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ORIGINAL ARTICLE

Prevalence of allergic rhinitis among adolescents from Distrito Federal, Brazil: comparison between ISAAC phases I and III

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Abstract

Objectives: To determine the prevalence of allergic rhinitis in a random group of schoolchildren aged 13 to 14 years in Brasilia, Brazil, to evaluate tendencies over 6 years and to compare prevalence rates among different socioeconomic groups.

Methods: Two cross-sectional studies were undertaken 6 years apart, using the ISAAC (phases I and III) written questionnaire. Thirty-nine schools were chosen at random from eight administrative regions in Brasilia, and were classified into three groups according to the socioeconomic conditions of the population.

Results: A total of 3,009 questionnaires were collected. Of these 53.5% related to female children and 80% to students from public schools. Prevalence rates for diagnosed rhinitis, recent rhinitis and allergic rhinitis were 20, 29.3 and 12.2%, respectively. Rhinitis was more prevalent in private schools than in public ones (17.8 versus 14.1%) and sufferers were predominantly female. Prevalence rates were also higher among populations with higher socioeconomic status (23.5 versus 12.2%). Comparison with the 1996 data revealed significant increases in the prevalence of diagnosed rhinitis (12.7 versus 20%, p = 0.001). These increases were observed at all socioeconomic levels.

Conclusion: A large number of 13 and 14-year-old children resident in the Distrito Federal exhibit symptoms indicative of rhinitis and the majority of them have allergic rhinitis.

Over a six-year period the prevalence of allergic rhinitis increased significantly, predominantly affecting females and with greater prevalence among students at private school and from families with higher socioeconomic status.

J Pediatr (Rio J). 2006;82(2):137-43: Perennial allergic rhinitis, prevalence, adolescent, analysis socioeconomic.

Introduction

Allergic rhinitis is described as one of the most common chronic diseases of childhood and, according to research undertaken in 155 cities in countries in Africa, North and South America, Asia, Australia and Europe, involving 463,801 13 and 14-year-old children,[1] exhibits substantial variability in prevalence rates, ranging from 1.4 to 39.7%. Furthermore, there are countless reports of rhinitis prevalence rates increasing over recent years.[2-5]

Allergic rhinitis, with its intimate association with asthma, is a public health problem in many countries, leading to the need for continuous monitoring of its tendencies.

The ISAAC (International Study of Asthma and Allergies in Childhood) project was created with the objective of assessing the prevalence and evolution of asthma and allergic diseases (rhinoconjunctivitis and atopic dermatitis), by means of a standardized written questionnaire that has been translated and validated for many languages, including Portuguese.[6] The protocol has already been employed in 56 countries, and eight cities in Brazil were studied during

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phase I.[7] The objective of phase III is to evaluate the tendencies of these pathologies.[8]

The phase I questionnaire was applied in the Distrito Federal in 1996.[9] Our objectives were to employ identical methodology to the previous study to investigate the current prevalence of allergic rhinitis in 13 and 14-year-old children resident in several different administrative regions in Brasilia (DF), to research the disease's tendencies, comparing the current data with the 1996 results and to assess the relationship between rhinitis prevalence and the socioeconomic conditions of the population studied.

The availability of these data may provide an instrument of aid to the creation of new strategies for rhinitis management.

Methods

The populations resident in Brasilia exhibit very specific characteristics. Different populations are very well defined from a socioeconomic perspective and there is a distribution pattern encompassing nearby administrative regions.

Eight of the 19 administrative regions of the Distrito Federal were randomly chosen to take part in the study. Each region was classified into one of three groups by socioeconomic status. The sample was selected by proportional distribution according to the number of students in each group. Towns were chosen by lots:[9]

Group I: n = 919 (30.5%) – Plano Piloto and Guará – highest socioeconomic status, with 82% of family incomes more than five times the minimum wage and 69% of schoolchildren at private school.

Group II: n = 1,664 (55.3%) – Taguatinga, Ceilândia, Sobradinho and Núcleo Bandeirante – intermediate socioeconomic status, with 65% of family incomes of five times the minimum wage and 17% of students attending private school.

Group III: n = 426 (14.1%) – Samambaia and São Sebastião – low socioeconomic, with 60% of family incomes less than twice the minimum wage and just 0.4% attending private school.

