Short Research Article

The etiology and antibiogram of bacterial causes of conjunctivitis among patients attending the eye clinic at Rugarama Hospital in South Western Uganda

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ABSTRACT

Background: Bacterial Conjunctivitis is a common eye condition that causes discomfort and is very irritating. It is a common condition in children and adults and can be caused by various bacterial agents.

Objective: To determine the prevalence, the common bacterial causes of conjunctivitis and their sensitivity to antimicrobial agents at the eye clinic of Rugarama Hospital, Kabale.

Materials and methods: All specimens were obtained during routine checkups and outreach programmes in April, 2013. The isolates were obtained after inoculation of the specimens onto blood, chocolate and MacConkey agar plates, incubated at 37^0C for 18-24 hours under aerobic conditions except for chocolate agar plates which were kept in candle extinction jar. The isolates were identified using a combination of colony morphology, biochemical and / or serological tests. Antibiotic sensitivity testing was performed using the Kirby-Bauer disc diffusion method.

Results: One hundred ninety six conjunctival swabs were cultured of which 87 grew bacteria, giving a prevalence rate of 44.4%. Fifty eight of the positive samples were from males and 29 were from females. The age range was from 1 year to 85 years with majority above 40 years. Women were two times more affected than men. The isolated organisms included *Staphylococcus aureus* 85.1% and *Neisseria gonorrhoea* 14.9%. Most of the isolates were sensitive to gentamicin, tetracycline and ciprofloxacin while penicillin/oxacillin and chloramphenicol had the least bacterial coverage.

Conclusion: There is a high prevalence of bacterial conjunctivitis at the eye clinic of Rugarama Hospital with the commonest causes being *S. aureus* and *N.gonorrhoeae*. Ciprofloxacin, gentamicin, tetracycline can be used for empirical therapy of bacterial of conjunctivitis but not chloramphenicol and penicillin/oxacillin.

Keywords: [Conjunctivitis, Bacterial, drug resistance]

1. INTRODUCTION

Bacterial conjunctivitis is an inflammation of the conjunctiva caused by bacteria[1, 2]. Bacterial conjunctivitis being the eye disease most commonly seen by general practitioners, and estimated to represent approximately 1% of all consultations in primary care. Bacterial conjunctivitis is a common ocular problem seen among patients attending the eye clinic of Rugarama Hospital. This is as a result of relapses that occur as the condition is treated empirically by most general practitioners. The American Optometric Association (AOA) clinical practice guideline[2] classifies bacterial conjunctivitis as hyperacute, acute, or chronic, while the American Academy of Ophthalmology (AAO) guideline[1] differentiates it as nongonococcal, gonococcal, or chlamydial conjunctivitis. Treatment varies depending on

classification. Its prevalence, associated microorganisms and their susceptibility to drugs among the patients attending the eye clinic of Rugarama Hospital, Kabale has not been documented. Therefore a study was conducted at this hospital to determine the prevalence, the common bacterial causes of conjunctivitis and their sensitivity to antimicrobial agents at the eye clinic of Rugarama Hospital.

2. MATERIAL AND METHODS

This was a cross-sectional study conducted in the inpatient and outpatient departments of the eye clinic of Rugarama hospital located in Kabale district in Southwestern Uganda. After obtaining informed consent from a participant with purulent ocular discharge a sample was collected using a cotton tipped applicator pre-moistened with sterile saline we swabbed the inferior tarsal conjunctiva (inside surface of the lower eye lid) and the fornix of the eye. The swab was placed in the transport medium and transported the microbiology laboratory of Kabale Regional Referral Hospital where it was cultured on blood, chocolate and MacConkey agar and incubated at 37^0C for 24-48 hours under aerobic conditions except for chocolate agar plates which were kept in candle jar. Upon growth, organisms were identified using colony appearance, gram stain and biochemical tests such as catalase, tube and slide coagulase, DNase and growth on manitol salt agar for *S. aureus* and the fermentation of glucose for *Neisseria gonorrhoeae*. Sensitivity was performed using the Kirby Bauer technique and interpreted according to CLSI guidelines [3]

Quality control

All procedures followed the established standard operating procedures and standard organisms were used as control organisms for the sensitivity testing. Control included *S. aureus* ATCC 25923, ATCC 29213, and *N.gonorrhoeae* ATCC 49226

Data analysis

Statistical data analysis was done by using SPSS program v20.

