

Research Article

Some Epidemiologic Aspects of Common Warts in Rural Primary School Children

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Cutaneous warts are common in children worldwide, although the prevalence figures are conflicting. There are few publications on that issue, particularly in rural Egypt. The present cross-sectional study aimed to assess the prevalence of warts of hands in rural primary school children and to examine some risk factors associated with warts in these children. The study examined 1833 children from 15 rural primary schools in Dakahlia governorate, Egypt, for the presence of warts. Data about sociodemographic, lifestyle, and environmental factors were collected. Prevalence of warts was estimated. Appropriate statistical analyses including multivariate logistic regression were done. The prevalence of warts of hands in the studied children was 2.3% (1.3–3.3%) with no significant sex difference. The risk of warts increased significantly in children reported swimming in Nile channels (adjusted odds ratio (OR) = 5.6; 95% confidence interval (CI) = 2.9–10.6) and child labor (adjusted OR = 4.5; 95% CI = 2.3–8.8). A ninety percent risk reduction was observed in children with educated parents. The study findings demonstrated a significant increase in the risk of warts among rural children reported swimming in Nile channels and child labor. Parents' education, on the other hand, was found to play an important role in risk reduction.

1. Introduction

Skin diseases are a common cause of morbidity, especially among school children, worldwide [1]. It is considered to be the second most common cause for medical consultation for children in rural communities [2]. Although skin disease is rarely lethal, it can have a significant impact in terms of treatment cost, days absent from school, and psychological distress [1–3]. *Verrucae vulgaris* (common warts) constitute a common skin problem in children that commonly affect hands and feet. *Verrucae* are benign epithelial proliferations caused by double stranded DNA virus called human papillomavirus (HPV), of which there are more than 100 different genotypes [4, 5].

Cutaneous warts are among the three most common dermatoses in children, and these lesions follow acne and atopic dermatitis in frequency of diagnosis in pediatric

dermatology clinics [6]. There have been several studies on the prevalence of cutaneous warts among school children in Egypt and worldwide with the prevalence varying from 2.4% to 33% [7–12], with an equal frequency in both sexes. Some of these studies have assessed the risk factors to increase the risk of common warts among children and adolescents. Of these factors, low social class, big family size, and rearing household animals [8, 9] were reported. The Egyptian studies in this review, however, were conducted in urban areas in Cairo [11] and Mansoura [12] cities. Currently, there is little information about the epidemiology of warts in rural Egyptian children.

The present cross-sectional study aimed to improve our knowledge about the epidemiology of common warts among rural primary school children in Egypt as a school health problem. The specific objectives of this study were to assess the prevalence of common warts of hands in primary school children in rural communities and to examine the possible

TABLE 1: Characteristics of the studied children by their sociodemographic factors and warts.

Characteristics*	Warts (<i>n</i> = 42)	No warts (<i>n</i> = 1791)	<i>P</i> value
Age (mean ± SD)	11.6 ± 0.33	11.7 ± 0.34	0.85
Sex			0.80
Male	22 (52.0)	904 (50.5)	
Female	20 (48.0)	887 (49.5)	
Family size			0.03**
≤5	16 (38.0)	980 (55.0)	
>5	26 (62.0)	811 (45.0)	
Father's education			0.0001**
Illiterate	5 (12.0)	78 (4.0)	
Less than 2ry school	31 (74.0)	908 (51.0)	
Secondary school and higher	6 (14.0)	805 (45.0)	
Mother's education			0.0001**
Illiterate	8 (19.0)	110 (6.0)	
Less than 2ry school	29 (69.0)	958 (54.0)	
2ry school and higher	5 (12.0)	723 (40.0)	
Father's occupation			0.66
Nonskilled work	8 (19.0)	253 (14.0)	
Skilled work	29 (69.0)	1323 (74.0)	
Professional work	5 (12.0)	215 (12.0)	
Mother's occupation			0.0001**
Housewife	33 (78.0)	1454 (80.7)	
Skilled work	7 (17.0)	221 (12.3)	
Professional work	2 (5.0)	116 (7.0)	

*Data are presented by mean ± SD or *n* (%).

