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Original Research Article

Profile of Bacterial Conjunctivitis in Sudan

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Abstract: Bacterial conjunctivitis has worldwide distribution, affecting persons of all ages, races, social strataand both genders. The present study aimed to isolate and identify the common bacteria causing conjunctivitis and their antibiotic susceptibility in Khartoum state, Sudan**.** Conjunctival swabs were collected from 200 patients attended to Khartoum Eye Hospital and allwaldin Eye Hospital. The swabs were directly inoculated onto blood agar, MacConkey agar and chocolate agar then a smear was prepared from each swab**.** For *C. trachomatis* identification was based on Giemsa stain to the air dried smearand examined microscopically for inclusion bodies. All isolated organisms were tested for their in vitro antimicrobial susceptibility against various antibiotics using the Kirby-Baur disk diffusion method. The frequency positive samples were 156/200(78%). Among the 156 positive samples 59.6 %were females, 41.0% in age group (< 15 years).Gram positive bacteria were the predominant isolates (73.1%). The major organism isolated was *S. aureus*(41%) and the least organism isolated was *Haemophilus* sp(2.6%). The maximum antibiotic sensitivity of the isolates was against gentamycin (94.20%) followed by chloramphenicol and ceftazidime (78.8%) while the maximum resistance was against tetracycline (94.2%) followed by amikacin (73.1%). It was concluded that bacterial conjunctivitis was higher in Sudan especially in children and females and mostly caused by *S. aureus*. Gentamicin and Chloramphenicol are the appropriate antibiotics. Infection control measures should be properly implemented in eye hospitals.
Keywords: Conjunctivitis, Bacteria, Gentamicin, *S. aureus*, Tetracycline

INTRODUCTION

Conjunctivitis (pink eye)may result from primary involvement of the conjunctival tissue or may occur secondary to other ocular or systemic conditions that produce conjunctival inflammation[1]. It has worldwide distribution, affecting persons of all ages, races, social strataand both genders. In the United States, its prevalence in the population ages 1 −74 was 13 in 1,000, according to the National Health Survey conducted [2]. It has also been noted that general practitioners tend to over-diagnosis bacterial conjunctivitis [3]. It was found approximately 1% of all patient visits to a primary care clinician are conjunctivitis related, and the estimated cost of the bacterial conjunctivitis alone is 377 million to 857 million annually [4]. Conjunctivitis may be due to bacterial, viral, fungal, parasitic or allergic agents[5]. Bacterial conjunctivitis can be broadly hyperacute, acute or chronic [6]. Furthermore, it can be either primary or secondary to systemic diseases such as gonorrhea, chlamydia, graft-vs-host diseaseor Reiter syndrome [4]. The causative agent of bacterial conjunctivitis is *Streptococcus pneumonia* (*St. pneumoniae*), *Haemophilus influenza* (*H. influenza*), *Staphylococcus aureus* (*S. aureus*), *Neisseria gonorrhoeae* (*N. gonorrhoeae)*, *Chlamydia trachomatis (C. trachomatis)*, *Pseudomnas aeruginosa* (*P. aeruginosa*) and Moraxella species [7]. Transmission of pathogens responsible for infectious conjunctivitis may be due to contact with contaminated fingers and this is believed to be a common cause of infective conjunctivitis, but bacteria may also reach the conjunctiva from the eyelid margins and adjacent skin, from the nasopharynx via the nasolacrimal duct, from infected eye drops or contact lenses, and more rarely from the genitals or via the bloodstream [8]. Symptoms of pyogenic bacterial conjunctivitisare; irritation of the conjunctiva, impaired vision, pains which may be extreme and a mucopurulent exudate. In untreated cases the infection may lead to loss of the eye [9]. Because pink eye can be contagious, early diagnosis and treatment can help limit its spread. Symptoms are typically unilateral but frequently spread to the opposite eye within a few days. Discharge is typically purulent.

Petechial subconjunctival hemorrhages, chemosis, photophobia. Eyelid edema is often moderate [10]. Various classes of antibiotics have been used for the treatment of bacterial conjunctivitis that almost include; aminoglycosides, polymyxin B combinations, macrolides and more recently fluoroquinolones. The need for screening and treatment are important to reduce the cost of the socioeconomic impact of conjunctivitis. Accurate diagnosis and appropriate treatment can minimize these costs and the illness. Misdiagnosis of conjunctivitis can add a substantial cost burden and may result in serious impairment of vision [2]. The present study aimed toisolate and identify the common bacteria causing conjunctivitis and their antibiotic susceptibility in Khartoum state, Sudan.