Ethical considerations

The study was cleared by the Faculty of Medicine Research and Ethics Committee and Institutional Ethics review Committee of Mbarara University. Permission to conduct the study the study was also sought from Kabale Regional Referral Hospital and Rugarama Hospital.

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3. RESULTS

This study included 196 participants, 43 (21.94%) were women and 153 (78.06%) were men whose age ranged between 1 year and 80 years old. The participants were categorized into 5 age group (1-5 years, 6-11 years , 12-20 years , 21-40 years, >40 years). Majority of the participants were above 40 years.

Of the 196 swabs cultured, 87 (44.39%) had a significant bacterial growth with two major pathogens isolated. Seventy four (85.06%) grew S.aureus and 13 (14.94) grew *Neisseria gonorrhoeae*.
Of the 87 culture positive samples 58 were males and 29 samples were from females. The prevalence of bacterial conjunctivitis among the females was 67.44% where as that among the males was 37.90%. Among males*Neisseria gonorrhoeae* accounted for 12.07% (7/58) and *Staphylococcus aureus* accounted for87.93% (51/58) while among the females *Neisseria gonorrhoeae* accounted for 20.69% (6/29) and *Staphylococcus aureus* accounted for 79.31% (23/29).

The most affected age groups were those below 5 years and those above 20 years of age (Fig 1).

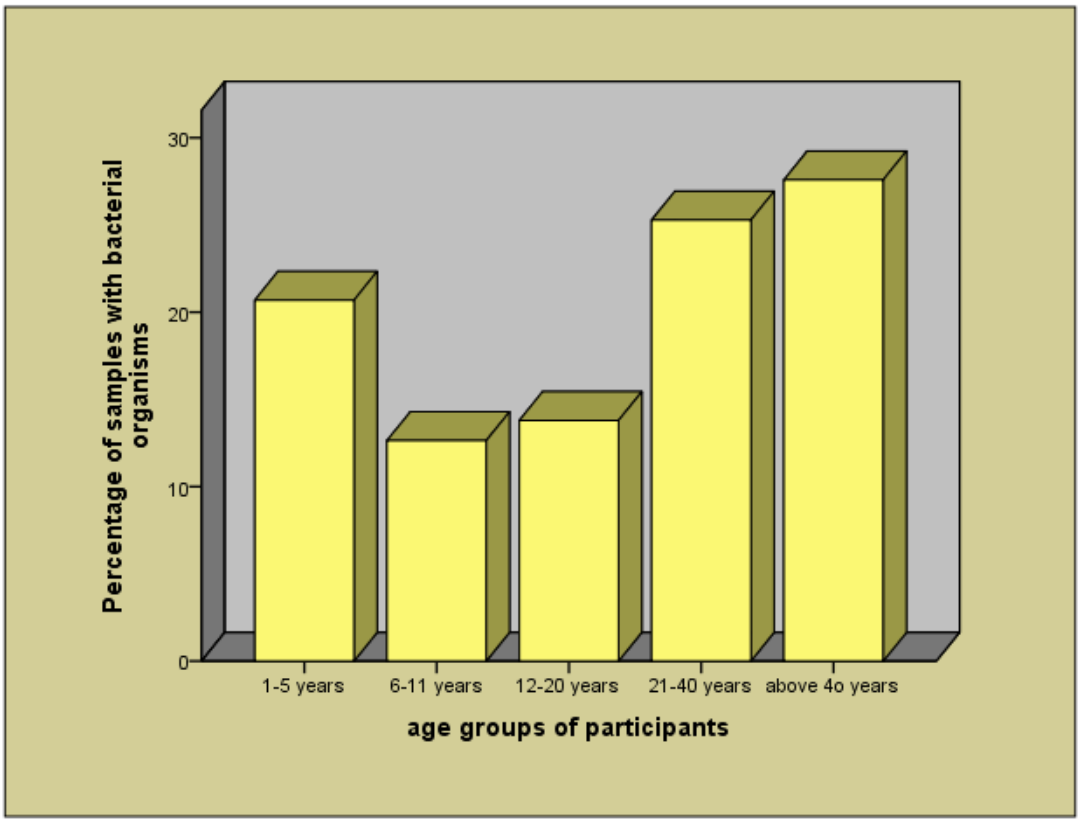

Fig 1: Prevalence of bacterial conjunctivitis by age group

S. aureus was highly sensitive to gentamicin and ciprofloxacin but very resistant to penicillin and chloramphenicol (Fig 2). Whereas *Neisseria gonorrhoeae* was highly sensitive to tetracycline, chloramphenicol and penicillin but was highly resistant to ciprofloxacin. (Fig 3)

