

Prevalence of trachoma in preschool and schoolchildren in the city of São Paulo

Inês Kazue Koizumi^a, Norma Helen Medina^a, Rosa Kazuye Koda D'Amaral^b, Wilma Tiemi Miyake Morimoto^b, Lígia Santos Abreu Caligaris^b, Nilton Chinen^b, Yvone Marcondes R de Andrade^b and Maria Regina Alves Cardoso^c

^aCentro de Vigilância Epidemiológica "Prof. Alexandre Vranjac" (CVE). Secretaria de Estado da Saúde de São Paulo. São Paulo, SP, Brasil. ^bSecretaria Municipal de Saúde da Prefeitura de São Paulo. São Paulo, SP, Brasil. ^cDepartamento de Epidemiologia. Faculdade de Saúde Pública. Universidade de São Paulo. São Paulo, SP, Brasil

Keywords

Trachoma, epidemiology. Preschool. Epidemiological surveillance. School health. C. trachomatis.

Abstract

Objective

To assess the prevalence of trachoma among preschool and school children of public schools to give new focus to control programs.

Methods

An epidemiological survey was carried out in São Paulo City in 1999. Children aged four to 14 years old were selected by a cluster sampling in which school shift was the sampling unit. External eye examination was conducted to detect clinical signs of trachoma.

Results

A total of 27,091 children were examined and 597 cases of trachoma were found (2.2%; 95% CI: 1.86%–2.55%). The prevalence ranged from 0.4% to 4.2% in 10 city areas. The trachoma detection rate in the household contacts examined was 8.7%. Follicular trachoma was found in 99% of the cases and intense trachoma in 1.0%. It was observed that 21.8% of the cases were asymptomatic.

Conclusions

Though the trachoma prevalence was low, the occurrence of severe cases points out to the likelihood of cicatricial trachoma cases in the future if they are not adequately treated and controlled. The great difference in the prevalences in different city areas indicates the need for strengthening epidemiological surveillance activities.

INTRODUCTION

Trachoma is a chronic keratoconjunctivitis caused by the bacterium *Chlamydia trachomatis* characterized by acutely affecting conjunctival follicles and papillae. Depending on the severity and course of the inflammatory process, this condition can progress to spontaneous healing or conjunctival scarring. Mounting scarring from repeated infections since childhood can cause retractions, which lead to entropion and trichiasis. Also, conjunctival glands can be affected leading to dry eye. All these lesions are risk factors for corneal alterations which can potentially lead to visual impairment.⁴

Dawson et al⁴ (1981) reported that trachoma can be indistinct in its early manifestations and most often develops gradually causing slight eye discomfort, mild tearfulness, burning and mild morning discharge. Itchiness has been described in many studies as the most common symptom and, though it is not a classic clinical manifestation of trachoma, it can facilitate the transmission of infection.¹² Copious purulent discharge is seen only when associated with bacterial infection and symptoms are not always proportional to the clinical manifestations in some severe cases.

Inflammatory forms of trachoma prevail among

Correspondence:

Inês Kazue Koizumi
Centro de Vigilância Epidemiológica
"Prof. Alexandre Vranjac"
Av. Dr. Arnaldo, 351 6º andar Sala 614
01246-000 São Paulo, SP, Brasil
E-mail: ikoizumi@terra.com.br

Partially funded by Coordenação de Vigilância Epidemiológica and Controle do Tracoma do Ministério da Saúde. Work presented at the XIV Congresso Brasileiro de Prevenção de Cegueira e Reabilitação Visual, Natal, RN, 2000; at the VII Congresso Paulista de Saúde Pública, Santos, SP, 2001 and V Congresso Brasileiro de Epidemiologia, Curitiba, PR, 2002. Received on 12/7/2004. Reviewed on 14/6/2005. Approved on 22/7/2005.

children aged less than 10 years who are the main source of *C. trachomatis* infection in a community.^{4,15}

Higher susceptibility to trachoma is generally associated with poor water supply and poor sanitation and housing conditions and thus this disease is an indicator of poverty and underdevelopment.^{4,6,15}

In endemic areas, the prevalence of inflammatory trachoma tend to decrease with age while its sequelae, such as scarring, trichiasis, and corneal opacity, increase with age.^{4,11,15}

Endemic trachoma can be seen in many regions of Brazil. In the Southeastern state of São Paulo, prevalences are lower than in Northeastern states.^{5,6,11,14}

Trachoma reemerged in the city of São Paulo in 1990 and this led to an intervention in epidemiological surveillance.²

Data from the city of São Paulo, provided by the Epidemiological Surveillance System of the State Health Department of São Paulo (SVE/SES/SP), showed detection rates of 4.6 per 100 thousand persons in 1993, 16.1 in 1994, 6.0 in 1995, 2.3 in 1996, 3.3 in 1997, and 3.4 in 1998. Most trachoma cases in the state of São Paulo have few or no symptoms at all and they are often detected by active surveillance of the disease in schoolchildren.

