ORIGINAL ARTICLE

Demographic and clinic characteristics and risk factors of molluscum contagiosum in children

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Abstract

Objective: To address the gap in evidence related to molluscum contagiosum in children by focusing on demographic and clinical features as well as risk factors.

Method: The multicentre, prospective, clinical study was conducted at four hospitals in Ankara and Tokat cities of Turkey from August 1, 2014, to August 5, 2019, and comprised patients aged ≤18 years diagnosed with molluscum contagiosum. Data about demographics, day nursery and preschool attendance, the seasons when the disease occurred, any use of Turkish baths and swimming pools, history of personal/familial atopy, coexistence of diseases, disease duration, courses, number of lesions and anatomic localisation. Data was analysed using SPSS 19.

Results: Of the 286 patients, 130(45.5%) were girls and 156(54.5%) were boys. The overall mean age was 5.94±3.95 years. The median duration of the disease was 5 weeks (interquartile range: 3.00-12.00 weeks). There was a significant number of cases with family history 18(48.6%) in the 0-3 age group (p=0.027). History of personal atopy was significantly high in the winter season (p<0.05). Patients with >20 lesions had used swimming pools significantly more frequently than the rest (p=0.042). The trunk was the most commonly involved region 162(56.6%).

Conclusion: Providing prospective data about demographics, clinical characteristics and risk factors of molluscum contagiosum in children will lead to appropriate preventive and therapeutic measures.

Keywords: Children, Molluscum contagiosum, Epidemiology. (JPMA 72: 2375; 2022)

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Introduction

Molluscum contagiosum (MC) is a common, benign viral skin infection characterised by flesh-coloured, discrete, usually asymptomatic dome-shaped pearly papules with a central dell from which a grey-white cheesy material can be extruded. It is common in children, with a prevalence of 5.1% to 11.5%.[1,2] MC is caused by a double-stranded deoxyribonucleic acid (DNA) MC virus (MCV) that is part of the poxviridae family. Since the eradication of smallpox, MCV has been the only remaining pox virus infection specifically affecting humans.[1] The virus is contagious through direct skin-to-skin contact and autoinoculation, or indirectly via fomites on towels, shared baths, bath sponges, clothing, bedding and swimming pools.[1,3] There is limited data on the epidemiology and clinical features of the paediatric population with MC. The current study was planned to fill the gap in evidence by conducting by focussing on demographic and clinical features as well as risk factors.

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Patients and Methods

The multicentre, prospective, clinical study was conducted at dermatology and venerology clinics of four hospitals in Ankara and Tokat cities of Turkey from August 1, 2014, to August 5, 2019, after approval from ethics review committee.

The four participating hospitals were Health Science University Kecioren Education and Training Hospital, Ankara Occupational Diseases Hospital, Tokat Gaziosmanpasa University Health Research and Practice Hospital, and the Tokat State Hospital.

The study comprised patients who had been diagnosed with MC and were under the age of 18 years. Written informed consent for data and photographs was obtained from the parents of all the enrolled subjects. Children with an uncertain diagnosis of MC and a lack of informed consent were excluded from the study. Data recorded was age, gender, the season when the disease occurred, day nursery or preschool attendance, disease duration at the time of diagnosis, family history of MC, history of personal atopy, like allergic rhinitis,

allergic conjunctivitis, atopic dermatitis (AD), active AD, and asthma, familial atopy, use of swimming pools and Turkish baths in the preceding six months, concomitant verruca vulgaris, numbers and anatomic locations of the lesions, systemic diseases, and concomitant use of topical and/or systemic immunosuppressive medications.

The patients were divided into 3 age subgroups: 0-3 years, 4-6 years, and 7-18 years. The course of the disorder was considered to be either acute or chronic. Acute cases were defined as patients in whom the disorder had emerged for the first time and lasted ≤8 weeks. Chronic cases were defined as patients in whom the disease lasted >8 weeks.

