

A study of the correlation between molluscum contagiosum and atopic dermatitis in children *

Estudo da correlação entre molusco contagioso e dermatite atópica em crianças

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Abstract: BACKGROUND: Although no scientific evidence has yet been published, it is widely understood that molluscum contagiosum tends to be more common and more intense in patients with atopic dermatitis. This lack of evidence led to the development of the present study.

OBJECTIVES: To evaluate the prevalence of the association between atopic dermatitis and molluscum contagiosum; to evaluate whether molluscum contagiosum is more likely to be recurrent and/or disseminated in patients with atopic dermatitis and whether the occurrence of eczema surrounding the molluscum contagiosum lesions, pruritus and/or infection is more prevalent in these patients compared to patients without atopic dermatitis.

METHODS: A total of 284 children of both sexes with a diagnosis of molluscum contagiosum and/or atopic dermatitis were evaluated.

RESULTS: Only 13.4% of the patients had both conditions. The number of anatomical areas affected by molluscum contagiosum and the occurrence of surrounding eczema and pruritus was greater in the patients who also had atopic dermatitis. There was no statistically significant difference in the frequency of secondary infection associated with the molluscum contagiosum lesions between the patients who had atopic dermatitis and those who did not.

CONCLUSION: The prevalence of atopic dermatitis associated with molluscum contagiosum was low. There was no statistically significant difference in the recurrence rates associated with molluscum contagiosum or in the number of lesions between the patients who had atopic dermatitis and those who did not. The number of anatomical areas affected by the molluscum contagiosum lesions and the presence of surrounding eczema and pruritus were higher in the patients with atopic dermatitis. There was no statistically significant difference in the occurrence of secondary bacterial infection between the groups with and without atopic dermatitis.

Keywords: Dermatitis, atopic; Eczema; Molluscum contagiosum

Resumo: FUNDAMENTOS: É bastante divulgado, sem a fundamentação científica necessária, que a infecção por molusco contagioso tende a ser mais frequente e de maior intensidade nos pacientes acometidos por dermatite atópica. Tal fato motivou a realização deste trabalho.

OBJETIVOS: Avaliar a prevalência de associação de dermatite atópica e molusco contagioso; avaliar se, nos pacientes com dermatite atópica, a infecção por molusco contagioso é mais recorrente e/ou disseminada e se a ocorrência de eczema perimolusco, prurido e/ou infecção é mais prevalente que nos pacientes sem dermatite atópica.

MÉTODOS: Avaliaram-se 284 crianças de ambos os sexos, com diagnóstico de molusco contagioso e/ou dermatite atópica.

RESULTADOS: Apenas 13,4% dos pacientes apresentavam ambas as doenças. O número de áreas anatômicas afetadas por molusco contagioso, a ocorrência de eczema perimolusco e prurido foram maiores nos pacientes com dermatite atópica associada. Não houve diferença significativa de frequência de infecção secundária associada às lesões de molusco contagioso nos pacientes com e sem dermatite atópica.

CONCLUSÃO: A prevalência da ocorrência de dermatite atópica e molusco contagioso associados foi baixa. Não houve diferença significativa na recorrência da infecção por molusco contagioso e na quantidade de lesões nos pacientes com e sem dermatite atópica. O número de áreas anatômicas afetadas por lesões de molusco contagioso, a presença de eczema perimolusco e de prurido foram maiores nos pacientes com dermatite atópica. Não houve diferença significativa na ocorrência de infecção bacteriana secundária nos grupos com e sem dermatite atópica.

Palavras-chave: Dermatite atópica; Eczema; Molusco contagioso

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INTRODUCTION

Molluscum contagiosum is a skin infection caused by a virus of the *Poxviridae* family.¹⁻³ It is more common in children and adolescents but may also affect adults, principally when immunosuppression is present.²⁻⁵ The virus is more common in tropical climates, where the incidence of the disease may reach 20% in children.^{3,5-7} Transmission occurs principally by direct contact or self-inoculation.^{8,9}

The clinical manifestations of molluscum contagiosum are fairly characteristic. The typical lesion consists of a normochromic or yellowish papule measuring 2-6 mm, with central umbilication. It may appear as a single lesion or, more commonly, various lesions in clusters or disseminated.¹⁰ The lesions may be asymptomatic or accompanied by pruritus. Molluscum contagiosum infection may also be accompanied by other clinical alterations such as eczema around molluscum papules and bacterial infection.^{1,5,11-14} In immunocompetent patients, the infection is benign and self-limiting, and may disappear spontaneously in a few months or years.⁸ Various factors may contribute to the dissemination and persistence of the molluscum contagiosum infection, including some situations and diseases that involve changes in systemic and skin immunity.^{2,3,8,15}