MATERIALS AND METHODS

The study is descriptive laboratory-based study conducted during the period from July, 2014 to July; 2015. Conjunctival swabs were collected from 200 patients attended to Khartoum Eye Hospital and Allwaldin Eye Hospital at Khartoum state. Each conjunctival swab was obtained by having the patient look up and wiping a sterile swab moistened with sterile peptone water by rubbing them over the lower conjunctival sac from medial to lateral canthus and back again to the medial canthus very carefully without touching the cornea. The Swabs were directly inoculated onto blood agar, MacConkey agar and chocolate agar then a smear was prepared from each swab.The media were incubated at 35-37°C for 24 hrs aerobically and chocolate agar was incubated at 35-37°C for 48 hrs in an atmosphere with 5-7% carbon dioxide (CO2). Colonial identification wass tudied according to morphology, size, color, edges, haemolysis, on blood agar, side views of colonies and fermentation of lactose on MacConkey agar. Identification was based on Gram staining, cytochrome oxidase production, coagulase test, catalase production and growth and lactose fermentation on McConkey Agar. Isolated strains were biochemically identified by conventional tests followed by use of API 20 NE identification system (API 20 NE, Biomerieux). For *C. trachomatis* identification was based on Giemsa stain to the air dried smear and examined microscopically for inclusion bodies of *C. trachomatis*. All isolated organisms were tested for their in vitro antimicrobial susceptibility against various antibiotics, using the Kirby-Baur disk diffusion method according to the Clinical and Laboratory Standards Institute guidelines [11]. The antibiotic discs used were penicillin (10µg), gentamycin (10µg), amoxicillin clavulanic acid (30µg), ciprofloxacin (5 µg), erythromycin (10µg), fusidicacid (10µg), chloramphenicol (30µg), amikacin (30µg), ceftazidime (30µg) and tetracycline (30µg). Antibiotic sensitivity discs were placed on each plate and incubated at 37^{o}C for 24 hours. The plates were examined for zones of inhibition around each of the antibiotic disc. These were measured and compared with interpretive chart to determine the sensitive, intermediate and the resistant strains.

RESULTS

A total number of two hundred eye swabs specimens (n = 200) were collected from patients with symptoms of conjunctivitis attending the two hospitals in Khartoum. All the specimens were taken from outpatient wards. The frequency positive samples were 156/200(78%). Among the 156 positive samples 93(59.6%) were females while 63(40.4%) were males. The difference was not significant (p = 0.599). Patients enrolled in the study were divided into four age groups: less than 15 years old, 16- 30 years old, 31- 50 years old and more than 50 years old. The highest frequency of isolates was 64/156(41.0%) which was in the age group (<0-15 years) followed by the age group (16-30) years which was 41/156(26.3%) while the lowest frequency of isolates was 22/156(14.1%) in the age group of (>50 years) as shown in figure1. This age frequency was statistically significant (p = 0.00).The total number of Gram positive bacteria isolated was 114/156 (73.1%) while the total number of Gram negative bacteria was 42/156 (26.9%). The major organism isolated was *S. aureus* 64/156(41%)and the least organism isolated was *Haemophilus* spp 4/156(2.6%) (Figure 2). This difference was statistically significant (p = 0.00). The maximum antibiotic sensitivity of the isolates was against gentamycin 147/156 (94.20%) followed by chloramphenicol and ceftazidime 123/156 (78.8%) while the maximum resistance was against tetracycline 147/156 (94.2%) followed by amikacin 114 /156 (73.1%) as shown in table 1.