Data were collected during the period from July to October 2002. During phase I, data were collected throughout 1996.[9] The standardized ISAAC questionnaire (phase III) was employed. This has been adequately described in other publications.[10,11] Thirty-nine schools were randomly selected, in common with the 1996 study (phase I).[9] Information on their characteristics and locations were obtained from the Distrito Federal Education Department.

The prevalence of diagnosed or reported allergic rhinitis was determined based on answers to the question, "have you ever had hayfever?" The question, "In the past 12 months, have you had a problem with sneezing, or a runny, or blocked nose?" identified those adolescents suffering from rhinitis at the time of data collection, and, in conjunction with the question, "has this nose problem been accompanied by itchy-watery eyes", identified allergic rhinitis. The severity of symptoms was assessed based on answers to the question "how much did this nose problem interfere with your daily activities?" (Figure 1).

Data analysis

Data were input to a data analysis program (Epi-Info 2002) provided by ISAAC, and compared with the data from phase I,[9] which were obtained using identical sampling and methodology.

The statistical significance of differences between the two datasets and between different socioeconomic groups was tested by applying the chi-square test. Results were considered significant at $p < 0.05$.

Results

Questionnaires were completed by 3,131 children aged 13 or 14 years (53.5% were female), in the classroom under the supervision of a member of the research team.

One hundred and twenty-two of the questionnaires had to be discarded, but 3,009 (96.1%) had been correctly completed. Eighty percent of the valid questionnaires came from public schools.

The proportions of affirmative answers to each of the questions are listed in Table 1.

The prevalence of nasal symptoms ("Have you ever had a problem with sneezing, or a runny, or blocked nose?") was very high in this population (42.7%), while 29.3% reported suffering symptoms during the previous 12 months (current rhinitis sufferers). When only individuals who had ocular symptoms concomitantly are selected, this prevalence drops to 12.3% (allergic rhinitis).

Nasal symptoms were intense enough to interfere with the day-to-day activities of just 4.3% of adolescents. Another 16.8% reported that they were not badly affected by their symptoms. An even larger number of children had nasal symptoms that did not interfere with their lives (22.7%).

Monthly variation followed a perennial pattern, with peaks during June, July and August, which are winter months in Brazil (Figure 2).

The prevalence of diagnosed rhinitis ("have you ever had hayfever") was 20%, being significantly higher among females (12.3% compared with 7.8% of males, $p < 0.001$, M/F ratio = 0.63). The prevalence of current rhinitis was significantly higher than diagnosed rhinitis (29.3 against 20%, $p < 0.001$).

Questionnaire 2 (13 to 14 years)

All questions are about problems which occur when you do not have a cold or the flu.

School: _____

Today's date: _____ / _____ / _____

Your name: _____ Your age: _____

Date of birth: _____ / _____ / _____ Sex: ( ) Male ( ) Female

1) Have you ever had a problem with sneezing, or a runny, or blocked nose when you did not have a cold or the flu?
( ) Yes ( ) No **If you have answered "no" please skip to question 6.**

2) In the past 12 months, have you had a problem with sneezing, or a runny, or blocked nose when you did not have a cold or the flu?
( ) Yes ( ) No **If you have answered "no" please skip to question 6.**

3) In the past 12 months, has this nose problem been accompanied by itchy-watery eyes?
( ) Yes ( ) No

4) In which of the past 12 months did this nose problem occur? (Please tick any which apply)
( ) January ( ) May ( ) September
( ) February ( ) June ( ) October
( ) March ( ) July ( ) November
( ) April ( ) August ( ) December

5) In the past 12 months, how much did this nose problem interfere with your daily activities?:
( ) Not at all ( ) A little ( ) A moderate amount ( ) A lot

6) Have you ever had hayfever?
( ) Yes ( ) No

Figure 1 - Translation of questionnaire used for the study (original version available online at www.jped.com.br/ing)

Compared with the 1996 research data, a significant increase was observed in the prevalence rates of diagnosed rhinitis (from 12.7 to 20%, p = 0.001), without significant alteration in the prevalence of current rhinitis (30.2 to 29.3%, p = 0.46). Furthermore, a significantly greater number of children reported that their activities were not disturbed by their nasal problems (from 12.4 to 22.7%, p = 0.001). In contrast, the number of individuals reporting moderate worsening of symptoms increased (from 1.6 to 3.2%, p = 0.001, Table 1).