Atopic dermatitis (AD) is a chronic inflammatory dermatitis characterized by xerosis, pruritus and eczema, resulting in changes in skin immunity, particularly cell-related immune function.^{16,17} In most cases, onset occurs in the first years of life. The frequency of the disease is variable and it predominantly affects children.^{16,18,19} Due to immunological alterations, individuals affected by atopic dermatitis are more susceptible to bacterial, viral and fungal infections.^{20,21}

Some authors have reported a greater prevalence of infections caused by the molluscum contagiosum virus in patients with atopic dermatitis. This higher prevalence is principally the result of alterations in cell immunity and in skin barrier function present in patients with atopic dermatitis.^{4,8,15,17,20,22-26} It has also been reported that in patients with atopic dermatitis, molluscum contagiosum infections tend to be more persistent, with more disseminated lesions associated with complications such as pruritus, eczema surrounding papules and secondary bacterial infection.^{10,14,15,17,20} Nevertheless, some studies failed to find a higher prevalence of molluscum contagiosum infection and/or its complications in patients with associated atopic dermatitis.⁵

The objectives of the present study were to: evaluate the prevalence of atopic dermatitis in patients with molluscum contagiosum and the prevalence of molluscum contagiosum in patients with atopic dermatitis in the study population; to evaluate whether infection by the molluscum contagiosum virus is more recurrent and/or disseminated in those patients with atopic dermatitis compared to patients without this condition; and to evaluate whether the prevalence of eczema around molluscum papules, pruritus and associated secondary bacterial infection is greater in patients

with atopic dermatitis infected by molluscum contagiosum.

MATERIAL AND METHODS

This observational, prospective study was conducted at the pediatric dermatology outpatient clinic of the Department of Dermatology, *Escola Paulista de Medicina*, Federal University of São Paulo.

The data were collected between September 2007 and March 2008. A total of 284 patients of both sexes, aged from 6 months to 15 years, with a clinical diagnosis of molluscum contagiosum and/or atopic dermatitis, were included in the study.

The principal investigator performed the dermatological examination of all the patients included in the study. The diagnoses of molluscum contagiosum and atopic dermatitis were made exclusively by anamnesis and clinical and dermatological examination based on the presence of the characteristic lesions associated with these diseases.

Patients with lesions that resembled but were not characteristic of molluscum contagiosum or atopic dermatitis and patients with primary or secondary immunodeficiency were excluded from the study.

The patients were evaluated with respect to the occurrence of atopic dermatitis and, when positive, whether they were having a flare-up or were in remission. The presence of current infection by the molluscum contagiosum virus was also investigated and, when positive, the number and location of existing lesions, the presence of eczema surrounding papules, the presence of molluscum contagiosum in areas of atopic eczema (in the case of patients with atopic dermatitis) and the presence of associated bacterial infection and pruritus were also analyzed. In all patients, history of previous molluscum contagiosum infection was investigated and, when positive, information was requested on the number of times it had occurred.

In the statistical data analysis, the patients were divided into the following groups according to their diagnosis following dermatological examination: AD (patients with atopic dermatitis with or without molluscum contagiosum); AD alone (patients with atopic dermatitis without molluscum contagiosum); MC (patients with molluscum contagiosum with or without atopic dermatitis); MC alone (patients with molluscum contagiosum without atopic dermatitis); and AD+MC (patients with both atopic dermatitis and molluscum contagiosum).

A descriptive analysis was performed using absolute and relative frequencies of patients in the case of categorical variables and by means and standard deviations in the case of numerical variables. The chi-square test was used for the comparison of categorical variables between groups.

Significance was established at 5% throughout the statistical analysis ($p < 0.05$). All calculations were made using the Minitab statistical software program, version 15.1.

RESULTS

A total of 284 children were included in this study, 154 (54.2%) female and 130 (45.8%) male. There was no statistically significant difference between the groups with respect to the age of the children (Table 1). Of the 284 children included in the study, 209 had atopic dermatitis and 113 had molluscum contagiosum; 171 children (60.2%) had atopic dermatitis alone, 75 (26.4%) had molluscum contagiosum alone and 38 (13.4%) had both diseases (Table 2).

The prevalence of molluscum contagiosum in children with atopic dermatitis was 18.2% (38 cases in 209 children) and the prevalence of atopic dermatitis in children with molluscum contagiosum was 33.6% (38 cases in 113 children).