The cases were also categorised into 3 subgroups according to the number of MC lesions: ≤10, 11-19 and ≥20. The cases were further categorised into 6 subgroups according to the anatomical locations of the lesions: face, trunk, extremities, trunk and extremities, genital area, and whole body. The spread of the lesions was also grouped as 1 region involvement and >1 region involvement. Curettage, cryotherapy, 10% potassium hydroxide (KOH) solution, and tea tree oil were used in the treatment of the patients, depending on age, the extent of the lesions, and the children's ability to tolerate the treatment. Detailed investigation of treatment, molluscum eczema, or bacterial superinfection were outside the scope of the study.

Data was analysed using SPSS 19. Categorical variables were expressed as frequencies and percentages, normally distributed continuous variables as mean ± standard deviation, and non-normally distributed continuous variables as medians with interquartile range (IQR) and minimum-maximum range. Independent sample t-test was used to compare the continuous normally distributed data between various groups. Mann Whitney U test was used to compare the continuous non-normally distributed data between the groups. Pearson's chi-squared test was used to compare the categorical data between the groups. P<0.05 was considered statistically significant.

Results

Of the 286 patients, 130(45.5%) were girls and 156(54.5%) were boys. The overall mean age was 5.94±3.95 years. No cases were observed in children aged <1 year. Detailed demographic and clinical data of all the subjects was noted (Table-1).

Family history of MC was found in 37(13%) patients, and a significant number of cases with family history 18(48.6%) was in the 0-3 years age group (p=0.027). In terms of family history, no significant differences were found in

Table-1: Demographic and clinical features of paediatric patients with molluscum contagiosum (MC).

Epidemiologic Features	Number (%)
Age	
Mean Age ± Standard Deviation	5.94±3.95
Age Groups (year)	
0-3	86 (30.1)
4-6	104 (36.4)
7-18	96 (33.6)
Gender	
Male	156 (54.5)
Female	130 (45.5)
Median Disease Duration	5 weeks (min-max 1-108)
Season	
Winter	85 (29.7)
Spring	105 (36.7)
Summer	67 (23.4)
Autumn	29 (10.2)
Family History	37 (13)
Nursery (0-6 age group)	37 (20.6)
Turkish Bath	6 (2.1)
Swimming Pool	20 (7.0)
Verruca Vulgaris Coexistence	7 (2.4)
Personal History of Atopy	69 (24.1)
Allergic Rhinitis	26 (9.09)
Allergic Conjunctivitis	17 (5.94)
Atopic Dermatitis	14 (4.89)
Active Atopic Dermatitis	8 (2.79)
Asthma	12 (4.19)
Family History of Atopy	39 (13.6)
Systemic diseases	
Ichthyosis Vulgaris	2
Coeliac Disease	1
Type 1 Diabetes Mellitus	1
Ulcerative Colitis	1
Renal Transplantation	1
Epilepsy	2
Human Immune Deficiency Virus Infection	None
Primary immunodeficiency disorders	None
(any known)	
Systemic Immunosuppressive Medications	2
Topical Immunosuppressive Medications	9 (3.1)
Disease Course	
Acute (? 8 week)	197 (68.8)
Chronic (>8 week)	89 (31.2)
No. of Lesions	
≤ 10	147 (51.4)
11-19	94 (32.9)
≥20	45 (15.7)
Anatomic Localization	
Trunk	162 (56.6)
Face	136 (47.5)
Extremities	66 (23.07)
Trunk and extremities	30 (10.5)
Genitalia	5 (1.7)
Whole-body	None
Spread of lesions	
One Region Involvement	209 (73.1)
More than one Region Involvement	77 (26.9)

Table-2: Relation between personal atopy and demographics, season, risk factors and clinical features.