Significant alterations were observed to other items investigated by the two studies. There was a significant increase in the prevalence of symptoms during June, July and August, but there were not reductions during February, November or December (p < 0.05).

When analyzed from a socioeconomic perspective, the prevalence of diagnosed rhinitis was higher among groups with greater purchasing power (G1 > G2 > G3), and these differences were significant for G1 versus G2 (p = 0.045), G1 versus G3 (p = 0.001) and G2 versus G3 (p = 0.002). The prevalence of current rhinitis was also higher in the groups with higher socioeconomic status (G1 > G2 > G3), and differences were significant for G1 versus G2 (p = 0.03) and G2 versus G3 (p = 0.005), but not for G1 versus G3 (p = 0.101, Table 2).

There are indications that the severity of symptoms had reduced in all groups. Conjunctivitis was reported in a similar manner by all three groups (Table 2).

When we compared the phase I to the phase III data we observed that there had been a significant increase

in the prevalence of reported rhinitis at all socioeconomic levels. However, analyses of the current prevalence rates of rhinitis and conjunctivitis revealed that no variation had occurred (Table 3).

The prevalence of diagnosed rhinitis was significantly higher in private than in public schools (26.8 versus 18.4%, p = 0.001). Diagnosed rhinitis was reported in association with asthma by 27.7% of the children, while

Table 1 - Percentage of affirmative responses to the written ISAAC questionnaire (phase III)

Question	1996 n = 3,254		2002 n = 3,009		Chi-square
	n	%	n	%	
Ever had sneezing, or a runny, or blocked nose?	1,317	40.4	1,286	42.7	0.07
Sneezing, or a runny, or blocked nose during the last 12 months?	983	30.2	883	29.3	0.46
Itchy-watery eyes?	504	15.4	463	15.4	0.91
Occurring in which month(s)?					
January	158	4.8	124	4.1	0.16
February	162	4.9	114	3.8	0.02 *
March	197	6.0	176	5.8	0.73
April	176	5.4	157	5.2	0.74
May	228	7.0	199	6.6	0.54
June	252	7.7	287	9.5	0.01 *
July	224	6.8	326	10.8	0.001 *
August	257	7.9	348	11.6	0.001 *
September	196	6.0	208	6.9	0.152
October	140	4.3	113	3.8	0.272
November	133	4.0	36	1.2	0.001 *
December	115	3.5	40	1.3	0.001 *
Does nose problem interfere with daily activities?					
Not at all	405	12.4	683	22.7	0.001 *
A little	491	15.0	506	16.8	0.062
A moderate amount	52	1.6	17	3.2	0.001 *
A lot	35	1.0	33	1.1	0.94
Have you ever had hayfever?	414	12.7	603	20	0.001 *

ISAAC = International Study of Asthma and Allergies in Childhood.
* p < 0.05.

Table 2 - Socioeconomic breakdown of 2002 data

Question	G1 n = 919		G2 n = 1,664		G3 n = 426		p		
	n	%	n	%	n	%	G1xG2	G1xG3	G2xG3
Ever had sneezing, or a runny, or blocked nose?	442	48.1	677	40.7	167	39.2	0.002 *	0.002 *	0.580
Sneezing, or a runny, or blocked nose during the last 12 months?	303	33	480	28.8	160	23.5	0.030 *	0.101	0.005 *
Itchy-watery eyes?	145	15.8	256	15.4	62	14.6	0.801	0.562	0.670
Does nose problem interfere with daily activities?									
Not at all	199	21.7	382	23	102	23.9	0.450	0.350	0.667
A little	144	15.7	278	16.7	84	19.7	0.495	0.660	0.143
A moderate amount	32	3.5	50	3.0	15	3.5	0.508	0.971	0.584
A lot	9	1.0	17	1.0	7	1.6	0.920	0.296	0.283
Have you ever had hayfever?	216	23.5	335	20.1	52	12.2	0.045 *	0.001 *	0.002 *

* p < 0.05.