**Significant.

risk factors associated with the development of warts in these children.

2. Subjects and Methods

The present study recruited 6th grade primary school children from El-Dakahlia governorate, Delta region, Egypt, to determine the prevalence of common warts of hand among them and to examine the possible associated risk factors. A multistage random sampling technique was used to select the studied children from all rural primary schools in the governorate. The sample size was calculated according to the average prevalence of *Verruca vulgaris* in urban school children (5%) reported in previous Egyptian studies [11, 12] and to an assumed precision of 0.01 with confidence interval of 95% and probability value of 0.05.

All children were eligible, and no exclusion criteria were used. The children were interviewed and examined individually in the classroom where the school nurse, doctor and/or the class teacher were attending. A child was diagnosed to have a *Verruca vulgaris* (common wart) in presence of a sessile, firm, variable sized papule, with rough papillary surface, skin colored or darker [13, 14]. Out of 1870 children interviewed in 15 rural primary schools in the studied governorate, 1833 agreed to participate (98% response rate). Those who refused to participate did not differ significantly from those participated regarding sociodemographic characteristics.

Based on review of the literature, a questionnaire was designed to collect relevant data from the studied children to investigate possible risk factors of warts. The questionnaire included questions about (i) sociodemographic factors: age, sex, family size, and parents' education and occupation; (ii) lifestyle factors: swimming, sport practice, and working after school time (child labor); and (iii) environmental factors: presence of household animals (farm, pet, and domestic birds). The validity of the used questionnaire was obtained from discussions with a dermatologist, an infectious disease consultant, and two community medicine consultants.

All data analyses were performed by using statistical analysis system software package [15]. In order to compare the distribution of the studied factors in diseased and nondiseased children, χ^2 tests for the categorical variables and *t*-test for the continuous variables were used. The level of statistical significance was defined as $P \leq 0.05$. Multivariate logistic regression analyses were used to estimate odds ratios (OR) and their 95% confidence intervals (95% CI) for the association of sociodemographic, lifestyle, and environmental factors with the risk of common warts in the studied children. The school officials were clearly informed about the aim and scope of the research. No one of the studied children was obliged to participate in the study. Furthermore, ethical consideration were considered to avoid physical or emotional harm and to ensure confidentiality and privacy of the collected data.

TABLE 2: Distribution of the studied children by lifestyle and environmental factors according to warts.

Lifestyle factor	Warts (<i>n</i> = 42)	No warts (<i>n</i> = 1791)	<i>P</i> value
Swimming in Nile channels			0.0001*
No	22 (52.0)	1520 (85.0)	
Yes	20 (48.0)	271 (15.0)	
Child labor			0.0001*
No	21 (50.0)	1402 (94.0)	
Yes	21 (50.0)	389 (6.0)	
Regular sport practice			0.88
No	22 (52.0)	988 (55.0)	
Yes	20 (48.0)	803 (45.0)	
Farm animals			0.002*
No	9 (21.0)	547 (31.0)	
Yes	33 (79.0)	1244 (69.0)	
Pet animals			0.002*
No	8 (19.0)	458 (26.0)	
Yes	34 (81.0)	1333 (74.0)	
Domestic birds			0.47
No	2 (5.0)	158 (9.0)	
Yes	40 (95.0)	1633 (91.0)	

*Significant.

3. Results

The prevalence of wart of hand in the studied children was 2.3% (95% CI = 1.3–3.3), with no statistically significant difference by sex. The prevalence was 2.4% and 2.2% in male and female children, respectively. Table 1 presents the sociodemographic characteristics of the studied sample by wart. There were no statistically significant differences between the mean age and sex distribution among the studied children with and without warts. There have been differences between children with warts and without warts regarding their parents' education and occupation. The lower percent of education and professional work was among children with warts. Also, children reporting they came from a large family showed a higher prevalence of warts with statistically significant difference.

Table 2 displays the distribution of the studied children by lifestyle and environmental factors by warts. There were significant differences between children with and without warts regarding swimming in Nile channels and working after school time (child labor) ($P = 0.0001$). Also, there were significant differences between diseased and nondiseased children with regard to the presence of farm and pet animals. On the other hand, no significant difference was observed between both groups regarding regular sport practice (football practice).