Studies carried out in the 1990's in the city of São Paulo showed disease prevalences ranging from 2.8% in Freguesia do Ó district to 4.7% in Bela Vista district.^{1,2}

In this scenario, the present study aimed at assessing the current epidemiological status of trachoma for redirecting and prioritizing disease control actions.

METHODS

An epidemiological survey was carried out in the city of São Paulo from August to October 1999. The study sample consisted of public (municipal and state) preschool and schoolchildren in 10 Regional Health Administration Areas (RHAA).

The estimated sample size was 25,476 children aged four to 14 years. A 1.5% prevalence* of all forms of trachoma was established for a maximum error of 0.00225, 5% significance level and a design effect equal to two, as sampling was conducted through clusters. The sample was increased by 20% as previous

studies reported losses due to absentees despite repeated visits to the schools.

The Brazilian Ministry of Education census of public preschool and schoolchildren was used as the sampling frame. Children were selected using one-step cluster sampling and school period – morning, intermediate, afternoon and evening – was the sampling unit. The mean number of children by period was first calculated to obtain the number of periods required for the study sample. Then, the sampling interval was calculated to select the study periods randomly.

All subjects attending the school period drawn were evaluated for detecting trachoma cases according to the World Health Organization (WHO) criteria.¹³ Data on the child and school identification, observation on facial hygiene and on whether the child used to share his/her bed were collected.

External eye examination was performed using a standardized procedure by trained examiners using a magnifying glass (2.5 x) and natural or artificial lighting. Trachoma was diagnosed when any of the following key signs were found:¹³

- Follicular inflammatory trachoma (TF) - presence of at least five follicles with 0.5 mm diameter or more;
- Intense inflammatory trachoma (TI) - presence of trachomatous inflammation blurring more than 50% deep tarsal vessels;
- Cicatricial trachoma (TC) - presence of trachomatous scarring;
- Trachomatous trichiasis (TT) - presence of at least one eyelash touching the eye globe or evidence of its recent removal;
- Corneal opacity (CO) - presence of corneal opacity blurring the pupillary edge.

All cases detected were recorded in the epidemiological survey record of the Epidemiological Surveillance System of the State of São Paulo, which includes information on: age, gender, address, origin, study site, signs and symptoms, clinical disease form, contacts with similar cases, housing sanitation conditions and home contacts.

Inflammatory trachoma (TF/TI) was treated and followed up during periodical visits every three months, according to the SES-SP guidelines.

Family contacts of detected cases were examined and treated when needed.

The study was approved by the Research Ethics

*Municipal Health Department of São Paulo. Center for Health Action Coordination. Annual Report on the Eye Health Program. São Paulo: 1998.

Committee of the Instituto Adolfo Lutz, State Health Department of São Paulo, and all parents/caretakers and subjects were informed on the study procedures and signed a consent form.

RESULTS

Of 30,629 children actually enrolled in the school periods drawn from 72 public schools, 27,091 children were examined, i.e., 88.5% coverage. There were losses due to absentees (11.3%) at the examination days and parental refusal to participate (0.3%).

A total of 597 cases of inflammatory trachoma (TF/TI) were detected, obtaining a prevalence of 2.2% (95% CI: 1.86%-2.55%) for the city, ranging from 0.4% in the Western city area to 4.2% in the Eastern area (Figure 1). The highest prevalences were found in the Eastern area, 6.3% (36/573) in a school of São Miguel Paulista district and 6% in two other schools.

Follicular trachomatous inflammation (TF) was the most common clinical manifestation seen in 99% of the cases and intense trachomatous inflammation (TI) was detected in only six children (1%).

With regard to signs and symptoms, 23% (132) of the cases were asymptomatic. Among symptomatic cases, the following signs and symptoms were found: itching (49%; 284), tearfulness (40%; 231), burning (37%; 217), red eye (31%; 179), eye discharge (24%;140), photophobia (24%;139), and foreign body sensation (22%;128). Conjunctivitis was present in 3% (17) of the cases. Reinfection was ascertained in two cases (0.3%) who reported previous treatment.

The Table shows the distribution of children according to their characteristics and the presence of trachoma. The prevalence of trachoma was 2.2% for both boys and girls.

