

Outbreak of acute conjunctivitis in the period 2017-2018 in Recife, Brazil

Surto de conjuntivite aguda no período de 2017-2018 em Recife, Brasil

Candice Carolina de Mesquita Costa¹ <http://orcid.org/0000-0003-0875-5443>

Larissa Halley Soares e Sá¹ <http://orcid.org/0000-0002-4790-2875>

Larissa Paz Mendes¹ <http://orcid.org/0000-0002-9689-0647>

Roberto Leal Cavalcanti Júnior² <http://orcid.org/0000-0001-6311-7458>

Camilla Silva da Rocha³ <http://orcid.org/0000-0001-9543-4044>

Michel Bittencourt Santos⁴ <http://orcid.org/0000-0002-1164-0893>

Taciana Mirely Maciel Higino³ <http://orcid.org/0000-0001-6704-2393>

ABSTRACT

Purpose: To evaluate the epidemiological and clinical profile and economic impact of the acute conjunctivitis outbreak in the period of 2017-2018 in Recife-PE. **Methods:** Cross-sectional study based on the analysis of medical records of patients diagnosed with conjunctivitis at the emergency room of the Altino Ventura Foundation (FAV) between December 2017 and March 2018. The collected data included ocular manifestations at examination, subsequent complications, management, and days of sick leave. **Results:** Out of 12,712 patients assisted at FAV from December 2017 to March 2018, 6,359 (50.0%) were diagnosed with conjunctivitis. The mean age of patients was 29.5 ± 14.1 years (range, 01–85 years), with similar distribution between sex (2,288 [50.1%] male; 2,282 [49.9%] female). The most common diagnosis was non-pseudomembranous conjunctivitis (5,645 cases [88.8%]). Conjunctival hyperemia (6,278 cases [98.7%]) and follicular reaction (6,255 cases [98.4%]) were the most frequent ocular findings. The most common complication was pseudomembrane in 1,062 cases (16.7%). Lubricants (4,308 [67.7%]) and antibiotic associated to corticosteroid eyedrops (2,033 [32.0%]) were the most prescribed medications. The average days of sick leave per patient was 4.8 ± 2.9 days (range, 1- 47 days) and the productivity loss estimated in R\$1.159.329,14. **Conclusion:** The conjunctivitis outbreak in Pernambuco, Brazil was responsible for half of the consultations in an ophthalmic emergency room. Conjunctivitis outbreaks may cause an economic impact as it mostly affects young adults in their productive ages and take in average a 5-day sick leave. The clinical characteristics observed suggest an outbreak of conjunctivitis of viral etiology.

Keywords: Conjunctivitis/diagnosis; Lubricant eye drops; Drug therapy; Epidemics

RESUMO

Objetivo: Avaliar o perfil clínico, epidemiológico e o impacto econômico do surto de conjuntivite no período 2017-2018 no município de Recife-PE. **Métodos:** Estudo transversal com base na análise de prontuários de pacientes com diagnóstico de conjuntivite, atendidos na emergência da Fundação Altino Ventura entre dezembro/2017 e março/2018. Os dados coletados incluíram manifestações oculares no exame, complicações subsequentes, manejo e dias de licença médica. **Resultados:** Dos 12.712 pacientes atendidos na FAV entre dezembro de 2017 e março de 2018, 6.359 (50,0%) foram diagnosticados com conjuntivite, dos quais 3.543 pacientes (55,7%) foram atendimentos únicos. A média de idade dos pacientes ao atendimento foi de $29,5 \pm 14,1$ anos (variação, 1–85 anos), com distribuição semelhante entre os sexos (2.288 casos [50,1%] masculino; 2.282 casos [49,9%] feminino). O diagnóstico mais comum foi conjuntivite sem pseudomembrana (5.645 casos [88,8%]). Hiperemia conjuntival (6.278 casos [98,7%]) e reação folicular (6.255 casos [98,4%]) foram os achados mais frequentes ao exame. A complicação mais frequente foi pseudomembrana (1.062 casos [16,7%]). Os colírios lubrificantes (4.308 [67,7%]) e os colírios de associação antibiótico com corticoide (2.033 [32%]) foram os mais prescritos no tratamento. A média de dias de atestado médico foi de $4,8 \pm 2,9$ dias (variação, 1- 47 dias) e a perda de produtividade estimada em R\$1.159.329,14. **Conclusão:** O surto de conjuntivite em Pernambuco foi responsável por metade das consultas em um pronto-socorro oftalmológico. Surtos de conjuntivite podem causar um impacto econômico, uma vez que afeta principalmente adultos jovens em idade produtiva. As características clínicas observadas sugerem um surto de conjuntivite de etiologia viral.

