

## Frequency of Viral Skin Infections in Turkish Children

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### Abstract

**Background:** Studies on this field have shown that dermatological diseases are prevalent in developing countries and infections head on the most common ones' list. In this study, we aimed to assess the prevalence of skin infections, especially viral skin infections appraised as more frequently seen in our area. Presenting the frequency of these diseases has an important role because of being avoidable by the help of protective medicine and public health services.

**Material and Methods:** Under 16 years of age 2815 pediatric patients admitted a dermatology policlinic in Ankara, examined and assessed prospectively and researchy.

**Results:** It was determined that 607 patients (21,6 %) of the population diagnosed as dermatological infections. Viral dermatological infection was the most prevalent (n=402, 66,2 %), followed by fungal infection (n=97, 16,1 %), bacterial infection (n=97, 16 %) and infestation (n=10, 1,6%). As you have seen in the findings, viral skin infections are significantly more prevalent. Warts were the most frequent seen viral infections (n=245, 60,9 %). 74,7 % of the warts constituted verruca vulgaris. The second common viral skin infection was mollosquum contagiosum (n=72, 17,9 %), followed by herpes simplex infection (n=26, 6,5 %).

**Conclusion:** Viral skin diseases are detected of the second most common skin disease in our country. Because the infections can be prevented form, the frequency of the diseases can be reduce by training.

### Introduction

As in adults, skin diseases are also frequently observed in the pediatric age group. Studies have demonstrated that skin diseases are common in children in developing countries and the most frequently observed ones are infections and infestations [1]. Revealing the frequency of infectious skin diseases is important since they are preventable through preventive health services. There is no detailed study at hand describing the frequency of viral infections. In this study, our aim is to document the frequency of viral skin infecti-

ons which are reported to be common among children in our region.

### Materials and Methods

Our prospective study was conducted on 2815 pediatric patients between 0-16 years of age who had applied to the Dermatology Clinic of the Ankara Children's Health and Diseases, Pediatric Hematology and Oncology Teaching and Research Hospital. Approval was granted by the Ethics Committee of the Hospital. After the initial examination, the patients were prospectively enrolled in the study and divided into four groups according

to the age as infantile (0-2 years), pre-school (3-5 years), school children (6-11 years) and adolescents (12-16 years). The diagnoses were made clinically and auxiliary diagnostic methods were also employed where needed. The statistical analysis was conducted using the SPSS 20 software package and the Chi-square test. Statistical significance was based on a value of  $P < 0.05$ .

**Results**

Skin infections were observed in 607 out of the 2815 patients (21.6%). Among the patients with skin infections, 308 (50.7%) were female, while 272 (49.3%) were male. Among these patients, 402 (66.2%) had viral skin infections, 98 (16.1%) had fungal skin infections, 97 (16%) had bacterial skin infections, and 10 (1.6%) had infestations.

Among the fungal infections, the most commonly observed ones were tinea versicolor (22.4%), candidiasis (21.4%) and tinea capitis (15.3%).

The most common one among the bacterial skin diseases were impetigo (n=43; 44.3%), paronichia (n=18; 18.6%) and secondary impetiginization (n=15; 15.5%).

The infestations included 6 patients with scabies and 4 patients with pediculosis.

Viral skin diseases comprised 14.3% of the total of 2815 patients and their frequency was statistically significantly higher than the other skin infections ( $p < 0.05$ ). The diagnosed viral skin diseases and their ratios are presented in (Table 1).

Warts were the most frequently observed viral skin diseases and among these, 74.7% (n=183) were verruca vulgaris, 11.4% (n=28) were verruca plana, 10.2% were (n=25) verruca plantaris, 2.04% (n=5) were verruca filiformis, 1.2 (n=3) were genital warts, and 0.4% were (n=1) Heck's disease. Among the patients with warts, 132 (53.9%) were female and 113 (46.1%) were male. There was no statistically significant difference in terms of the gender

( $p > 0.05$ ); whereas the condition was more frequent in those who lived in the periphery ( $p < 0.05$ ). The family history was insignificant ( $p > 0,05$ ). The distribution of the warts according to the age and sex are presented in (Table 2).