When only the 209 children with atopic dermatitis are taken into consideration, 159 (76.1%) were having flare-ups, with characteristic lesions of atopic dermatitis present, while 50 (23.9%) were in remission and had no lesions at the dermatological examination carried out at admission to the study. There was no statistically significant difference in the number of cases with flare-ups and the number in remission between the AD alone and AD+MC groups ($p=0.100$). The percentage of children with flare-ups was 78.4% in the AD alone group and 65.8% in the AD+MC group. The percentage of children in remission was 21.6% in the AD alone group and 34.2% in the AD+MC group.

Of all the 284 children in the study, only 21 (7.4%) reported having had a previous molluscum contagiosum virus infection and the majority of these (19 children) reported only one previous episode. The other two children reported two previous occurrences of molluscum contagiosum infection. The prevalence of previous infection by molluscum contagiosum was slightly higher in patients in the MC alone group compared to the overall group of AD patients, i.e. those who had atopic dermatitis with or without current molluscum contagiosum infection: 15/209 patients (7.2%) in the overall AD group and 6/75 patients (8%) in the MC alone group. This difference was not, however, statistically significant ($p=0.815$).

The clinical characteristics of the molluscum contagiosum viral infection were evaluated in the 113 patients infected with this virus at the time of examination. Of these, 75 had only molluscum contagiosum and 38 had molluscum contagiosum and associated atopic dermatitis.

There was no statistically significant difference in the number of molluscum contagiosum lesions between

the patients affected by molluscum contagiosum alone and those in whom the infection was associated with atopic dermatitis (Table 3).

The most common site of the molluscum contagiosum lesions was the trunk (67.3%), followed by the upper limbs (25.7%), lower limbs (23.0%) and face (21.2%). Molluscum contagiosum lesions in the genital region were less common (8.0%). There were no statistically significant differences in the prevalence of the site of the molluscum contagiosum lesions between the groups (Figure 1).

The median number of anatomical areas of the body affected by the molluscum contagiosum lesions was slightly greater in the AD+MC group compared to the MC alone group. This difference was statistically significant (Table 4).

The prevalence of molluscum contagiosum in areas with atopic eczema was low. Of the 38 patients with atopic dermatitis and molluscum contagiosum, only 25 had atopic eczema at the time of examination. Of these 25 patients, only 5 (20.0%) had molluscum contagiosum lesions in areas of atopic eczema.

The 113 cases of molluscum contagiosum were also evaluated with respect to secondary clinical characteristics associated with the infection (Figure 2).

The proportion of cases of eczema around molluscum papules in the AD+MC group was higher than the proportion in the MC alone group, i.e. patients with molluscum contagiosum and without AD (68.4% and 36.0%, respectively). This difference was statistically significant.

The prevalence of pruritus was higher in the AD+MC group compared to the MC alone group, 71.1% and 40.0%, respectively. This difference was statistically significant.

Only 13/113 patients (11.5%) had a secondary infection in the molluscum contagiosum lesions, 7/38 in the AD+MC group (18.4%) and 6/75 in the MC alone group (8.0%). Although the prevalence was slightly higher in the AD+MC group, this difference was not statistically significant.

DISCUSSION

The concept that the occurrence of molluscum contagiosum is more common in children with atopic dermatitis has been widely divulged in the field of medicine. Nevertheless, in daily practice, clinical observations suggest that the frequency of molluscum contagiosum is no higher in patients with atopic dermatitis than in those

TABLE 1: Mean and median age of the children in the study

	N	mean	SD	Minimum	Median	Maximum
AD alone	171	6.2	4.0	0.5	6	15
MC alone	75	5.6	2.8	1	5	15
AD+MC	38	5.4	2.8	2	5	15

Kruskal-Wallis test: $p=0.649$

TABLE 2: Frequency distribution according to the disease studied

Disease	N	%
Atopic dermatitis alone	171	60.2
Molluscum contagiosum alone	75	26.4
Atopic dermatitis + molluscum contagiosum	38	13.4
Total number of children	284	100

without this disease.

There have been some reports on the association between molluscum contagiosum viral infection and atopic dermatitis in which the authors have stated, with no scientific basis for doing so, that the frequency and intensity of the viral infection is greater in patients with atopic dermatitis.^{3,4,8,9,15,17,20,21,23,24,27,28} Despite many references in the literature, few studies have presented concrete statistical evidence either confirming or refuting these reports.^{1,5,8,9,16,24,29}

The scarcity of studies that have assessed the association between atopic dermatitis and molluscum contagiosum viral infection led to the design of the present study.