Descritores: Conjuntivite/diagnóstico; Lubrificantes oftálmicos; Tratamento Farmacológico; Epidemias

¹Altino Ventura Foundation, Recife City, PE, Brazil.

²Pernambuco Federal University, Recife City, PE, Brazil.

³Scientific Research Department, Altino Ventura Foundation, Recife City, PE, Brazil.

⁴Pernambuco Eye Hospital – HOPE, Recife City, PE, Brazil.

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INTRODUCTION

Conjunctivitis is the most prevalent Red Eye Syndrome diagnosis in primary eye care.⁽¹⁾ Conjunctivitis is a common infectious (bacterial, fungal or viral) toxin-induced or allergic disease; it is usually self-limiting. Although infectious conjunctivitis outbreaks are not unlikely,⁽²⁾ this disease significantly affects basic daily activities of infected individuals and eye care institutes.⁽³⁾

Conjunctivitis is defined as the extensive inflammatory process of the bulbar and/or tarsal conjunctiva, which leads to vessel dilation, hyperemia and chemosis.⁽⁴⁾ This disease causes great socioeconomic impact, since its contagious and transmissible nature leads to the need of license from work during treatment. Accordingly, more than 377 million dollars are spent annually on conjunctivitis treatment in the US.⁽⁵⁾

Brazil recorded an alarming increase in conjunctivitis cases from December 2017 to March 2018, mainly in the Northeastern region. Altino Ventura Foundation reported increase by 800% in conjunctivitis cases in Pernambuco State.⁽⁶⁾ Thus, the aim of the present study was to assess the clinical, epidemiological and economic effects of this conjunctivitis outbreak from late 2017 to early 2018 in Recife City, Pernambuco, and to describe results on conjunctivitis management and complications.

METHODS

The present cross-sectional study assessed data from electronic health records of patients treated at the ophthalmology emergency room of Altino Ventura Foundation, from December 2017 to March 2018. Data was collected after the project's approval by the Research Ethics Committee of Altino Ventura Foundation (approval n. 3.008.774).

The keywords "conjunctivitis", "conj", "H10.3" and "H10" were entered into the foundation's electronic database. Only complete medical records were included in the study, from which the following data were collected for later analysis: demographic data, anamnesis, anterior segment biomicroscopy, diagnosis and management.

A single medical record was given to patients who visited the ophthalmologist more than once within 30 consecutive days. After this period, patients were given a new medical record.

Epidemiological data such as sex, age and residence city were collected and compared. The main common symptoms upon examination were also assessed, namely: periorbital edema, eye discharge, conjunctival hyperemia, follicular response, pupillary response, subconjunctival hemorrhage and chemosis. Complications secondary to these conjunctivitis types included: pseudomembranes; keratitis; corneal ulcers and abrasions; keratic precipitates; subepithelial infiltrates. Data on mean off-work time and mean sick-leave length based on number of ophthalmology visits were also collected.

Treatments for patients diagnosed with acute conjunctivitis during the outbreak period were based on the prescription of the following medications: topical antibiotics; topical and oral anti-inflammatory medication; eye drops; cold compresses, high-potency topical steroids; antibiotic-steroid eye drops. This treatment management was compared to that of the herein assessed ophthalmology institute.