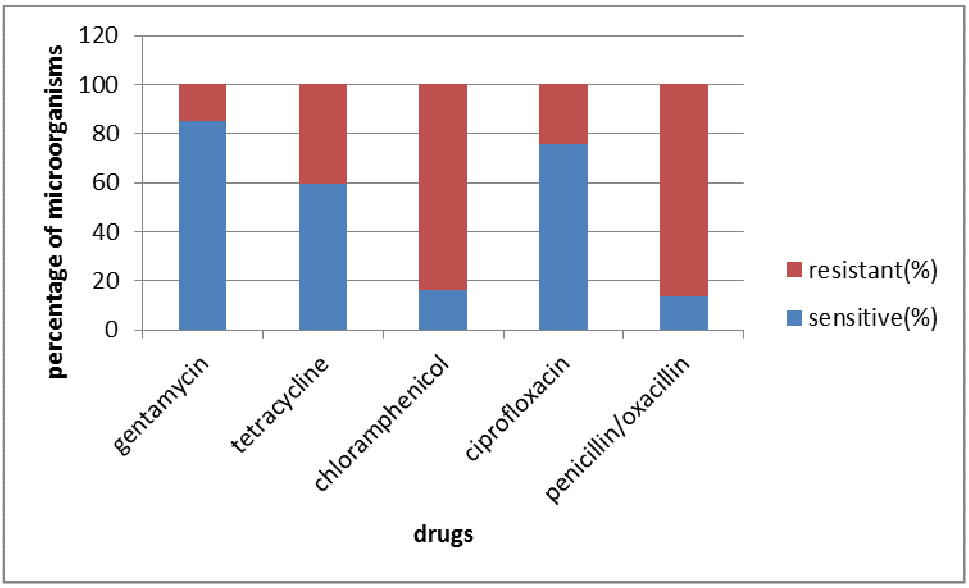

Figure 2: Susceptibility pattern of *Staphylococcus aureus* to the commonly used antibiotics

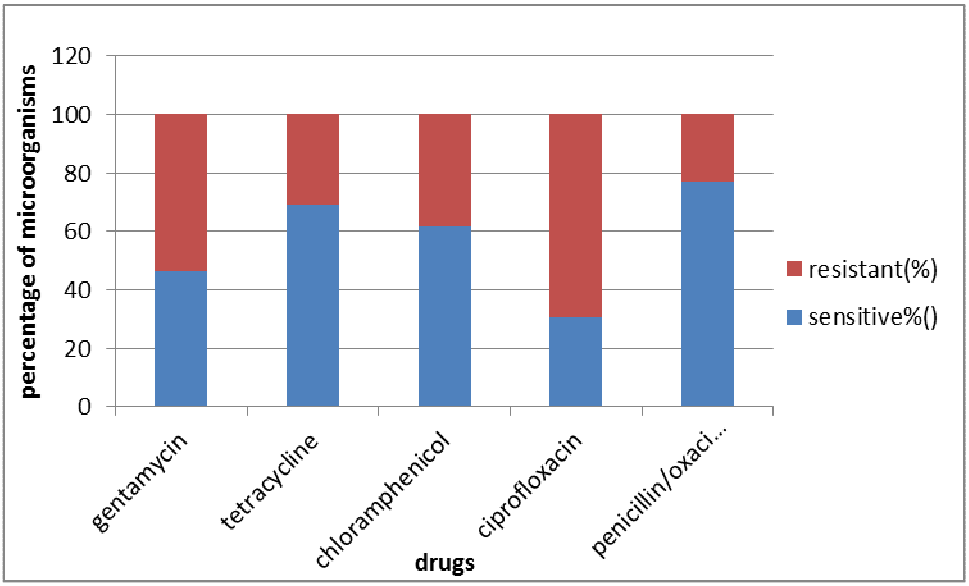

Fig 3: Susceptibility pattern of Neisseria *gonorrhoea* to the commonly used antibiotics