Trachoma prevalence by age group ranged from 1.9% in those aged four to six years to 2.4% in those aged seven to 10 years. The proportions of trachoma cases are depicted in Figure 2. Most cases were detected at the age of 11 years (15.4%) and 82.6% of cases lie within the age group seven to 14 years.

No statistical difference was found for either sharing bed or facial hygiene.



Figure 1 - Trachoma detection rate (%) in Regional Health Administration Areas (RHAA), city of São Paulo, Brazil, 1999.

It was found 127 trachoma cases in the household survey, corresponding to a prevalence of 8.6% among 1,477 contacts examined. Of all cases, 94% (538) reported previous exposure at school and 14% (76) at home.

As for cases origin, 8% (47) came from other Brazilian states; being that 62% of them (29) have been living in the city of São Paulo for less than five years.

With regard to mother's occupation, 48% (289) were housewives, 41% (245) were employed and 3% (15) were unemployed. As for father's occupation, 75% (444) reported having a job and 5% (27) were unemployed.

Concerning basic sanitation conditions, 90% (537) of the cases lived in areas with water supply and 75% (445) lived in areas with sewage system.

DISCUSSION

Despite difficulties found in the city of São Paulo, such as inadequate transportation and long distances between schools, the active surveillance of cases in schools could be undertaken during a short period of time and satisfactory coverage was achieved, since more than 80% of schoolchildren were examined in all Regional Health Administration Areas (RHAA) but one, where the coverage was 78%.

Table - Factors associated to trachoma cases in preschool and schoolchildren in the city of São Paulo, Brazil, 1999.

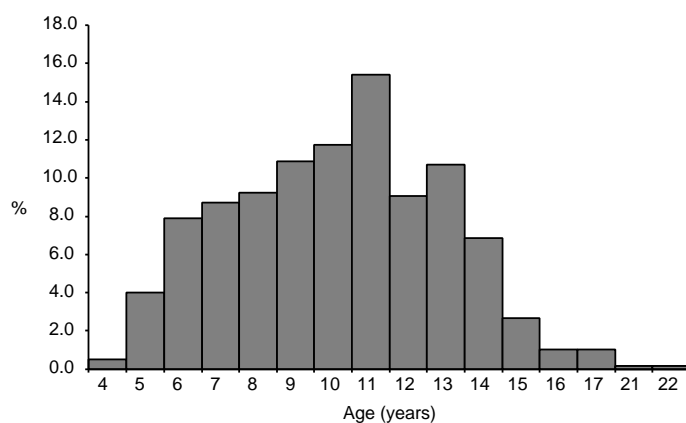
Variables	N	Trachoma cases				p-value
		Yes	%	No	%	
Gender						0.66
Male	293		2.2	13,243	97.8	
Female	304		2.2	13,250	97.8	
Age (years)						0.43
4-6	75		1.9	3,792	98.1	
7-10	242		2.4	10,039	97.6	
11-14	249		2.2	11,123	97.8	
Over 15	31		2.0	1,540	98.0	
Bed sharing						0.46
No	405		2.1	18,494	97.9	
Yes	187		2.3	7,994	97.7	
Facial hygiene						0.22
No discharge	552		2.2	24,818	97.8	
Discharge	45		2.6	1,676	97.4	

Though higher than expected, the prevalence of 2.2% found among preschool and schoolchildren in São Paulo is not as high as that seen in other Brazilian cities, such as Joinville, in the Southern state of Santa Catarina, and Duque de Caxias, in the state of Rio de Janeiro, with TF prevalences of 4.9% and 8.8% respectively.^{3,10} In the state of São Paulo, the highest prevalences were seen in the cities of Guaraci (9.6%) and Botucatu (11.9%).^{7,9}

The prevalence found in São Paulo, however, was similar to that found in the municipalities of Francisco Morato and Franco da Rocha, where a prevalence of 1.5% for inflammatory trachoma has been reported.⁸

Trachoma cases were detected throughout RHAA of the city of São Paulo, but mostly in the Eastern and Southern areas, indicating a non-homogeneous distribution of cases. Most cases were detected in children who were born in the state of São Paulo, evidencing disease transmission statewide.

The age distribution of cases corroborates the fact that preschool and schoolchildren are important

**Figure 2** - Proportion of trachoma cases by age, city of São Paulo, Brazil, 1999.

sources of active trachoma infection, since 95% of cases were detected in those aged four to 14 years.^{4,15}

In addition to its low prevalence, trachoma in the city of São Paulo showed to be a mild illness, mostly manifested by follicular forms with few severe cases. However, it should be noted the 1% prevalence of intense inflammatory trachoma (TI). If these cases had not been detected and treated timely, they might have developed into scarring lesions (TS), which can ultimately lead to impairment. The occurrence of intense trachomatous inflammation implies current severe infection and higher risk of scarring.¹⁵ The finding of active disease among children, even at low prevalence, indicates that this population is a source of infection and can thus perpetuate the chain of transmission of trachoma.