Data were organized in Microsoft Office Excel® (Microsoft Corporation, Albuquerque City, USA) spreadsheets. Keywords

for each of the aforementioned variables were entered into a counter. The keywords contained at least two terms for each field.

Indirect production loss was calculated based on the human capital approach, which is based on the premise that license from work cannot be compensated by extra hours after the regular shift or by hiring other employees. Therefore, this method assumes that production losses can be estimated based on wage losses due to absence from work.⁽⁷⁾ The following formula was used to estimate production loss (in R\$): $A \times B \times C \times D$, wherein, A - number of ophthalmology visits by patients at economically active age (≥ 14 years); B - mean nominal income/day; C - mean absence from work (sick-leave days); D - occupation level. Items B and D were based on the Continuous National Household Sample Survey (PNAD-C), which was published in the first quarter of 2018.⁽⁸⁾

RESULTS

Altino Ventura Foundation attended 12.712 patients from December 2017 to March 2018, of whom 6.359 (50.0%) had contracted conjunctivitis. There were 55.7% (3.543) of single ophthalmology visits and 44.3% (2.816) of multiple visits. In total, there were 38.9 cases per 10.000 inhabitants.

The mean age of patients was 29.5 ± 14.1 years (1–85 years). Sexes were similarly distributed (2.288 [50.1%] males and 2.282 [49.9%] females). Peak of visits to emergency room due to conjunctivitis took place in March 2018 (2.963 records [46.6%]; Figure 1).

The highest conjunctivitis rates among the 90 Recife City neighborhoods were recorded for Cohab (231 records [5.1%]), Nova Descoberta (179 records [3.9%]), Afogados (174 records [3.8%]), Santo Amaro (149 records [3.3%]), and Água fria (148 records [3.2%]) (Figure 2).

Non-pseudomembranous conjunctivitis — described in the diagnostic hypothesis field of medical records — was diagnosed in 88.8% ($n = 5645$) of patients, whereas pseudomembranous conjunctivitis was diagnosed in 11.2% ($n = 714$) of them. The main ophthalmic manifestations were conjunctival hyperemia (6278 patients [98.7%]), follicular response (6255 patients [98.4%]), periorbital edema (176 patients [2.8%]), chemosis (76 patients [1.2%]), subconjunctival hemorrhage (32 patients [0.5%]), mucus secretion (16 patients [0.3%]), purulent drainage (9 patients [0.1%]) and pupillary response (5 patients [0.1%]) (Table 1).

Medical record data indicated that the main conjunctivitis complications found through biomicroscopy were pseudomembranes (1062 patients [16.7%]), punctate keratitis (65 patients [1.0%]), subepithelial infiltrates (37 patients [0.6%]), corneal

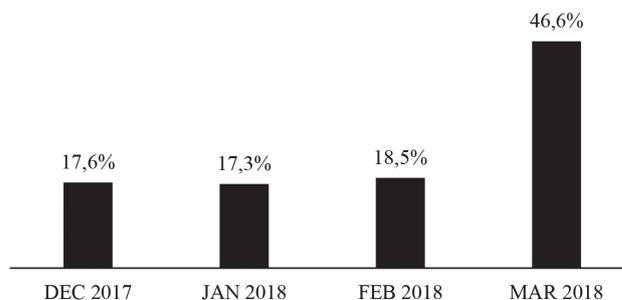


Figure 1: Distribution of treated conjunctivitis patients a month

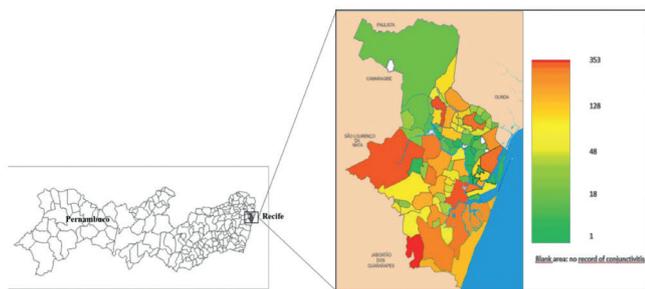


Figure 2: Distribution of conjunctivitis cases in Recife City neighborhoods. (Heat map of cases by neighborhood in Recife City; blank area = nondetected cases).

abrasion (34 patients [0.5%]), filamentary keratitis (10 patients [0.2%]) and corneal ulcer (6 patients [0.1%]) (Table 2).

