

# The Investigation of Bacterial and Candidial Conjunctivitis in Pasinler and Köprüköy Towns of Erzurum Province<sup>11</sup>

## ERZURUM İLİ PASINLER VE KÖPRÜKÖY İLÇELERİNDE BAKTERİYEL VE KANDİDAL KONJONKTİVİTLERİN İNCELENMESİ

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### Summary

The aim of our study was to get information about conjunctivitis of all ages and to determine the most common microorganisms associated with the bacterial and fungal conjunctivitis in Erzurum, an eastern town in Turkey. To determine the epidemiological characteristics of the disease in the area, we chose 20% of the households in 17 residential areas by using the method of simple random sampling.

The prevalence of conjunctivitis of all age groups was 4.2%; the highest value in 20-49 age group (5.1%) and the lowest in 0-6 (1.7%). Bacteria and/or Candida were detected in 17.5 % of all the cases. Of all cases with conjunctivitis, only 4.7% were evaluated as bacterial conjunctivitis. As pathogen agents, gram negative bacilli (28.6%), gram positive (22.2%) and gram negative cocci (22.2%) were encountered.

The prevalence of non-specific conjunctivitis was found to be higher statistically in following situations: 5 or more members in the family, using no soap, using same towel, visiting thermal springs frequently

It was concluded that conjunctivitis was an important problem of public health, and that the disease can be prevented by using simple hygienic rules, and thermal springs in the area might have significant role in contamination.

**Key Words:** Infectious, Non-specific Conjunctivitis, Bacterial, Purulent, Candida

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### Özet

Erzurum iline bağlı Köprüköy ve Pasinler ilçelerinde, 17 yerleşim birimindeki hanelerden %20'si (8854 kişi) rastgele örnekleme yöntemi kullanılarak örneklem grubuna seçilmiş, bunlardan 8606'sına (% 97.2) ulaşılabilmektedir. Bu kişilere anket uygulanmış, fizik muayene yapılmış ve laboratuvar incelemesi için konjonktival smear ve kan örnekleri alınmıştır.

Tüm yaş gruplarında non spesifik konjonktivitlerin prevalansı % 4.2 olup, en yüksek 20-49 yaş grubunda (% 5.1), en düşük 0-6 yaş grubunda (%1.7) saptanmıştır. Tüm olguların %17.5'inde bakteri ve/veya kandida saptanmıştır. Patojen ajan olarak, ilk üç sırayı gram negatif basiller (%28.6), gram pozitif koklar (%22.2) ve gram negatif koklar (%22.2) almıştır.

Ailedeki kişi sayısı, sabun kullanımı, ortak havlu kullanımı ve kaplıcaya gitme sıklığı ile nonspesifik konjonktivitlerin görülme sıklığı arasındaki ilişkiler anlamlı bulunmuştur.

Bölgede konjonktivitlerin önemli bir halk sağlığı sorunu olduğu, basit hijyenik kurallarla hastalığın önlenilebileceği, ayrıca bölgedeki kaplıcaların bulaşmada önemli bir etken olduğu sonucuna varılmıştır.

**Anahtar Kelimeler:** Enfeksiyöz, Nonspesifik Konjonktivit, Bakteriyel, Pürülan, Candida

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Conjunctiva is an important tissue due to its being open to environmental harmful agents and tendency to inflammatory reaction (1). Conjunctiva reacts to infections with inflammatory cells and oedematous infiltration rather than ulceration in respect to its poor vascular structure (2).

Infectious conjunctivitis is widespread all over the world and can be seen in all ages. It can be ob-

served in various degrees from conjunctival papillae together with aqueous discharge to follicular neof ormation, subconjunctival hyperemia and serious necrotic conditions (1,3).

The normal microbial flora of conjunctiva, composed mainly of *Staphylococcus epidermidis* and *diphtheroides*, demonstrates pathologic changes as a result of irresponsible use of antibiotics (4). The pathogen flora, resistant microorganisms, insufficient therapy result in chronic conjunctivitis which threat the health of society (5).

This study covering the districts of Pasinler and Kôprukôy, was designed to provide data on the basic epidemiology of conjunctivitis, on the possible risk factors, and also on major causative bacterial and fungal agents of infectious conjunctivitis. It is believed that such basic data will be necessary to make appropriate strategies for the prevention of the disease.

### Materials and Methods

This is a defining and sectional study which was undertaken in the districts of Kôprukôy and Pasinler near Erzurum, between September 1, 1993 and May 31, 1994. To determine the epidemiological characteristics of conjunctivitis in the area, we chose 20% of the households in 17 residential areas by using the method of simple random sampling. Thus the study was conducted on the total number of 8606 individuals living in the above-mentioned households.

First, the individuals were given a questionnaire. Then a standard clinical examination was given by an ophthalmologist. Blood samples and conjunctival smears of all the individuals whose subjective and objective eye examination results tended to be conjunctivitis were taken by the research team and then evaluated by a specialist of infectious diseases and clinical microbiology.