Verruca vulgaris was most commonly observed in the 6-11 age group (42%) ( $p < 0.05$ ) and among those with medium and lower socioeconomic status (SES). The lesions were most frequently located on the hands. Verruca plana lesions were most frequently observed on the face, while all the cases of verruca filiformis were located on the face. Verruca plana was also more common in the 6-11 age group and the difference was statistically significant ( $p < 0.05$ ).

The second most commonly observed viral skin infection after warts was the molluscum contagiosum and it was observed in 42 (58.3%) of the females and 30 (41.7%) of the males (total=72; 17.9%). No difference was observed in terms of the gender ( $p > 0.05$ ). The infection was more common in females between 0-2 years of age (73.6%) and the greatest number of the infections were in the 6-11 age group. No relationship with the residence area or family history has been observed ( $p > 0.05$ ), although the infection was more common among the children with medium and lower socioeconomic status (SES).

The third most commonly observed viral skin infection was herpes simplex (n=25; 6.5%), which was most commonly located on the lips and face. Among the patients with herpes simplex, 12 (46.2%) were female, while 14 (53.8%) were male. The condition was more frequently observed among females between 12-16 years of age (85.7%) and the greatest number of the patients were in the 6-11 age group.

Varicella was diagnosed in 20 (4.9%) patients, among which 8 were female (40%) and 12 (60%) were male. The disease was more common in females in the 6-11 age group and in males in the 3-5 and 12-16 age groups. It was statistically significantly more common in the patients from the periphery ( $p < 0.05$ ).

A total of 11 patients with 8 females (72.7%) and 3 males (27.3%) were diagnosed with herpes zoster (2.73%). The lesions were located on the body. Although there were patients from every age group, the majority of the patients were 12-16 years of age (54.5%). The condition was most commonly observed in patients from the medium SES ( $p < 0.05$ ).

Hand, foot and mouth disease was found in 15 patients (3.73%). Among these, 6 were female (40%) and 9 were male (60%). There were no patients in the 12-16 age group. No difference was observed between the other age groups.

**Table 1.** Diagnosed Viral Skin Infections and Ratios

Viral Skin Infections	Number	(n:2815) %	(n:402) %
Warts	245	8,7	60,9
Mollusqum contagiosum	72	2,6	17,9
Herpes simplex	26	0,9	6,5
Varicella	20	0,7	5,0
Hand-foot-mouth disease	15	0,5	3,7
Viral exanthem	13	0,5	3,2
Zona zoster	11	0,4	2,7

**Table 2.** Distribution of Warts By Sex and Age Groups

Warts		Sex		Total	
		Female	Male		
Verruca vulgaris				9	
	Age group	0-2	33,3%	66,7%	100,0%
			14	24	38
		3-5	36,8%	63,2%	100,0%
			41	36	77
		6-11	53,2%	46,8%	100,0%
		39	20	59	
	12-16	66,1%	33,9%	100,0%	
	Total	97	85	182	
		53,3%	46,7%	100,0%	
Verruca plana				1	
	Age group	0-2	0,0%	100,0%	100,0%
			1	3	4
		3-5	25,0%	75,0%	100,0%
			12	7	19
		6-11	63,2%	36,8%	100,0%
		3	1	4	
	12-16	75,0%	25,0%	100,0%	
	Total	16	12	28	
		57,1%	42,9%	100,0%	
Anogenital wart				1	
	Age group	0-2	100,0%	0,0%	100,0%
			0	1	1
		3-5	0,0%	100,0%	100,0%
			1	0	1
		6-11	100,0%	0,0%	100,0%
	Total	2	1	3	
		66,7%	33,3%	100,0%	
Verruca filiformis				2	
	Age group	3-5	100,0%	0,0%	100,0%
			1	0	1
		6-11	100,0%	0,0%	100,0%
			1	1	2
		12-16	50,0%	50,0%	100,0%
	Total	4	1	5	
		80,0%	20,0%	100,0%	
Verruca plantaris				3	
	Age group	0-2	66,7%	33,3%	100,0%
			6	2	8
		6-11	75,0%	25,0%	100,0%
			4	10	14
		12-16	28,6%	71,4%	100,0%
	Total	12	13	25	
		48,0%	52,0%	100,0%	

Viral exanthema was clinically observed in a total of 13 patients (3.23%) with 5 females and 8 males. The disease was most frequently observed in the 0-2 age group and among the patients from the periphery (p<0.05) and showed a negative correlation with the SES.