The main prescribed medications for conjunctivitis treatment were standard eye drops (n = 4308 [67.7%]), antibiotic-steroid eye drops (n = 2033 [32%]), cold compresses (n = 1084 [18.6%]), high-potency topical corticosteroid eye drops (n = 423 [6.7%]), antibiotic eye drops (n = 215 [3.4%]), oral nonsteroidal anti-inflammatory drugs (n = 82 [1.3%]) and topical eye drops (n = 28 [0.4%]) (Table 3).

Mean sick-leave length per patient was 4.8 ± 2.9 days (1-47 days; Figure 3).

Indirect costs with lost production throughout the study were estimated at R\$ 1.159.329.14.

Table 1
Main ophthalmic findings in patients treated at Altino Ventura Foundation during the conjunctivitis outbreak

Variable	n	(%)
Conjunctival hyperemia		
Yes	6278	98.7
No	81	1.3
Conjunctival follicles		
Yes	6255	98.4
No	104	1.6
Periorbital edema		
Yes	176	2.8
No	6183	97.2
Chemosis		
Yes	76	1.2
No	6283	98.8
Subconjunctival hemorrhage		
Yes	32	0.5
No	6327	99.5
Mucus secretion		
Yes	16	0.3
No	6343	99.7
Purulent drainage		
Yes	9	0.1
No	6350	99.9
Papillary conjunctivitis		
Yes	5	0.1
No	6354	99.9

Table 2
Conjunctivitis outbreak complications in patients treated at Altino Ventura Foundation

Variable	n	(%)
Pseudomembranes		
Yes	1062	16.7
No	5297	83.3
Punctate keratitis		
Yes	66	1.0
No	6293	99.0
ISubepithelial infiltrates		
Yes	37	0.6
No	6322	99.4
Corneal abrasion		
Yes	34	0.5
No	6325	99.5
Filamentary keratitis		
Yes	10	0.2
No	6349	99.8
Corneal ulcer		
Yes	6	0.1
No	6325	99.5
Keratic precipitates		
Yes	0	0.0
No	6359	100.0

Table 3
Patient treatment at Altino Ventura Foundation during the conjunctivitis outbreak

Variable	n	(%)
Eye lubricant		
Yes	4308	67.7
No	2051	32.3
Antibiotic-steroid eye drops		
Yes	2033	32.0
No	4326	68.0
Cold compresses		
Yes	1184	18.6
No	5175	81.4
High-potency corticosteroids		
Yes	423	6.7
No	5175	81.4
Topical antibiotics		
Yes	215	3.4
No	6144	96.6
Oral anti-inflammatory medication		
Yes	82	1.3
No	6277	98.7
Topical anti-inflammatory medication		
Yes	28	0.4
No	2051	32.3

DISCUSSION

Conjunctivitis is a common disease in Northeastern Brazil, whose hot and humid climate allows infectious agents (viruses and bacteria) to spread. Pernambuco State recorded increase by 800% in conjunctivitis cases from 2017 to 2018.⁽⁶⁾

The herein presented data show that conjunctivitis accoun-

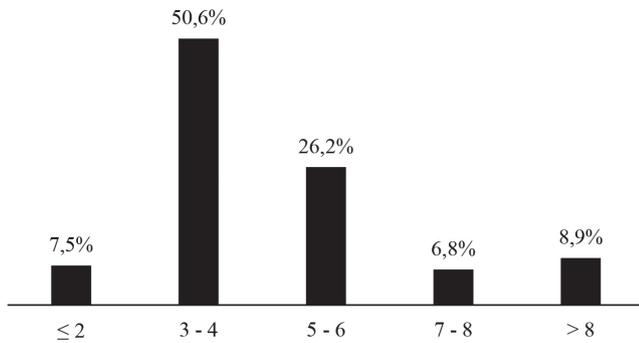


Figure 3: Total sick-leave days

ted for half of the emergency visits to Altino Ventura Foundation, from December 2017 to March 2018. There was no significant sex distinction and most of the affected patients were economically-active young individuals. These findings corroborate those by Balasopoulou et al.⁽⁹⁾, who have demonstrated that sex does not significantly affect conjunctivitis diagnosis and that the young population is the most affected one.