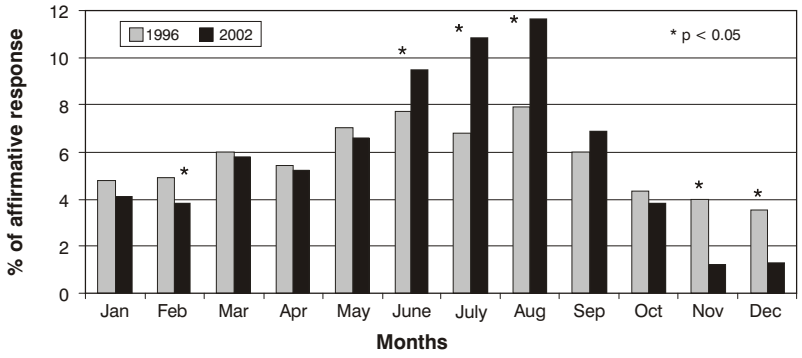

Figure 2 - Seasonal variation of rhinitis prevalence during 2002

23.5% reported an association with eczema. The occurrence of all three pathologies (asthma, allergic rhinitis and eczema) simultaneously was reported by just 8.8% of the children. In contrast, just 11.1% of those who did not have rhinitis reported asthma. Current rhinitis was reported by 79.9% of the children with ocular symptoms.

Discussion

Employing the ISAAC protocol we have demonstrated that the prevalence of rhinitis in 13 and 14-year-old children in Brasilia has increased significantly over a six-year period. We have also demonstrated that populations with higher socioeconomic status suffer more from this disease.

Table 3 - Comparison between 1996 and 2006 data, by socioeconomic groups

	G1			G2			G3		
Year	**1996**	**2002**	**p**	**1996**	**2002**	**p**	**1996**	**2002**	**p**
n	**1,136**	**919**		**1,516**	**1,664**		**602**	**426**	
Ever had sneezing, or a runny, or blocked nose?	499 43.9%	442 48.1%	0.06 *	546 36.2%	677 40.7%	0.007 *	272 45.2%	167 39.2%	0.06 *
Sneezing, or a runny, or blocked nose during the last 12 months?	376 33.1%	303 33	0.951	402 26.5%	480 28.8%	0.143	205 34.1%	160 23.5	0.247
Itchy-watery eyes?	168 14.8%	145 15.8%	0.535	205 13.5%	256 15.4%	0.136	131 21.8%	62 14.6%	0.004 *
Does nose problem interfere with daily activities?									
Not at all	186 16.4%	199 21.7%	0.002 *	165 10.9%	382 23%	0.001 *	54 8.97%	102 23.9%	0.001 *
A little	162 14.3%	144 15.7%	0.372	204 13.5%	278 16.7%	0.011 *	125 20.8%	84 19.7%	0.681
A moderate amount	23 2.02%	32 3.5%	0.042 *	17 1.12%	50 3.0%	0.002 *	12 1.99%	15 3.5%	0.131
A lot	5 0.44%	9 1.0%	0.140 *	16 1.06%	17 1.0%	0.925	14 2.33%	7 1.6%	0.450
Have you ever had hayfever?	212 18.7%	216 23.5%	0.007	164 10.8%	335 20.1%	0.001 *	38 6.31%	52 12.2%	0.009 *

* $p < 0.05$.

For several years the ISAAC questionnaire has been used all over the world and has proven itself useful for assessing the prevalence and morbidity of asthma and allergic diseases. It is an easy-to-apply questionnaire that can be completed quickly without interfering with school activities.

The first study carried out in Latin America using this protocol, (phase I) took place in São Paulo, and after that six research projects were run in other Brazilian cities, investigating a total of 20,587 adolescents aged 13-14 years. According to the authors, the mean prevalence of diagnosed rhinitis was 34.2%, and the mean prevalence of allergic rhinitis was 18%.[12]

According to many research projects applying the phase III ISAAC protocol, the prevalence of allergic rhinitis has been increasing in some countries.[2-5] In Brazil the mean prevalence of rhinitis was 16.8%.[13] No changes were detected in Porto Alegre, Salvador or São Paulo, but increases were observed in Curitiba and Recife. Our phase III research in the Distrito Federal has shown that the prevalence rates of diagnosed rhinitis (20%) and of current rhinitis (29.3%) were both above the national average, and a significant increase was recorded over the six-year period, following the global tendency.