Table 3 presents the adjusted odds ratios and their 95% confidence intervals for the association of warts with the studied sociodemographic factors. Sex of children appeared to have no role in the risk of warts with an adjusted OR of 0.96 (CI = 0.50–1.70). The risk of warts, however, showed a twofold risk in children with a reported family size more than five. Parents' education and occupation of the studied children appeared to have an important role in the risk of warts where

the risk was markedly reduced among children with educated and professional worker parents. The risk was reduced by about 90% in those children with educated parents.

Table 4 shows the adjusted odds ratios and their 95% confidence intervals for the association of warts with the studied lifestyle and environmental factors by residence. The risk of warts was significantly increased in association with child labor (OR = 4.5; CI = 2.3–8.8). Similarly, swimming in Nile channels was associated with a significant increased risk with an adjusted OR of 5.6 (CI = 2.9–10.6). The presence of household animals was associated with a nonsignificant increased risk of warts. The risk was 1.6, 1.7, and 1.9 in children who reported rearing farm animals, pet animals, and domestic birds, respectively. Regular sport practice, however, appeared to have a minimal role in the risk of warts in the studied children.

4. Discussion

The present study revealed the prevalence of common warts of hands in the studied children to be 2.3%. A similar prevalence of warts in primary school children was also reported in different studies conducted in Mansoura city, Egypt [12], Taiwan [7], and Romania [16]. The prevalence in these studies was 2.5%, 2.4%, and 2.8%, respectively.

A higher prevalence rate, however, was reported in an Egyptian study conducted in Bab El-Sharia region, Cairo, Egypt [11], and in a regional study conducted in Saudi Arabia, in Al Hassa rural area [17]. The prevalence rate in these two studies was 7.5% and 4.5%, respectively. Primary school children of all grades were included in these studies, and their estimated prevalence included common warts of both hands and feet. The high prevalence rate observed in these

TABLE 3: Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for the association of warts with the studied sociodemographic factors.

Factor	Warts (<i>n</i> = 42)	No warts (<i>n</i> = 1791)	OR* (95% CI)
Sex*			
Female	22	904	1.0 (Ref.)
Male	20	887	0.96 (0.50–1.70)
Family income*			
≤5	16	980	1.0 (Ref.)
>5	26	811	1.8 (0.80–4.30)
Father's education*			
Illiterate	5	78	1.0 (Ref.)
Less than 2ry school	31	908	0.49 (0.15–0.89)
2ry school and higher	6	805	0.11 (0.04–0.39)
Mother's education*			
Illiterate	8	110	1.0 (Ref.)
Less than 2ry school	29	958	0.43 (0.10–0.42)
2ry school and higher	5	723	0.10 (0.03–0.30)
Father's occupation*			
Nonskilled worker	8	253	1.0 (Ref.)
Skilled worker	29	1323	0.72 (0.32–1.6)
Professional worker	5	215	0.75 (0.24–2.3)
Mother's occupation			
Housewife	33	1454	1.0 (Ref.)
Skilled worker	7	221	1.4 (0.62–3.3)
Professional worker	2	116	0.75 (0.19–3.2)

*OR was adjusted by swimming in Nile channels, child labor, sport practice, and presence of household animals.

TABLE 4: Odds ratios (ORs) and 95% confidence intervals (CIs) for the association of warts with the studied lifestyle and environmental factors.

Factor	Warts (<i>n</i> = 42)	No warts (<i>n</i> = 1791)	OR* (95% CI)
Swimming in Nile channels*			
No	22	1520	1.0 (Ref.)
Yes	20	271	5.6 (2.9–10.6)
Child labor*			
No	21	1402	1.0 (Ref.)
Yes	21	389	4.5 (2.3–8.8)
Regular sport practice*			
No	22	988	1.0 (Ref.)
Yes	20	803	1.20 (0.60–4.2)
Farm animals*			
No	9	547	1.0 (Ref.)
Yes	33	1244	1.6 (0.75–3.3)
Pet animals*			
No	8	458	1.0 (Ref.)
Yes	34	1333	1.7 (0.67–3.2)
Domestic birds			
No	2	158	1.0 (Ref.)
Yes	40	1633	1.9 (0.50–8.1)

*OR was adjusted by sex, family income, and parents' education and occupation.

and other studies may reflect the availability of school health care services. Availability of health care services in schools may help an early diagnosis and prompt treatment of diseased children [18], which in turn shortens disease duration, and decreases its prevalence [19].