The frequency of atopic dermatitis of 33.6% found in the patients with molluscum contagiosum in the present study is higher than the prevalence rates of 14%, 18.2% and 24.2% that have been reported in the literature.^{1,5,24} However, the data from the present study cannot be compared with the data from these other studies, since the sample populations and/or methodology used are different. Conversely, the present prevalence of 33.6% is lower than that found by Agromayor et al., who reported that 49% of children under 10 years of age infected with molluscum contagiosum had atopic dermatitis. Nevertheless, the sample population used in that study also differed from that of the present study.⁸

When the frequency of molluscum contagiosum found in the patients with atopic dermatitis in the present study (18.2%) is compared with the data reported in the literature, this prevalence is found to be greater than that reported in other previously published studies (<1% and 2.9%).^{16,29} However, the data presented in the abovementioned studies are not comparable with the data found in the present study, since there are substantial differences,

principally in the characteristics of the populations and in the methodology used.

In the present study, the concomitant presence of the two diseases was found in only 38 patients, corresponding to 13.4% of the patients included in the study. These data, showing that 66.4% of the patients with molluscum contagiosum did not have atopic dermatitis and 81.8% of the patients with atopic dermatitis did not have molluscum contagiosum, indicate that atopic dermatitis was not more prevalent in patients with molluscum contagiosum, and molluscum contagiosum was not more prevalent in patients with atopic dermatitis.

To evaluate the effect of atopic dermatitis in molluscum contagiosum infection, certain clinical characteristics of the virus infection were evaluated and cases of the infection alone were compared with cases of the infection in patients with associated atopic dermatitis.

When the number of molluscum contagiosum lesions in the 113 infected patients was analyzed and the percentages in the groups with and without atopic dermatitis were compared, no statistically significant difference was found with respect to the number of molluscum contagiosum lesions between the group of patients affected solely by molluscum contagiosum and the group affected by both molluscum contagiosum and atopic dermatitis ($p=0.223$). Based on our observations in daily clinical practice, we expected to find more molluscum contagiosum lesions in the patients with atopic dermatitis. This may have failed to occur because the patients with atopic dermatitis are followed up constantly as outpatients, permitting early diagnosis of molluscum contagiosum infection.

Some publications state that, in patients with atopic dermatitis, molluscum contagiosum infection tends to be more extensive and disseminated.^{2,4,5,17,20,25} However, the majority of these studies fail to show statistical data confirming this statement.^{2,17,23}

With respect to the site of the molluscum contagiosum lesions, no statistically significant difference was found between the group of patients affected only by molluscum contagiosum and the group of patients with molluscum contagiosum and atopic dermatitis. The data obtained show that, in this study, the presence of atopic dermatitis had no effect on the site of the molluscum con-

TABLE 3: Distribution of the number of molluscum contagiosum lesions

Number of MC lesions	AD+MC		MC alone		Total	
	N	%	N	%	N	%
1-10	15	39,5	37	49,3	52	46,0
11-20	11	28,9	25	33,3	36	31,9
> 20	12	31,6	13	17,3	25	22,1
Total number of children	38	100,0	75	100,0	113	100,0

Chi-square test: $p = 0.223$

TABLE 4: Frequency distribution of the number of body areas affected by molluscum contagiosum lesions

Number of body areas affected by MC lesions	AD+MC		MC alone		Total	
	N	%	N	%	N	%
1	18	47.4	54	72.0	72	63.7
2	17	44.7	16	21.3	33	29.2
3	3	7.9	4	5.3	7	6.2
4	0	0.00	1	1.3	1	0.9
Median	2	-	1	-	1	-
Total number of children	38	100.0	75	100.0	113	100.0

tagiosum lesions.