In common with other studies undertaken in South Africa[14] and in Brazil,[15] we found that the prevalence of allergic rhinitis was higher among patients living under better socioeconomic conditions. Our data are in agreement with data obtained in epidemiological studies of asthma, such as that carried out by Britto et al. in Recife, reporting a higher prevalence of asthma in private schools and among children whose parents had spent longer in education.[16]

One concern when a research project is based on the answers given to written questionnaires is the ability of the population studied to understand the questions and to provide adequate responses. This is one possible explanation for the prevalence of diagnosed rhinitis being significantly higher at private schools and in the socioeconomic groups with higher status. In addition to cultural factors, the fact that financially more privileged groups have easier access to healthcare services may be responsible for this elevated prevalence.

The severity of rhinitis appears to have reduced since 1996, to the extent that a larger number of adolescents reported that their activities were not disturbed by their nasal symptoms. This could be due to the fact that treatment is increasingly common in our region, although this factor was not investigated by our research. In common with what we observed in phase I, the three different socioeconomic groups had similar levels of rhinitis severity. Furthermore, deterioration was observed in one of the items of rhinitis severity (moderate interference with activities) for the two highest socioeconomic status groups, in contrast with the elevated number of children who reported lesser severity.

A higher prevalence was observed for current rhinitis (sneezing, or a runny, or blocked noses in the past 12 months) than of diagnosed rhinitis (have you ever had hayfever?). We believe that underdiagnosis is the cause of the predominance of current rhinitis, as has been mentioned in the case of asthma.[17,18]

We observed a predominance of females among the children with rhinitis, which is in agreement with other publications.[19,20]

The seasonal variation of allergic rhinitis with increased prevalence during the winter has also been reported.[21,22]

The high prevalence of rhinitis among children with ocular symptoms confirms the intimate relationship between rhinitis and allergic conjunctivitis.

In conclusion, the application of identical methodology by two different research teams to similar populations at an interval of 6 years, together with the representative samples, allows us to believe that we have evaluated the tendencies of allergic rhinitis prevalence rates, with a high degree of reliability, among 13 and 14-year-old schoolchildren in the Distrito Federal.

The data indicate a significant increase in the prevalence of allergic rhinitis. Furthermore, we found that its morbidity was greater among groups living under more favorable economic conditions and also among females.

References

1. Strachan D, Sibbald B, Weiland S, Ait-Khaled N, Anabwani G, Anderson HR, et al. Worldwide variations in prevalence of symptoms of allergic rhinoconjunctivitis in children: the International Study of Asthma and Allergies in Childhood (ISAAC). Pediatr Allergy Immunol. 1997;8:161-76.
2. Annus T, Riikjarv MA, Rahu K, Bjorksten B. Modest increase in seasonal allergic rhinitis and eczema over 8 years among Estonian schoolchildren. Pediatr Allergy Immunol. 2005;16: 315-20.
3. Lee SL, Wong W, Lau YL. Increasing prevalence of allergic rhinitis but not asthma among children in Hong Kong from 1995 to 2001 (Phase 3 International Study of Asthma and Allergies in Childhood). Pediatr Allergy Immunol. 2004;15:72-8.
4. Arnedo-Pena A, Garcia-Marcos L, Blanco-Quiros A, Martinez Gimeno A, Aguinaga Ontoso I, Gonzalez Diaz C, et al. Time trends in prevalence of symptoms of allergic rhinitis in 13-14 year-old schoolchildren in 8 areas of Spain between 1993-1994 and 2001-2002 according to the International Study of Asthma and Allergies in Childhood (ISAAC). Med Clin (Barc). 2004;123:490-5.
5. Lis G, Breborowicz A, Cichocka-Jarosz E, Sobkowiak P, Gazurek D, Swiatly A, et al. The prevalence of allergic rhinitis and conjunctivitis in school children from Krakow and Poznan – ISAAC study (International Study of Asthma and Allergies in Childhood). Otolaryngol Pol. 2004;58:1103-9.
6. Sole D, Vanna T, Yamada E, Rizzo MC, Naspitz C. International Study of Asthma and Allergies in Childhood (ISAAC) written questionnaire. Validation of the asthma component among Brazilian children. J Investig Allergol Clin Immunol. 1998;8: 376-82.