The prevalence of warts in the present study was not affected by sex of the studied children with an odds ratio close to the null. This finding appeared consistent with the results of several previous studies conducted in different countries, including Egypt [7–12].

The risk of warts in this study was found to increase significantly in children who reported swimming in Nile channels with an adjusted OR of 5.6 (95% CI = 2.9–10.6). It is generally accepted that HPV infection via the environment is more likely to occur if the skin is macerated and in contact with roughened surfaces, the conditions which are common in swimming and communal washing areas [20, 21]. The study findings revealed a significant increase in the risk of warts in association with child labor, with an adjusted odds ratio of 4.5 (95% CI = 2.3–8.8). Child labor is highly relevant to the socioeconomic status of the family which in turn affects the incidence and prevalence of warts [7, 9]. The presence of household animals was also associated with a nonsignificant increased risk of warts in the studied children. The estimated risk was 1.6 (95% CI = 0.75–3.3) for farm animals, 1.7 (95% CI = 0.67–3.2) for pet animals, and 1.9 (95% CI = 0.50–8.1) for domestic birds. These findings coincide with the results of previous studies [8, 9] and confirm the well-settled role of environmental factors profoundly influence the occurrence of warts [20, 21]. Presence of household animals is a feature of rural communities in Egypt which contributes to poor standards of hygiene favoring spread of contagious skin diseases.

Regular sport practice, however, appeared to have a minimal role in the risk of warts development in the studied children. The OR for the association of sport practice with warts was 1.20 (95% CI = 0.60–4.2), and this finding appeared consistent with the study results of van Haalen et al. [8]. Family size has also been associated with an increased risk of warts in children in families with more than five members, although not significant. Similarly, the risk of warts is increased in children with a family member with warts [8] and in children with large families and low social class [8, 9]. Large families, particularly in rural areas, usually experience overcrowding and poor personal hygiene such as shared clothing and fomite [8]. These factors may increase the risk of infectious skin diseases.

The study findings revealed a significant and marked risk reduction in children with higher educated parents. In these children, the risk is reduced by 90%. Also, the risk of warts is reduced by 25% in children with professional worker parents, although not significant. These findings coincide with the results of a cross-sectional study carried out in Magong, Taiwan, and included 3273 children aged 6–11 years [9]. In this study, the authors reported that having a father with a manual occupation was associated with an increased risk for having cutaneous warts. Education and occupation of the individuals certainly affect health awareness and standards of

hygiene within the family; for example, an educated parent will seek medical help if his son has wart [22, 23]. Although this attitude is less likely to decrease wart incidence, it may decrease wart prevalence through shortening disease duration [19].

The present study appeared to have a number of strengths that include being a school based study, the matter which consolidates the study findings. The sample was relatively large in size with a high response rate of interviewed children in the studied 15 schools. The study questionnaire was comprehensive and included most of the possible risk factors associated with the development of warts.

Limitations of this study should not also be overlooked. The study reported only the warts of hands in the studied children and warts in other body sites were not reported. The role of age as a risk factor in development of warts could not be assessed in this study due to the narrow range of age in the study sample. Also, the per capita income of the child's family could not be assessed in this young age through the questionnaire. However, the data collected about the children parents' education, occupation, and family size might reflect the per capita income in this study.

In summary, the present study found the prevalence of warts in rural primary school children to be 2.3% with no significant sex difference. The main risk factors implicated in the development of warts in these children were swimming in Nile channels, child labor, presence of household animals, and big family size. On the other hand, however, warts seemed to be less common in children with educated parents.

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