For the identification of bacteria and *Candida* in the conjunctival smear, Gram staining method, and for the search of chlamydial inclusion bodies in the conjunctival smear, Giemsa staining method were used. Then microscopical examination was done. Microelisa system was used for antichlamydia antibodies. Because of limited laboratory con-

ditions and culture techniques in the area at that time, culturing could not be performed.

Diagnosis of conjunctivitis was done according to the following criteria; follicul and/ or papillae formation on the eye lids, negative serology, absence of inclusion bodies, negativity or positivity in gram staining.

The laboratory results were compared and recorded. For the statistical analysis, Chi-square test was used.

### Results

This research was conducted on 4948 males (57.5%) and 3658 females (42.5%) totally on 8606 individuals ranging in age from 10 months to 85 years. In 359 of the participants (4.2%) conjunctivitis was found. 245 of the participants (2.8) were trachoma and previously infected patients (Table 1). Of 359 participants with conjunctivitis, 63(17.5%) were found to have microorganisms in conjunctival smears by gram staining. 53(14.7) of those 63 was found to have bacterial infection and 10(2.8) was found to have candidial (8; 2.2) or candidial and bacterial (2; 0.6) conjunctivitis.

The etiology of conjunctivitis in 296 (82.5%) patients was unknown (Table 2). According to the type of microorganisms; 28.8% (18 participants) were gram-negative bacilli, 22.2% (14 participants) were gram-positive cocci, 22.2% (14 participants) were neisseria, 11.1% (7 participants) were diphtheroid bacilli, 12.7 (8 participants) were *Candida* and 3.2% (2 participants) were *Candida* and diphtheroid bacilli (Table 3).

The prevalence of conjunctivitis was lower in the age group 0-6, which is statistically important (Table 4). When the etiology was investigated in

**Table 1.** Prevalence of Conjunctivitis Types.

Conjunctivitis Types	Number	%
Conjunctivitis	359	4.2
Trachoma and previously infected*	245	2.8
Normal	8002	93.0
Total	8606	100.0

\* Is the subject of another study (look at. Güraksin A, GüüUllü G, Prevalence of Trachoma in Eastern Turkey. *Int J Epidemiol* 1997; 26: 436-42).

**Table 2.** The Distribution of Patients with Conjunctivitis by Etiology.

Type of Microorganism	Number	%
Bacterial	53	14.7
Candida	8	2.2
Candida and Bacterial	2	0.6
Unknown etiology	296	82.5
Total	359	100.0

**Table 3.** The Distribution of Patients with Conjunctivitis by the Type of Microorganisms.

Microorganism	Number	%
Gram negative basilli (Heamophilus)	18	28.6
Gram positive cocci ( Staph+Strep)	14	22.2
Gram negative cocci (Neisseria)	14	22.2
Candida	8	12.7
Diphtheroid bacilli	7	11.1
Candida and Diphtheroid bacilli	2	3.2
Total	63	100.0

the patients according to the age groups, statistical significance was found between patients of unknown etiology and patients with infectious conjunctivitis. The prevalence of infectious conjunctivitis was higher in the pre-school and over 50 age groups. Statistical significance was seen because of these two age groups (Table 5).

When the prevalence and etiology of conjunctivitis were investigated according to the sex, no difference was found.

Table 6 shows the prevalence of the conjunctivitis according to various characteristics of the participants. As seen in the table, the prevalence of

conjunctivitis was higher; in families with 5 members or over, in those who do not have the habit of using soap, in those using the same towel with the other members and in those who are visiting thermal springs frequently. These were also found to be statistically important.

### Discussion

Some authors have stated that clinical data and incubation time of infection are not important criteria for defining etiologic agents (6,7). Besides, when the alteration of the treatment according to the pathogenic microorganisms and the necessity of systemic treatment in some specific conjunctivitis like gonorrhoea are taken into account, the determination of etiologic agents by laboratory methods becomes useful. A lot of researches about agent pathogens playing important roles in the pathogenesis of conjunctivitis have been carried out (5,7-12).

In our study, conjunctivitis was found in 4.2% (359 participants ) of male and female participants in all ages. In 17.5% (63 participants) of those, bacteria and/or Candida were detected. In 296 patients (82.5) allergy or viruses were considered as possible etiologic factors. Technical requirements for virus isolation could not be provided.

In bacterial conjunctivitis gram negative bacilli (28.6 %), gram-positive cocci (22.2 %) and Candida (12.7 %) were found to be the agent pathogen. In short, gram negative bacilli, gram positive and gram negative cocci were found in most of the bacterial conjunctivitis. Diphteroid bacilli and Candida were observed less frequently.