7. Sole D, Yamada E, Vana AT, Werneck G, Solano de Freitas L, Sologuren MJ, et al. International Study of Asthma and Allergies in Childhood (ISAAC): prevalence of asthma and asthma-related symptoms among Brazilian schoolchildren. J Investig Allergol Clin Immunol. 2001;11:123-8.
8. Ellwood P, Asher MI, Beasley R, Clayton TO, Stewart AW, ISAAC Steering Committee. The international study of asthma and allergies in childhood (ISAAC): phase three rationale and methods. Int J Tuberc Lung Dis. 2005;9:10-6.
9. Felizola MLBM. Prevalência de asma brônquica em escolares do Distrito Federal e sua relação com o nível socioeconômico [tese de mestrado]. Brasília: Universidade de Brasília; 1997.
10. International Study of Asthma and Allergies in Childhood – ISAAC Manual. Bochum, Auckland: ISAAC Coordinating Committee; 1992.
11. Asher MI, Keil U, Anderson HR, Beasley R, Crane J, Martinez F, et al. International Study of Asthma and Allergies in Childhood (ISAAC): rationale and methods. Eur Respir J 1995;8:483-91.
12. Sole D, Camelo-Nunes IC, Vana AT, Yamada E, Werneck F, de Freitas LS, et al. Prevalence of rhinitis and related-symptoms in schoolchildren from different cities in Brazil. Allergol Immunopathol (Madr). 2004;32:7-12.
13. Sole D, Camelo-Nunes IC, Rosario NA, Freitas LS, Britto M, Melo K, et al. Prevalence of asthma, rhinoconjuntivitis and atopic eczema among Brazilian adolescents. Comparison between ISAAC phases I and III [abstract]. J Allergy Clin Immunol. 2004;113:1030.
14. Mercer MJ, Joubert G, Ehrlich RI, Nelson H, Poyser MA, Puterman A, et al. Socioeconomic status and prevalence of allergic rhinitis and atopic eczema symptoms in young adolescents. Pediatr Allergy Immunol. 2004;15:234-41.
15. Nascimento-Carvalho CM, Rocha H, Benguigui Y. Effects of socioeconomic status on presentation with acute lower respiratory tract disease in children in Salvador, Northeast Brazil. Pediatr Pulmonol. 2002;33:244-8.
16. Britto MCA, Bezerra PGM, Brito RCCM, Rego JC, Burity EF, Alves JGB. Asma em escolares do Recife – comparação de prevalências: 1994-95 e 2002. J Pediatr (Rio J). 2004;80:391-400.
17. Sole D, Yamada E, Vana AT, Costa-Carvalho BT, Naspitz CK. Prevalence of asthma and related symptoms in school-age children in Sao Paulo, Brazil – International Study of Asthma and Allergies in Children (ISAAC). J Asthma. 1999;36:205-12.
18. Siersted HC, Mostgaard G, Hyldebrandt N, Hansen HS, Boldsen J, Oxhoj H. Interrelationships between diagnosed asthma, asthma-like symptoms, and abnormal airway behaviour in adolescence: the Odense Schoolchild Study. Thorax. 1996;51:503-9.
19. Shamssain MH, Shamsian N. Prevalence and severity of asthma, rhinitis, and atopic eczema in 13 to 14-year-old schoolchildren from the northeast of England. Ann Allergy Asthma Immunol. 2001;86:428-32.
20. Remes ST, Korppi M, Kajosaari M, Koivikko A, Soininen L, Pekkanen J. Prevalence of allergic rhinitis and atopic dermatitis among children in four regions of Finland. Allergy. 1998;53:682-9.
21. Carvalho N, Fernandez-Benitez M, Cascante L, Aguinaga I, Guillen F. International Study of Asthma and Allergies in Childhood. Results on rhinitis of first phase in Pamplona, Spain. Allergol Immunopathol (Madr). 2000;28:207-12.
22. Teeratakulpisarn J, Pairojkul S, Heng S. Survey of the prevalence of asthma, allergic rhinitis and eczema in schoolchildren from Khon Kaen, Northeast Thailand. An ISAAC study. International Study of Asthma and Allergies in Childhood. Asian Pac J Allergy Immunol. 2000;18:187-94.

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