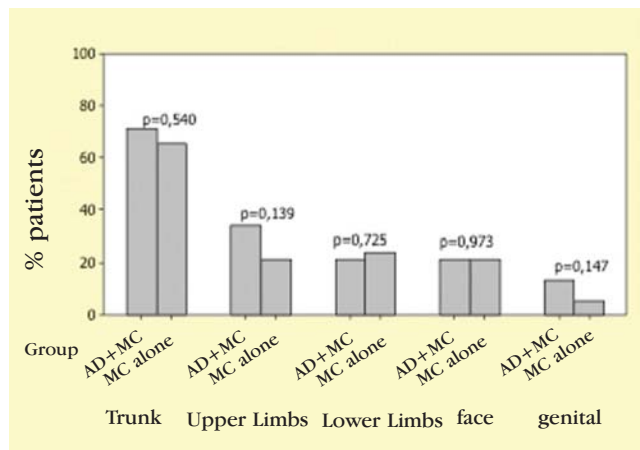
Although there was no statistically significant difference between the groups with respect to the number of molluscum contagiosum lesions, more parts of the body were found to be affected by the infection (face, trunk, upper limbs, lower limbs and genitals) in the patients with atopic dermatitis ($p=0.045$). These data show that, despite the fact that the number of molluscum contagiosum lesions was no greater in the patients with molluscum contagiosum associated with atopic dermatitis, the number of areas of the body affected by the molluscum contagiosum lesions was statistically greater in the patients with associated atopic dermatitis. Therefore, molluscum contagiosum infection appears to be more extensive and disseminated in patients who also have atopic dermatitis. In the literature, the only study found that refers to the number of areas of the body affected was conducted by Dohil et al.,⁵ who reported that 24% of the patients with molluscum contagiosum included in the study also had atopic dermatitis and in 50% of cases more than one area of the body was affected. However, these authors failed to compare the number of areas of the body affected by molluscum contagiosum lesions in patients with and without associated atopic dermatitis.

The cases of molluscum contagiosum in this study were evaluated and compared with respect to the presence of eczema around molluscum papules, pruritus and asso-

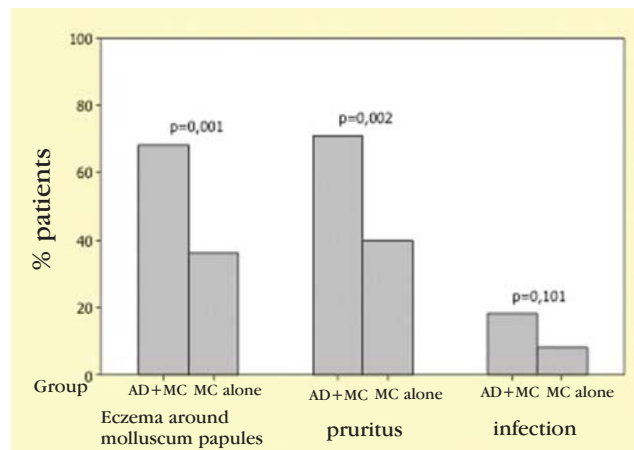
ciated bacterial infection in the groups of patients with and without atopic dermatitis.

The prevalence of eczema around molluscum papules in the patients infected by this virus was found to be statistically higher in the group of patients with associated atopic dermatitis, in which 68.4% of cases had eczema around the papules compared to 36.0% in the group of patients without atopic dermatitis ($p=0.001$). The overall prevalence of eczema around the papules found in the present study, both in the cases of molluscum contagiosum with atopic dermatitis and in the cases of molluscum contagiosum alone, was higher than that described in the literature. Some published studies report having found this reaction in 10-30% of patients infected by the virus.^{1,3,11,13,14,30} In the present study, the prevalence of this eczema was higher in the group of patients with molluscum contagiosum and atopic dermatitis. This finding is in agreement with studies published on the subject whose authors report a greater predisposition of patients with atopic dermatitis infected by the molluscum contagiosum virus to develop this perilesional reaction.^{10,14,15,20} However, these studies fail to present statistical analyses or concrete data confirming this statement.

The only study found in the literature in which the authors compare the frequency of this reaction in patients with and without associated atopic dermatitis was conducted in 1996 by Opromolla and Negrão in Brazil. The findings of the present study differ from those of these authors,



GRAPH 1: Site of the molluscum contagiosum lesions



GRAPH 2: Eczema around molluscum papules, pruritus and secondary infection in molluscum contagiosum

who concluded in their study that eczema around molluscum papules did not appear to be more prevalent in patients with atopic dermatitis infected by the virus.¹

Pruritus in the cases of molluscum contagiosum was also more common in the patients with associated atopic dermatitis, this difference being statistically significant ($p = 0.002$). This finding is in agreement with some reports in the literature that encountered a higher frequency of pruritus associated with molluscum contagiosum infection when atopic dermatitis was also present.¹⁷ Nevertheless, to the best of our knowledge, there are no studies on this subject that include a statistical analysis to confirm the greater frequency of pruritus associated with molluscum contagiosum in patients with atopic dermatitis.

With respect to the frequency of bacterial infection associated with cases of molluscum contagiosum virus infection, only 11.5% of the cases of molluscum contagiosum were found to be accompanied by bacterial infection. The prevalence of this complication in this study was low and there was no statistically significant difference between the group of patients with molluscum contagiosum and atopic dermatitis and the group of patients with molluscum contagiosum alone (18.4% versus 8.0%; $p = 0.101$).

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