The highest conjunctivitis prevalence was recorded in March 2018, during school holidays and carnival celebration in Brazil. Since Carnival is one of the busiest events in Recife City, agglomeration may have contributed to the number of recorded cases.

The highest conjunctivitis prevalence during the outbreak was recorded in Cohab neighborhood (5.1%), which has the third-highest population density in Recife City (157.97 inhabitants/hectare).⁽¹⁰⁾ Such a prevalence is assumingly associated with Cohab's large urban agglomeration, since conjunctivitis, as an infectious and contagious disease, can be easily transmitted through eye discharge, contaminated hands or even shared personal belongings.

The main clinical manifestations of Recife City's outbreak were conjunctival hyperemia and conjunctival follicles, which corroborate findings in the literature. Pinto et al.⁽¹¹⁾ found that follicular response, preauricular lymph nodes, epiphora, hyperemia, chemosis, periorbital hyperemia and pseudomembranes were the main viral conjunctivitis manifestations. Barbosa Júnior et al.⁽¹²⁾ supported this diagnostic hypothesis by claiming that follicles, mainly those forming in the inferior fornix, are typical of adenoviral conjunctivitis — when it is accompanied by conjunctival hyperemia, photophobia, excessive tearing and foreign body sensation. Azari et al.⁽⁵⁾ has also stated that viruses are the main etiological agents of conjunctivitis in adults. Symptoms such as chemosis and serous drainage may also be closely linked to this etiology. Therefore, the assessed outbreak was assumingly caused by a virus. This hypothesis could not be proven due to the following limitations: high costs of laboratory diagnosis and the Unified Health System's (SUS) lack of financial resources.

In 2005, Smith et al.⁽¹³⁾ performed univariate sensitivity analysis to calculate the annual cost of conjunctivitis treatment and management in the US; they found that it ranged from 469 to 705 million dollars. Sick-leave length assessment is considered relevant because it provides a notion (estimate) of how conjunctivitis can be costly to society. Recife City's conjunctivitis outbreak led to production losses of more than R\$ 1 million (≈ US\$ 350 thousand), based only on the indirect costs of wage losses during the study period. Yet, this cost is underestimated, since it does not cover medical consultation, examination, medication and patient transportation expenses. Filleul et al.⁽¹⁴⁾ estimated medical

consultation and medication costs caused by the conjunctivitis outbreak on Réunion Island, France (2015), at €\$ 3.341.191.00 (≈ R\$ 11 million). Such data demonstrate that acute conjunctivitis outbreaks can substantially affect the economy.

Several acute conjunctivitis treatments are recommended in the literature, since it can be caused by viral (most common etiology), bacterial and allergic infections. Viral conjunctivitis is usually self-limited and naturally healed within two to four weeks^(11,15). Likewise, 60% of acute bacterial conjunctivitis cases are self-limited and naturally heals within 1 to 2 weeks.⁽⁵⁾ However, conjunctivitis treatment is only effective in reducing one to two days of the condition's duration. Therefore, some authors do not recommend any conjunctivitis treatment.^(5,11,15)

Cold compresses, eye drops and topical antihistamine (for significant pruritus) are the most common medication prescribed for conjunctivitis symptom relief.^(5,11,15) However, the most common medication prescribed for patients diagnosed with conjunctivitis in AVF were standard eye drops (67.7%), corticosteroid and topical antibiotic eye drops (32%); cold compress (18.6%). Such medications provided efficient symptom relief.