**Discussion**

Various factors such as genetic predisposition, geographical region, climate, season, socioeconomic status and living conditions play a role in skin diseases [2]. Malnutrition, crowded conditions and poor hygiene are also contributing factors. In developing countries such as India, the most commonly observed diseases in children and adolescents include infections and infestations [3]. In different areas around the world, infections and infestations are observed in varying rates. While this ratio is 60% in Pakistan, 54.5% in Southern India, 47.1% in New Delhi; non-infectious diseases are reported more frequently in Sweden, Turkey and Kuwait [2, 4, 5, 6].

The prevalence of viral skin infections vary in a wide range between 17.6% and 3.6% [6, 7]. In the disease prevalence study by *Mostafa* et al. conducted on 1860 patients in Egypt, 70.9% of the patients were found to have infections and infestations. The authors have associated the high ratio of skin infections to the lower socioeconomic status and poor hygiene among the rural population. Viral skin infections took the third rank with a ratio of 11.2% after bacterial and parasitic infections. The most commonly observed viral infection was varicella (71.3%), followed by warts (21.6%), molluscum contagiosum (3.3%), herpes simplex (2.4%), and herpes zoster (1.4%). The population density, differences in the transmission of the virus, and environmental and social factors affect the prevalence.

Besides the prevalence of the skin infections, their distribution also varies between countries. While the most frequently observed skin infection in Egypt was found as bacterial skin infections, it was viral skin infections in Kuwait and fungal skin infections in Pakistan [2]. In northern India, 12586 school children between the ages of 6 and 14 were scanned for skin diseases and 38.8% of them were found to have a skin disease, with the

most common one being skin infections with a ratio of 29.4%. Viral infections took the third rank (9.7%) after pyoderma and fungal infections [3]. In their study conducted on 10.000 patients, *Nanda et al.* observed viral skin infections as the second most common (17.6%) condition following atopic dermatitis. Warts comprised 74% of all the viral skin diseases and they were most commonly observed in school children. The second most commonly observed viral infection was molluscum (18.5%), followed by varicella (2%) and viral exanthema (2%). Herpes zoster (1.6%) and herpes simplex (0.9%) were also observed in smaller numbers [6]. *Wenk et al.* have reported skin infections as the second most common skin diseases in Sweden with a ratio of 20.1% and the frequency of viral infections as 13.4%. While warts comprised 37.2 of the viral skin infections, they have reported molluscum more frequently in school children and warts in adolescents [4]. *Hayden* has reported skin infections as the most common condition (%36) among the 1547 patients who presented to the pediatrics clinic [8].

In the study by *Inanir et al.* where they scanned skin diseases in two schools with different (high and low) socioeconomic status in Manisa, they have frequently observed infectious diseases (16.1%) where 23.6% were viral infections (second after infestations). Lower socioeconomic status especially increases the incidence of infectious diseases. Infectious skin diseases are also associated with poor living conditions [9]. In the study conducted by *Oruk et al.* on 1276 patients in Ankara, viral skin infections were the 2nd most common skin diseases with a ratio of 15.8%. Among these, 45.5% were warts, 17.8% were molluscum and 9.9% were herpes simplex infections. Shingles and varicella were also observed in lower ratios [10]. Although we have found similar results with *Oruk et al.* in terms of the rank and ratio of viral skin diseases, we have found a greater ratio of warts and smaller ratio of the herpes infections.

