of non-genital warts.

Independent predictors	*β*	*p*	*AOR (95%CI)*
Residence			
Rural	0.9	≤0.001	2.5(1.7-3.7)
Urban			1 (r)
Grade			
G1 to G3	0.7	0.001	1.9 (1.3-2.9)
G4 to G6			1 (r)
SES			
Very Low	2.8	≤0.001	16.3 (6.8-39.2)
Middle	2.2	≤0.001	9.0(3.8-21.2)
High	-	-	1(r)
Sharing shoes			
Yes	0.7	0.004	2.0 (1.3-3.2)
No			1 (r)
Constant		-4.6	
Model χ^2		97.2, P ≤0.001	
% correctly predicted		90.0%	

AOR= adjusted OR, CI=Confidence interval, r=reference category

Table 4 Clinical characteristics of students with warts.

Clinical characteristics	*Students with warts (n=130)*
Recurrent warts	8 (6.2%)
Duration (months)	
< 8	74 (56.9%)
≥8	56 (43.1%)
Current treatment	
No	34 (26.2%)
Medical	48 (36.9%)
Surgical	2 (1.5%)
Cryotherapy	21 (16.2%)
Immunotherapy	7 (5.4%)
Electrocautery	18 (13.8%)
Number of warts	
One	120 (92%)
Two	8 (6.1%)
Three	2 (1.5%)
Site#	
Sole of the Foot	70 (49.2%)
Palmer surface of hand	25 (17.6%)
Dorsal surface of hand	24 (16.9%)
Face	14 (9.8%)
Fingers	5 (3.5%)
Leg	3 (2.1%)
Type#	
Planter	70 (49.2%)
Common	57 (40.0%)
Plane	15 (10.8%)

#142 warts.

Factors such as overcrowding, low hygiene and sharing personal fomites, and delay to seek treatment are not uncommon among children in families with low socio-economic status. Previous studies[8,9] reported that parenteral education and work nature (the most important determinants of SES) had an effect on warts' prevalence. Highly educated fathers of skilled job, as well as a working mother were linked to low prevalence of warts. High SES certainly affects standards of hygiene within the family and health awareness; as educated parents will seek care for the affected children.[21] This practice does not affect wart incidence, it decreases the prevalence through shortening disease duration.

Rural residence is an independent predictor of warts among students. This agrees with previous studies in other countries.[6,20,22,23] This is in contrast to van Haalen et al., in Netherlands and Kasim et al., and Essa et al., in other Egyptian studies.[6,9,10] Lower hygiene, overcrowding, sharing of personal fomites, and delayed medical advice are more common in rural areas.

Sharing shoes with a family member is as independent risk factors of warts. This habit is more likely to be common in big families and

lower socio-economic status. This is consistent with previous studies Egypt; Taiwan; the Netherlands; Saudi Arabia.[6,8,10,15,20]

This study the bivariate analysis revealed that the prevalence of warts is higher in students enrolled in governmental schools than private schools (10.4% vs. 2.7%). This is in line with previous studies.[6,8,15,20] Students of previous school belongs to rich families with high SES

In this study the bivariate analysis revealed that prevalence of warts was not affected by age, sex, hyperhidrosis, positive family history, practicing sports raising animals in homes, exposure to water canal, swimming, and fishing, swimming in swimming pools, scratches or wounds on the child skin. This finding are consistent with the results of several previous studies conducted in different countries, including Egypt.[2,6,9,13,20,23] In contrast, other researchers revealed a greater prevalence among male children aged 8-12 years as they are more exposed to out-of-doors activities and can get infected e.g. exposure to water channels.[8,24] This difference between studies might reflect difference in socio-demographic states as well as distribution of risk factors in children along with differences in inclusion criteria.[10]

Planter warts were the most prevalent type in this work (49.2%) followed by common warts (49.2% and 40.0% respectively). This is consistent with van Haalen et al.[6] However many previous studies in Egypt and other countries reported greater affection with common warts followed by planter ones.[10,12,18,25]

In the current study 26.2% of student refused treatment, 36.9% had medical treatment, 1.5% had Surgical treatment, 16.2% treated by Cyotherapy, 5.4% with Immunotherapy and 13.8% treated by Electrocautary; treatment was by the help of dermatology outpatient clinics in Mansoura University Hospital. This is in line with[26] which showed that many parents bring children for treatment of warts. Salicylic acid and cryotherapy are the most effective therapies, being available and safe. Compared to salicylic acid, cryotherapy is more effective, but is more painful. Combined treatments might be used for better cure. Other treatments, such as immunotherapy might be used in extensive warts. However, the data regarding effectiveness and safety among pediatric population is limited and must only be considered when other treatments fail.[7,24]

The hands were the most commonly affected sites in this study. This agrees with many previous studies.[15,25] Hands are more likely to contact a contaminated surfaces during play and children have the natural tendency to pick or scratch at existing warts.

Many warts, however, resolve spontaneously within a few years even without treatment. The majority (92%) of student had single warts and 6.2% of them reported that their warts are recurrent. A study of school children in Netherlands found that 43% had multiple warts and spontaneous resolution was common and was higher in younger immunocompetent children.[7,24] These differences can be attributed to genetic, environmental and hygienic factors.

Conclusion

The prevalence of non-genital warts was relatively high (10%) among primary school students in Bilkas district and is comparable to previous studies in Egypt. The independent predictors of presence of warts were low and middle socioeconomic status urban residence and sharing shoes. There is a need for regular screening and adequate treatment of students with wart. Health education of students, teachers and families about personal hygiene as

preventive measures is important. A large scale national study is recommended for more evaluation of the risk factors of warts and their effects on child health. Given the high prevalence of warts with lack of practical reliable method of prevention, there is a need for studies on using HPV prophylaxis for prevention and controlling the spread of warts in high risk population.

Study limitations: This cross sectional study had some limitations first, it is a onetime estimate of both outcome and exposure, and it is hard to conclude causal relationships and determine the direction of associations. Second, the prevalence depends on the incidence as well as the length of the disease duration. Cross-sectional studies are not sufficient to apprehend disease trends. Third, genital warts were not included as its examination could face moral and cultural considerations. Lastly, it was done in a single district and its results cannot be generalized to national level.

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