	Children with personal atopy N (%)	Children without personal atopy N (%)	P-value
Gender			
Female	30 (23,1)	100 (76,9)	0,705
Male	39 (25)	117 (75)	
Age Groups (years)			
0-3	20 (29)	66 (30.4)	0,689
4-6	28 (40,6)	76 (35)	
7-18	21 (30,4)	75 (34.6)	
Season			
Winter	29 (42)a	56 (25.8)	0.037
Spring	17 (24.6)b	88 (40.6)	
Summer	17 (25.6)ab	50 (23)	
Autumn	6 (8.7)ab	23 (10.6)	
Family History of MC			
Yes	8 (11.6)	29 (13.4)	0.703
No	61 (88.4)	188 (86.6)	
Nursery (0-6 age group, n=190)			
Yes	12 (24)	25 (17.9)	0.206
No	38 (76)	115 (82.1)	
Swimming pool			
Yes	2 (2.9)	18 (8.3)	
No	67 (97.1)	199 (91.7)	
Number of Lesions			
≤ 10	30 (20.4)	117 (79.6)	0.308
11-19	27 (28.7)	67 (71.3)	
≥20	12 (26.7)	33 (73.3)	
Disease Course			0.518
Acute (≤ 8 week)	45 (65.2)	152 (70)	
Chronic (>8 week)	24 (34.8)	65 (30)	

MC: Molluscum contagiosum.

Table-3: Relation between familial atopy and demographics, season, risk factors and clinical features.

	Children with familial atopy N (%)	Children without familial atopy N (%)	P-value
Gender			
Female	19 (48,7)	111(44.9)	0,660
Male	20 (51,3)	136 (55.1)	
Age Groups (years)			
0-3	11 (28,2)	75 (30.4)	0,352
4-6	18 (46,2)	86 (34.8)	
7-18	10 (25,6)	86 (34.8)	
Season			
Winter	13 (15.3)ab	72 (29.1)	0.040
Spring	8 (7.6)b	97 (39.3)	
Summer	10 (14.9)ab	57 (23.1)	
Autumn	8 (27.6)a	21 (8.5)	
Family History of MC			
Yes	8 (20.5)	29 (11.7)	0.129
No	31 (79.5)	218 (88.3)	
Nursery (0-6 age group, n=190)			
Yes	4 (13.3)	33 (20.6)	0.206
No	26 (86.7)	127 (79.4)	
Swimming pool			
Yes	1 (2.6)	19 (7.7)	0.591
No	38 (97.4)	228 (92.3)	
Number of Lesions			
≤ 10	15 (38,5)	132 (53.4)	0.219
11-19	16 (41)	78 (31.6)	
≥20	8 (20,5)	37 (15)	
Disease Course			
Acute (≤ 8 week)	27 (69,2)	170 (68.8)	0.950
Chronic (>8 week)	12 (30,8)	77 (31.2)	

MC: Molluscum contagiosum.

relation to gender, season of occurrence, personal history of atopy, family history of atopy, numbers of lesions, and localisations of the lesions (p<0.05 each). None of the patients was doing close-contact sports.

History of personal atopy was found in 69(24.1%) patients (Table-2) and the history of familial atopy was found in 39(13.6%) (Table-3). There was a significant difference between personal/familial atopy and the season of occurrence (p<0.05). History of personal atopy was found to be higher in those who developed MC during the winter season 29(42%) (p=0.037). Also, the history of familial atopy was higher in the autumn season 8(27.6%) (p=0.040).

The median disease duration at the time of diagnosis was 5 weeks (IQR: 3.00-12.00 weeks, range: 1-108 weeks). The disease duration was >1 year in 10(3.5%) patients. There was no significant difference between the acute and chronic stages of the disease in terms of age, gender, season, family history, day nursery, Turkish bath, swimming pool, history of personal/familial atopy, number of lesions, and lesion localisation (p>0.05 each)

Further, 147(51.4%) patients had <10 lesions. Swimming pool use was found in 9(6.1%) patients of those with <10 lesions, 4(4.3%) with 10-20 lesions, and 7(15.6%) with >20 lesions (p=0.042). There was no significant difference between the number of lesions and factors, like age, gender, season, nursery, Turkish bath, concomitant verruca vulgaris, and lesion localisation (p>0.05 each). Trunk localisation was the most commonly involved region. There were no significant differences between anatomic localisations with respect to age, gender, season, nursery, Turkish bath and swimming pool (p>0.05 each). Overall, 10(3.5%) patients had lesions on the face with eyelash bottom involvement; 9(90%) of them had umbilicated and/or minimally inflamed papules, and 1(10%) patient had inflamed erythematous nodular papule accompanied by conjunctivitis (Figure).