**Table 4.** Prevalence of Conjunctivitis by Age

Age Groups	Conjunctivitis					
	Present		Absent		Total	
	Number	%	Number	%	Number	%
0-6	25	1.7	1427	98.3	1452	16.9
7-19	153	4.6	3201	95.4	3354	39.0
20-49	148	5.1	2765	94.9	2913	33.8
50 and over	33	3.9	854	96.1	887	10.3
Total	359	4.2	8247	95.8	8606	100.0

$X^2 = 29.55$        $p < 0.001$

**Table 5.** Prevalence of Conjunctivitis by Etiology According to the Age Groups.

Age Groups	Etiologic Condition					
	Bacterial, candida and Mixed		Unknown Etiology		Total	
	Number	%	Number	%	Number	%
0-6	8	32.0	17	68.0	25	7.0
7-19	20	13.1	133	86.9	153	42.6
20-49	24	16.2	124	83.8	148	41.2
50 and over	11	33.3	22	66.7	33	9.2
Total	63	17.6	296	82.4	359	100.0

$\chi^2 = 11.59$        $p < 0.001$

**Table 6.** Prevalence of Conjunctivitis By Various Characteristics of The Participants

Various Characteristics	Conjunctivitis						Statistical Analysis
	Present		Absent		Total		
	Number	%	Number	%	Number	%	
The number of family members							
4 and under	25	2.1	1165	97.9	1190	100.0	$\chi^2 = 14.81$
5 and more	334	4.5	7082	95.5	7416	100.0	$P < 0.001$
The use of soap							
Yes	174	3.8	4446	96.2	4620	100.0	$\chi^2 = 3.89$
No	184	4.6	3801	95.4	3986	100.0	$P < 0.01$
The use of same towel							
No	26	12	2180	98.8	2206	100.0	$\chi^2 = 9.34$
Yes	33	5.2	6067	94.4	6400	100.0	$P < 0.01$
Visiting thermal springs							
Yes	217	6.4	3151	93.6	3368	100.0	$\chi^2 = 71.42$
No	142	2.7	5096	97.3	5238	100.0	$P < 0.001$

Roger F Steinert (9) noted that, in most infectious conjunctivitis the pathogens were gram positive and gram negative bacteriae, mainly *Staphylococcus aureus*, and *Staphylococcus epidermidis*; but *Hemophilus influenza* and *Streptococcus pneumonia* were more common in babies and children (10).

In the research of Howart M. Leibowitz (11), it has been stated that gram negative bacilli follows staphylococcus, then less frequently streptococcus and other microorganisms were the common causes of the bacterial conjunctivitis.

Micheal (12) noted that, *Staphylococcus aureus* was the most frequent cause of conjunctivitis in all age groups and in all over the world. Frequently, *Neisseria* in adults; *Influenza* and less

frequently *Pneumococcus* in children, were found as the causes of conjunctivitis.

Although it has been determined that fungal infections were detected commonly as the cause in U.S.A.; in our study, *Candida* has relatively appeared to be the cause (12).

On the other hand, it has been reported that, the pneumococci were more common in children as a cause of conjunctivitis and were isolated more frequently in the northern states of America, especially during the colder months (8). As stated in the literature, gram positive diplococci might cause conjunctivitis. We thought that seasonal factors during collecting data may be the cause of gram positive diplococci absence in our research.

In 1989, in the research carried out in Erzurum by Manga ( Gullulu) (5), it has been stated that, predominantly Neisseria, Staphylococcus and less frequently, Pneumococcus, Diphteroid bacilli, Proteus and Haemophilus were observed in conjunctivitis.

In our research, gram positive bacilli, gram positive cocci and gram negative cocci were found predominantly, that was in agreement with the data in the classical literature of the disease (8).

An increase was observed in the rates of conjunctivitis in the age groups over 6 age in our research. We thought that, this age group was the active section of population, and thus carried the risk of spread of infection more than the other ages. In addition, our findings has been supported by those carried out in Singapur (11). In literature, the prevalence of the disease is higher for males than females (13,14). However in our region this difference was not observed, because of living and environmental conditions.

The disease spreads as a result of some conditions, like low educational level and crowded family. Similar data was reported in the literature (13,15). The disease was seen mostly in students, workmen, tradesmen due to their being in crowded places. In the research carried out in Nigeria (15), students and workmen made up the majority.

Simple hygienic rules as soaping and using separate towel were determined to be important components for preventing the spread of the disease. It was determined that the prevalence of the disease was higher for those individuals who had no habits of soaping, using their towel in common with the other people. These results were in conformity with the findings of the other studies (13,15).

Our results showed that, thermal springs in the area, which can be equivalent to swimming pool in foreign countries, found to have a role in spreading of the disease. It has been also noted that, swimming pool may be a source of the disease in epidemics (14).

We believed that, our research will be a guide in selection of suitable drugs, considering the etiology of nonspecific conjunctivitis, and that antibiotic therapy may be required in a small part of nonspecific conjunctivitis. Additionally, our re-

search showed that, simple hygienic rules required in prevention of the disease (16,17) and thermal springs in the area may have a role in spread of the disease.

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