Follicular trachoma is often characterized by few symptoms, except in those forms associated with bacterial or viral conjunctivitis or more severe cases of intense trachoma.⁴ The study findings support the evidence that there is no isolated or combined distinctive symptoms in trachoma, which otherwise would make it easier to clinically detect this disease.

Some study findings point out to the importance of active surveillance in schools as well as systematic epidemiological investigation of all cases detected. They include the proportion of those children who reported previous exposure in the study setting, the lack of pathognomonic trachoma signs and symptoms, the most affected age group and the high prevalence among household contacts.

The prevalences found in this study suggest the need for focused actions in areas of high prevalence. There is also a need for investigating potential risk factors for household infection which could provide insight for targeted interventions.

Promoting epidemiological surveillance actions could prevent increased trachoma prevalences in the city of São Paulo, especially in areas where contributing factors make the disease more likely to occur and perpetuate.

ACKNOWLEDGMENTS

To the Eye Health staff of the Health Department of the City of São Paulo for its help throughout the whole study, from design to analysis.

REFERENCES

1. Caligaris LSA, Waldman EA, Medina NH. Ocorrência de tracoma em população pré-escolar no subdistrito de paz da Bela Vista, município de São Paulo, 1995. *Arq Bras Oftalmol* 1999;62(4):423.
2. Campos CEG, Scarpi MJ, Guidugli T. Prevalence of trachoma among children from 2 a 7 years old, in the slums of the northern region of São Paulo, Brazil. *Invest Ophthalmol Vis Sci* 1991;32(4):985.
3. Couto Junior AS, Scarpi MJ, Guidugli T. Prevalência de tracoma em escolares e pré-escolares no Município de Duque de Caxias, RJ. *Rev Bras Oftalmol* 1997;56:515-21.
4. Dawson CR, Jones BR, Tarizzo ML. Guia Prático de luta contra el tracoma. Genebra: Organização Mundial de Saúde; 1981.
5. Freitas CA. Prevalência do tracoma no Brasil. *Rev Bras Malariol Doenças Trop* 1976;28:227-380.
6. Luna EJ, Medina NH, Oliveira MB, Barros OM, Vranjac A, Melles HH, et al. Epidemiology of trachoma in Bebedouro state of São Paulo, Brazil: prevalence and risk factors. *Int J Epidemiol* 1992;21(1):169-77.
7. Medina NH, Oliveira MB, Tobin S, Kiil Junior G, Mendonça MM, Barros OM, et al. The prevalence of trachoma in preschool and school children in Olimpia, Guaraci and Cajobi, São Paulo, Brazil. *Trop Med Parasitol* 1992;43(2):121-3.
8. Medina NH, Gentil RM, Oliveira MB, Sartori MF, Cabral JH, Vasconcelos MS, et al. Investigação epidemiológica do tracoma em pré-escolares e escolares no município de Franco da Rocha e Francisco Morato. *Arq Bras Oftalmol* 1994;57:154-8.
9. Medina NH, Gattás VL, Anjos GL, Montuori C, Gentil RM. Prevalência de tracoma em pré-escolares e escolares no município de Botucatu, São Paulo, Brasil, 1992. *Cad Saude Pública* 2002;18(6):1537-42.
10. Nóbrega MJ, Farah ALHL, Miller D, Kang HM, Haddad LH. Estudo clínico e laboratorial do tracoma em escolares de Joinville, Santa Catarina, Brasil. *Arq Bras Oftalmol* 1998;61(5):551-6.
11. Scarpi MJ, Plut RCA, Arruda HO. Prevalência do tracoma no povoado de Mocambo, Estado do Ceará, Brasil. *Arq Bras Oftalmol* 1989;52(5):177-9.
12. Scarpi MJ, Gentil R. Sinais e sintomas do tracoma em povoado do Estado da Bahia, Brasil. *Arq Bras Oftalmol* 1990;53(6):176-8.
13. Thylefors B, Dawson CR, Jones BR, West SK, Taylor HR. A simple system for the assessment of trachoma and its complications. *Bull World Health Organ* 1987;65(4):477-83.
14. Vieira JBF, Coelho GE. Tracoma: aspectos epidemiológicos e de controle. *Rev Soc Bras Med Trop* 1998;31 Supl 2:121-3.
15. World Health Organization (WHO). Primary health care level management of trachoma. Geneve; 1989.