Figure: A six-year-old atopic girl with secondarily infected eyelash bottom lesion and a large number of typical molluscum contagiosum lesions concentrating in periorificial areas on the face.

There was no significant difference between eyelash bottom involvement with respect to age, gender, family history, swimming pool, history of personal/familial atopy, and number of lesions (p>0.05 each). Concomitant perianal verruca vulgaris was detected in a 6-year-old girl with genital MC lesions whose lesions were limited only to the genital area. The judicial process was initiated on the suspicion of strong sexual abuse in the patient who was evaluated by social services and child psychiatry. At the end of the investigation, sexual abuse was confirmed.

Topical secondary infections were observed in 22(7.7%) patients. Topical antibiotics were sufficient in 16(72.7%) of these cases, while oral-systemic antibiotics were used in the other 6(27.3%) patients. Perilesional eczema reaction was recorded in 14(4.9%) patients who were treated with low-potency steroids and emollients.

Discussion

MC is commonly encountered in both primary care and dermatology practices around the world. In literature there is a lack of detail regarding seasonality, risk factors, atopy, transmission between family members, duration of disease, anatomical localisation, disease severity, and spread. The current prospective, multicentre study provided data about demographic, clinical presentation, and risk factors of MC in children.

Gender distribution analysis of patients reveals an equal dispersion generally or a little variation usually in favour of the male gender.[3-7] The ratio in the study was also 1:1.2. MC can occur at any age, but is more frequent in children, especially those aged 2-11 years.[8] Sociocultural and climate characteristics and countries' level of development may contribute to differences in incidence/prevalence rates and peak ages. A study in 1967 reported that while in cool climates the age of peak incidence of MC in children was 10-12 years, in warm countries it was 1-4 years.[9] Kakourou et al. found the mean age of 110 Greek children with MC as 4.8 years and they linked the low mean age to the hot climate in Greece.[6] The peak age of infection may show the difference between developed and developing countries. Previously, in developed countries, peak onset was typically in school-aged children.[10] Clinical trials from Japan and the Netherlands reported peak prevalence of MC in patients aged 8 and 6-10 years, respectively.[5,7] Lately, there is an increase of MC in preschool-aged children. Osio et al. reported a peak of the prevalence of MC in 661 patients aged around 6 years in France.[3] One of the studies from the United States included 302 children, and two-thirds of the cases were aged <8 years, and the mean age of the remaining was 4.7 years.[4,11] Nowadays, women are more involved in the workforce, As such, stay-at-home parenting has been replaced with daycares and babysitters. This social reality may have caused the enhancement of infection in preschool-aged children. In the current study, the mean age was 5.94 years which was consistent with earlier studies.[3-5,12]

MC has been reported to be common in tropical climates.[1,5,6] However, high incidence rates are not limited to warmer areas. Koning et al. found a higher incidence in the winter season in the Netherlands, arguing that this may be understandable with the assumption of a prolonged incubation period.[5] In 2013, a systematic review among children revealed a higher frequency in warmer climates.[2] Warm moist conditions are more favourable to viral transmission and also preferred clothes in warm climates, which are thin and leave arms and legs open, facilitate direct skin-to-skin contact and disease transmission. In the current study, 172(60.1%) patients admitted to the hospital in spring and summer seasons, and the results were in line with literature.[1,2,5,6]

Various studies showed different modes of MC transmission, such as intra-familial spread.[3,12,13] In the current study, 13% patients had a history of MC in the household, and a significant part of these cases was aged 0-3 years (p=0.027). This can be explained with the high level of contact with parents and siblings in the care, play, and entertainment of children aged <3 years.