Topical antibiotic therapy is commonly indicated for patients susceptible to secondary bacterial infection or under high suspicion of bacterial conjunctivitis.^(11,15) However, overuse of topical antibiotics can increase microbial resistance, drug toxicity and/or allergy. It also increases the risk of infecting the medication bottle, which can lead to infection of the contralateral eye.^(5,15) Therefore, antibiotic therapy should be carried out with caution.

Another therapy alternative is topical corticosteroids, mainly dexamethasone, since it is a well-tolerated and potent steroid, which can be taken alone or in combination with other medication. They are widely used to reduce local inflammation and mitigate eye pain due to their effectiveness in alleviating patients' complaints, mainly conjunctivitis complications such as pseudomembranes and subepithelial infiltrates.⁽¹²⁾ However, this therapy is not suitable for viral conjunctivitis, since even short-term therapy with low-potency medication can further viral replication and, consequently, aggravate the infection.^(11,16)

Topical antibiotics were empirically administered to 35.4% of patients diagnosed with conjunctivitis, based on the medical conduct of other ophthalmology centers. This conduct agreed with findings by Bro,⁽¹⁷⁾ who has demonstrated that 1 in 3 patients receiving antibiotic therapy benefits from it; thus, 66% of non-purulent conjunctivitis patients received therapy even without formal indication. Risk factors of bacterial co-infection — such as the large gathering of acute conjunctivitis patients waiting too long for medical appointments at Altino Ventura Foundation — were also taken into consideration.

Erdin et al.⁽¹⁸⁾ report that development of pseudomembranes and subepithelial corneal infiltrates are the most prevalent complications of conjunctivitis. This finding corroborates those of the present study, since the most common complications were pseudomembranes (16.7%), punctate keratitis (1.0%) and subepithelial infiltrates (0.6%). Pseudomembranes and subepithelial infiltrates are severe forms of acute conjunctivitis.⁽⁴⁾ Yet, pseudomembranes were the most significant finding, since single urgent ophthalmology visits were more common than multiple visits — subepithelial infiltrates are usually formed between one and two weeks after the infectious episode.⁽¹¹⁾

Conjunctivitis duration varies according to its etiological agent, e.g., adenoviral conjunctivitis can last approximately 14 days.⁽¹²⁾ Patients are forced to leave work during the symptomatic period of conjunctivitis due to its high infection rate. Sick-leave

length ranged from 1 to 47 days (4.8 days, on average) during the outbreak period. Days off work were assumingly reduced because all diagnosed patients received therapy, which significantly reduced the disease's duration.

Since person-to-person contact is the main route of conjunctivitis transmission, both health education and guidelines are essential to raise population awareness and thereby reduce transmission. Accordingly, the following preventive measures were adopted: regular hand washing guidelines; not touching or scratching the eyes; not sharing personal objects; not sharing eye drops. This information was passed on verbally and through posters in intensive care units. Moreover, the large number of infected patients susceptible to conjunctivitis compelled Emergency Eye Care centers to take the following measures: using disposable gloves and daily changing eye drops to reduce iatrogenic transmission.

CONCLUSIONS

The conjunctivitis outbreak in Recife City was most prevalent among economically-active young adults. Accordingly, both days off work and decreased productivity due to this illness may have negatively affected the economy. The most common manifestations of this outbreak were conjunctival hyperemia, follicles, pseudomembranes and corneal subepithelial infiltrates. Although ophthalmic findings suggested that the etiologic agent is a virus, laboratory confirmation was not available. Nevertheless, educational measures and population awareness should be encouraged to prevent further outbreaks. In addition, protocols for widespread eye disease care should be made in order to ensure early diagnosis, therapy and data standardization.

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Corresponding author:

Candice Carolina de Mesquita Costa
 Altino Ventura Foundation – AVF
 Rua do Progresso, 71, Boa Vista, Recife City (PE), Brazil – CEP: 50070-040.
 Phone number: (+55 81) 991082529
 E-mail: can_cost@hotmail.com