In a study by *Tamer et al.* conducted on 6300 children in Ankara, the most commonly observed skin disease was reported as acne vulgaris (12.4%), although viral skin diseases in general took the first rank with a ratio of

13.2% (n=833). Among these viral diseases, 72.8% were warts, %10.6 were molluscum, 7.7 were herpes simplex infections, 3.5% were varicella, 3% were herpes zoster and 2.4% were viral exanthema. Warts were most common among school children, followed by adolescents. Herpes was observed more frequently among males with a ratio of 60.9% [5]. Although these ratios are comparable to our results, we have observed greater ratios of molluscum and varicella. This may be associated with the lower socioeconomic conditions of our patients and the greater number of those living in the periphery.

*Karaca et al.* have examined 1084 children aged 4-6 for skin diseases in kindergartens in Afyonkarahisar and found skin diseases in 327 (30.2%). Among these, 13.1% were skin infections and 74.4% of the infections were viral [11]. *Tekin et al.* have observed viral skin diseases as the leading one among all the diseases in 1383 pediatric patients between the ages of 0 and 16 in Zonguldak (15.1%). The ratio of all the infectious diseases was 25.2% and 60% of these comprised infections. The ratios of infections were higher among the group of school children [1]. In Elazig, the majority of the pediatric patients hospitalized due to skin diseases had skin infections (47.4%). In this study, viral infections took the second rank after fungal infections (21.5%). The patients in this region had lower socioeconomic conditions and originated from the rural areas where animal husbandry is the main source of income [12].

In the retrospective study conducted by *Sacar et al.* on 1756 pediatric patients between 0 and 12 years of age, infectious skin diseases took the second rank in terms of frequency (20.5%). In this study, viral skin infections observed among school children comprised 57% of all the infections [13].

*Can et al.* have also detected infectious skin diseases at the second rank (13.5%) in 850 children between the ages of 0 and 17. Among the infectious diseases, viral diseases were the most common (57.4%) and were most frequently observed in pre-school children. The most common viral skin infections were warts (55.8%) [14].

*Seraslan et al.* have observed skin infections to take the second rank with a ratio of 29.1%

in 78 patients between the ages of 0 and 16. Among the warts which comprised the majority of the viral infections with a ratio of 41.3%, 73.1% were verruca vulgaris, 16.4% were verruca plana, 7.5% were verruca vulgaris and verruca plana concurrently, and 3% were verruca filiformis [15]. We have observed lower ratios of verruca filiformis.

The only study in our country conducted on viral skin diseases in children is the scan by *Dogan et al.* on primary- and secondary school children in Malatya. In this study, viral skin diseases were observed in 230 out of 9281 children between the ages of 7 and 14 (2.5%). Among these, 210 had warts (91.3%), 14 had herpes (6.08%), 3 had molluscum (1.3%), 2 had shingles (0.86%) and 1 had varicella (0.43%). The warts were located on the hands in 195 children. Warts are the most commonly observed viral skin infections and they are most frequently observed in children and young adults between 10 and 20 years of age [16]. They are most commonly observed in the hands since they are exposed to trauma and direct contact [17]. Also in our study, the warts were most commonly observed on the hands. Various factors such as genetic predisposition, geographical region, climate, season, socioeconomic status and living conditions play a role in skin diseases [2]. Malnutrition, crowded conditions and poor hygiene are also contributing factors. In developing countries such as India, the most commonly observed diseases in children and adolescents include infections and infestations [3]. In different areas around the world, infections and infestations are observed in varying rates. While this ratio is 60% in Pakistan, 54.5% in Southern India, 47.1% in New Delhi; non-infectious diseases are reported more frequently in Sweden, Turkey and Kuwait [2, 4, 5, 6].

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## Conclusion

According to the studies, viral skin diseases are the second most commonly observed skin diseases in our country. However, further and detailed multi-centre studies still need to be conducted country-wide in Turkey. Since infections are preventable, their frequency can be reduced taking the necessary measures.

Therefore, families, teachers and students should be informed about the viral skin diseases frequently observed during school years and educational hygiene programs should be organized.

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