Many studies have suggested swimming pools as an important risk factor for MC transmission. Some studies found the incidence of MC in the swimming group was twice as high as in the non-swimming group.[7-10] A study reported that using a school swimming pool, sharing

towels, and bath sponges increased the risk of having a more aggressive MC infection (>26 lesions).[14] In the current study, swimming pool use was significantly high in the group of cases with >20 lesions (p=0.042).

Some skin diseases, such as AD, Darier's disease, and immunodeficiencies, make the individuals susceptible to MC infection.[7] AD has been found to be common in children with MC up to 49%.[3,6,10-12,15,16] In children with AD, MC can be extensive with a high number of lesions, more frequent relapses, and prolonged course.[12,16,17] Also, it is postulated that MC can trigger AD onset or flare, especially in young children with specific localisations.[18] However, several studies have revealed that the natural history of MC does not differ between children with and without AD.[3,4,19,20] Herein, the history of AD and active AD rates were consistent with data from Turkey and we did not find a relation between MC and AD.[21,22] However, in the winter, the history of personal atopy and in the autumn the history of familial atopy were found significantly high (p= 0.037, p =0.040 respectively). In winter, central heating systems, which reduce humidity and dries the skin, come into use and natural daylight exposure decreases. This makes the atopic skin more dry and prone to itching, which may be an explanation for the association between history of atopy and seasonality.

Primary immunodeficiency disorders (PIDs) refer to a heterogeneous group of more than 100 disorders associated with defects in the immune system. Although there was no known history of PID in the study population, PIDs should be suspected whenever the lesions are recurrent, atypical, generalised, or resistant to treatment. Looking for other suggestive features, such as recurrent infection, failure to thrive, or family history, would support the diagnosis.[23]

Although the clearance of MC infection is expected to be in 6-12 months, more prolonged disease courses of up to 24 months have been reported.[24] Olsen et al. reported that most children had the disorder for 12 months with a 13.3 months mean time to resolution of MC and they did not find an association between the number of lesions and the time to resolution.[13] In the current study, in approximately half of the cases, the number of lesions was 10 or less. The median duration of the disease was 5 weeks and 68.8% patients had the lesions for 8 weeks or less.

In children, MC mainly affects the exposed skin, like the face, trunk, extremities, intertriginous regions, and genitals. The involvement of the oral mucosa is rare.[25] A study found a significant relationship between the anatomical localisation of MC lesions and the way of transmission.[14] Kakourou et al. found face involvement mainly in children aged ≤2 years and found trunk lesions in older children.[6] Inthe current study, the trunk was the most frequent location, followed by the face and there was no significant relationship between anatomic localisation and demographic or clinical features.

Genital and perianal MC infections are seen in children less frequently and are mainly found as part of a multiple-site involvement or caused by autoinoculation.[2,8] In a study consisting of 514 children aged <5 years with a history of anogenital papular lesions, MC incidence was reported to be 16%. The authors concluded that the presence of such lesions can be a source of major concern for parents.[26] Osio et al. reported genital lesions in 6.7% cases and strict restriction of the lesions to the genital area was very rare in children.[3] In the current study, 5(1.7%) patients presented with genital lesions. Sexual abuse was detected in a 6-year-old girl with molluscum lesions limited to the genital area and concomitant perianal verruca vulgaris. Genital MC in children is rarely a sign of sexual abuse, but the presence of other concomitant sexually transmitted diseases and strictly limited lesions to the genital area may be a warning for physicians.

In terms of limitations, the current study was conducted at dermatology and venereology clinics instead of primary care settings, and there is a probability of underestimation of some cases, especially the milder ones.

Conclusion

The common seasons at the time of admission were spring and summer. MC had the potential to spread within households, and children aged 0-3 years seem to be more vulnerable to intra-familial transmission. Use of swimming pool appeared to be a risk factor for severe disease by increasing the number of lesions. The trunk was the most frequent location. MC infection limited to the genital area and accompanied by other sexually transmitted diseases might well be a clue of sexual abuse.

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