Discussion

This study has demonstrated a prevalence of bacterial conjunctivitis of 44.4% among the patients with a purulent eye discharge. This prevalence is much lower than the 69.2% that was found in Nigeria [4], the 55 % in southern Israel [5], the 55 % at Ruharo Eye Centre Mbarara Uganda (un published data) and the 52.50 % in Miami, South Florida at Bascom

Palmer Eye Institute. This variation could be due to difference in the type of participants in the various studies. Most of the patients in our study were adults as opposed to other studies that included a significant number of children in their studies. We also had fewer females in our study compared other studies.

The most common bacterial isolate in this study was Staphylococcus aureus (85.06%). This finding is similar to that of a study by Idu and Odjimogo, 2003 in Nigeria that found *Staphylococcus aureus* to be the most common organism. Another isolate was Neisseria gonorrhoea which accounted for 14.94%. A study by Mandell et al. (2005) identified *Staphylococcus* species as the most common organism describing others as well to be causatives as this study also found out in *Neisseria gonorrhoea.*

Conjunctival bacterial infection did not vary significantly by age, but was more common in women. In this study women were two times more likely than men to suffer from bacterial conjunctivitis.

Neisseria gonorrhoea accounted for 7 (12.069%) and *Staphylococcus aureus* accounted for 51 (87.931%) in males while among females, *Neisseria gonorrhoeae* accounted for 6 (20.690%) and staphylococcus aureus accounted for 23 (79.310%). *Neisseria gonorrhoeae* was more prevalent in the women than in males. The most probable reason for *Neisseria gonorrhoea* being more common in the females and the young children is because the disease takes time to manifest in women compared to men, therefore as a result it may end up affecting eyes of the children as there is a lot of sharing of bathing and cleaning towels between mothers and their children. However the exact reason for this is still remains to be studied.

Of the 5 age groups studied, the most affected were those of above 40 years with 24 (27.6%), a similar result was obtained by Cavuoto et al, (2007)[6]. This could be attributed to the fact that most of these patients were being exposed to a lot of contaminants especially in their field of work since they were attributing the contamination to prior cleaning their eyes with dirty hands. Between 21 to 40 years the isolates were 22 (25.3%), followed by 1 to 5 years with 18 (20.7%). This was attributed to the fact that most of these children were suffering from infection with *Neisseria gonorrhoeae* which they could have acquired due to poor sanitation from the parents and their surroundings. The 6 to 11 year age group comprises of primary school going children who usually have problems adjusting to the various weather conditions while travelling to and from school. They end up with itchy and teary eyes and in a bid to reduce the itchiness, their mothers who may already be infected with *Neisseria gonorrhoeae* scratch their eyes and end up contaminating the them with the disease.

The bacterial agents' susceptibility profile in this study shows that ciprofloxacin and gentamicin have the best coverage for gram positive bacteria (fig 1) and tetracycline and penicillin/oxacillin have the best coverage for gram negative bacteria (fig 2) . This finding agrees with earlier reports by Cavuoto et al, (2008)[6], and Solari et al, (2002). The high sensitivity of the isolates to ciprofloxacin and gentamicin found in this study may be related to its comparatively less frequent use and abuse in our community. The reduced susceptibility of *Staphylococcus aureus* to tetracycline and chloramphenicol compared to previous reports may be related to their use as the first line drugs in eye diseases in the community and the fact that they are readily available and affordable.

Conclusion

The prevalence of bacterial conjunctivitis at Rugarama Hospital eye clinic is significantly high with the commonest causative agents being Staphylococcus *aureus and N.gonorrhoeae.* Ciprofloxacin, gentamicin, tetracycline have the best coverage for empirical therapy of bacterial of conjunctivitis however due to high resistance to chloramphenicol and penicillin/oxacillin their empirical use for the treatment of bacterial conjunctivitis should be discouraged.

COMPETING INTERESTS

Authors have declared that no competing interests exist

ETHICAL APPROVAL

This study was approved by the Institutional Ethics review committee of Mbarara University of Science and technology and the Uganda National Council for Science and Technology

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