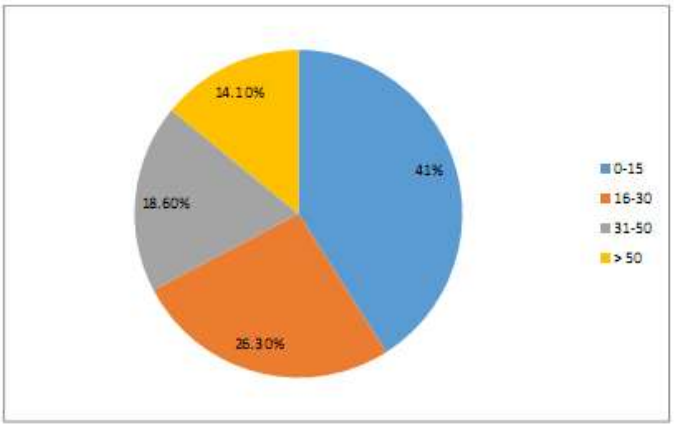

Fig. 1: Frequency of isolates according to age group

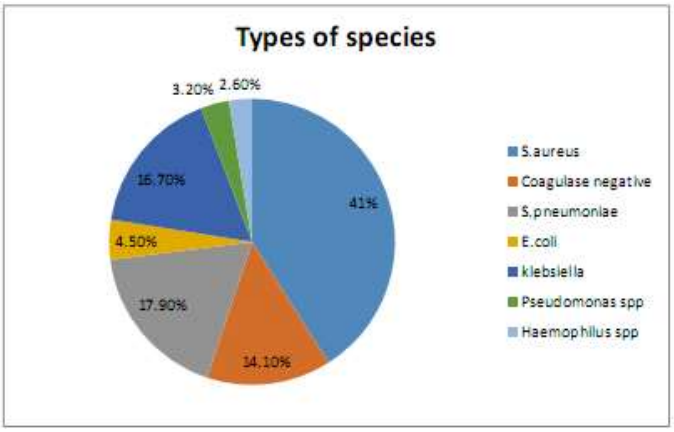

Fig.2: Frequency of isolates according to the species

Table 1: Antibiotic susceptibility pattern of the isolates

Antibiotic Name	Sensitive %	Intermediate%	Resistant %
Gentamycin	147 (94.20%)	4 (2.60%)	5(3.20%)
Amoxicillin clavulanic acid	86 (55.20%)	35 (22.40%)	35 (22.40%)
Ciprofloxacin	118 (75.60%)	26 (16.70%)	12 (7.70%)
Erythromycin	54 (34.60%)	7 (4.50%)	95 (60.90%)
Fusidic acid	29 (18.60%)	26 (16.70%)	101 (64.70%)
Chloramphenicol	123 (78.80%)	0 (0.00%)	33 (21.20%)
Amikacin	42 (26.90%)	0 (0.00%)	114 (73.10%)
Ceftazidime	123 (78.80%)	28 (17.90%)	5 (3.20%)
Tetracycline	4 (2.60%)	5 (3.20%)	147 (94.20%)
Penicillin	54 (34.60%)	0 (0.00%)	102 (65.40%)

DISCUSSION

Conjunctivitis is one of the most common nontraumatic eye complaints and is one of the most frequently reported diseases in the outpatient and emergency departments [12]. Bacterial conjunctivitis in Sudan is common as a primary event or a secondary infection following a viral illness such as a cold. In present study, bacterial conjunctivitis was found to be 78% which is much closed to the fact that infectious conjunctivitis is mainly bacterial or viral, with approximately 78% to 80% of cases being bacterial in origin [1]. Olatunji *et al*., and Adebayo *et al*., [13, 14] also reported near frequencies (69.2 % and 60% respectively) while one researcher [15] reported higher results (92.7%). In contrast, lower results had been reported by others [12, 16-18]. The present study showed that females were more infected than males with significant difference (p = 0.599) while some previous workers found a high prevalence of the disease in males patients [19-21]. It can be explained by that gender variation may vary on region to region basis. The highest infected age group was (0-15 years) with (41.0%) which in agreement to Kawuma [22]. The age frequency was statistically significant (p = 0.00).

Oppositely Abdullah *et al*.,[12]found that conjunctivitis was more common among elderly (61 to 70 years) with 34.4%. Conjunctivitis is very common in young persons and gradually disappears at puberty. Bacterial etiologies are more common in older children with non-epidemic conjunctivitis [23]. In the present study, the Gram positive bacteria (73.1%) were higher in number than Gram negative bacteria. That is with agreement to Perkins *et al*., [24] who reported results of isolates mostly were coagulase-negative staphylococci (67.8%)followed by *S. aureus* (23.1%). Everett *et al*., reported that Gram-positive organisms accounted for 75% of the isolates[25]. In the present study, the major organism isolated was *S. aureus* which was of rate (41%) followed by *St. pneumonae* (17.9%). That was in accordance to the existing literature[12, 14, 26, 27]which reported that S. *aureus* was the major cause of bacterial conjunctivitis. Similarly, one finding[28] reported that the major causative bacterial conjunctivitis was *S. aureus* (87.2%) followed by *St. pneumoniae* (4.7%). Our findings indicated that the maximum antibiotic sensitivity of the isolates was against gentamycin (94.20%) followed by both chloramphenicol and ceftazidime (78.8%). Gentamicin and chloramphenicol are most cost effective antibiotics in Sudan and with least side effect and hence safe to be prescribed even for children. Chloramphenicol is the drug of choice for treatment of infectious conjunctivitis in many countries. Though chloramphenicol is inexpensive and effective in uncomplicated cases, it is bacteriostatic in mechanism and may cause adverse effects, including bone marrow hypoplasia and aplastic anemia. One study reported that all of the bacterial isolates were susceptible to chloramphenicol, ciprofloxacin and gentamicin [29]. Tetracycline is mainly used for treatment of chlamydial and Neisseria infections and should not be prescribed to children less than eight years of age. The present study showed that the maximum resistance was against tetracycline (94.2%) followed by amikacin (73.1%). Inappropriate treatment of conjunctivitis with antibiotics can raise concerns of antibiotic resistance, cost-effectiveness, and potential increase of complications due to antibiotic use because bacterial infections that do not respond to drugs can result in blindness. It could be concluded that bacterial conjunctivitis was higher is Sudan especially in children and females and mostly caused by *S. aureus* and *St. pneumonae*. Gentamicin and Chloramphenicol are appropriate antibiotics and tetracycline was of the highest resistant rate. Infection control measures should be properly implemented in eye hospitals

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