

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

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°C 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 disc diffusion method.

Results: One hundred and ninety six conjunctival swabs were analysed and 87 grew bacteria, giving a prevalence rate of 44.4%. The positive samples were from 58 males and 29 females. The age range was from 1 year to 85 years. Most of the swabs were from age group above 40 years. 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: The most common bacterial agent of conjunctivitis seen in Kabale at the eye clinic of Rugarama Hospital is *Staphylococcus aureus* and is sensitive to gentamicin, tetracycline and ciprofloxacin.

Keywords: [Conjunctivitis, Bacterial, drug resistance]

1. INTRODUCTION

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. Bacterial conjunctivitis being the eye disease most commonly seen by general practitioners, and estimated to represent approximately 1% of all consultations in primary care. 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.

28 2. MATERIAL AND METHODS

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30 This was a cross-sectional study conducted in the inpatient and outpatient departments of
31 the eye clinic of Rugarama hospital located in Kabale district in Southwestern Uganda.

32 After introducing the study and its aims to the participant and obtaining consent, an eye
33 swab was collected and transported to the microbiology laboratory of Kabale Regional
34 Referral Hospital where it was and cultured on blood agar, and MacConkey agar and
35 incubated for 24-48 hours. Upon growth, organisms were identified using biochemical
36 techniques. Sensitivity was performed using the Kirby Bauer technique and interpreted
37 according to CLSI guidelines.

38 Quality control

39 All procedures followed the established standard operating procedures and standard
40 organisms were used as control organisms for the sensitivity testing.

41 Data analysis

42 The data was input using Microsoft Excel and statistically analyzed using SPSS program.
43 The results were presented in pie charts, histograms, and tables.

44 Ethical considerations

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

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49 3. RESULTS

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51 Demographic data

52 This study included 196 participants 43 (21.94%) were from women and 153 (78.06%) were
53 from men whose age ranged between 1 year and 80 years old and were categorized into 5
54 age group

55 Of the 196 participants samples, 87 (44.39%) were found to be positive for bacterial
56 conjunctivitis. A total of 13 out of 87 patient samples were *Neisseria gonorrhoeae* and 74
57 were *Staphylococcus aureus* bacteria.

58 Among the males *Neisseria gonorrhoeae* accounted for 7 (12.069%) and *Staphylococcus*
59 *aureus* accounted for 51 (87.931%). Among the females *Neisseria gonorrhoeae* accounted
60 for 6 (20.690%) and *Staphylococcus aureus* accounted for 23 (79.310%).

61 *S. aureus* was highly sensitive to Gentamicin and ciprofloxacin but very resistant to Penicillin
62 and Chloramphenicol (Fig 1).

63 *Neisseria gonorrhoeae* was highly sensitive to Tetracycline, chloramphenicol and penicillin
64 but with high resistance to ciprofloxacin. (Fig 2)

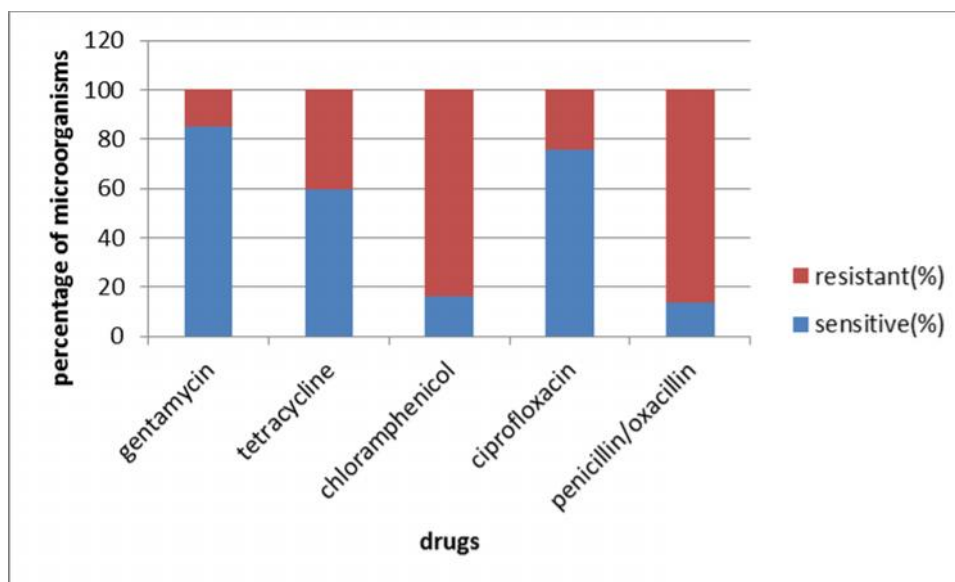


Figure 1: Susceptibility pattern of *Staphylococcus aureus*

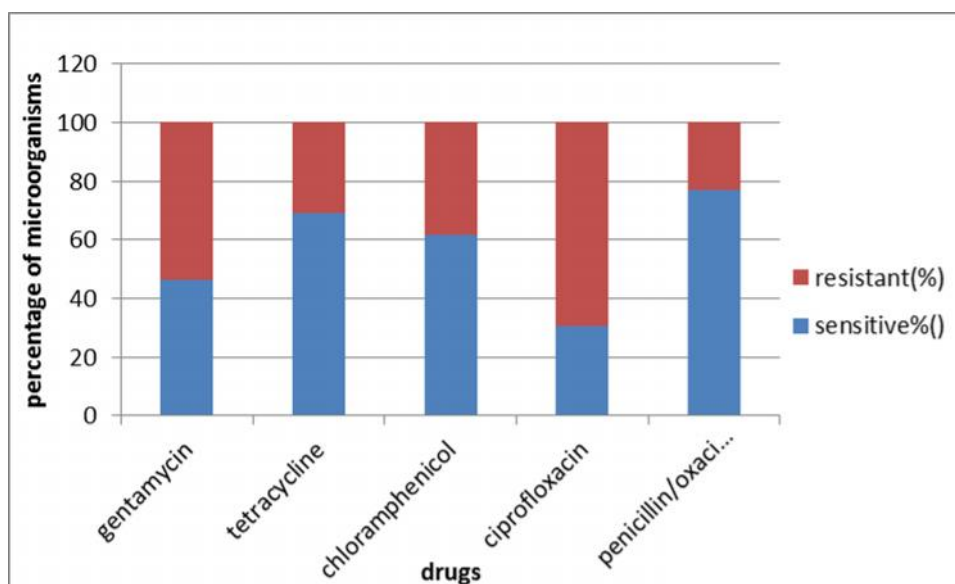


Fig 2: Susceptibility pattern of *Neisseria gonorrhoea* to the antibiotics used

Discussion

This study has further highlighted the magnitude of bacterial agents of conjunctivitis as 44.4% of the tested conjunctival swab specimens from patients with purulent eye discharge were bacterial isolates.

The prevalence of bacterial conjunctivitis in this study was lower than that found in some other countries; in Nigeria the prevalence rate was 69.2% [1]. In southern Israel prevalence was found to be 55 % [2], In Miami, South Florida at Bascom Palmer Eye Institute, prevalence was 52.2%. Even in a study in Ruharo Eye Centre, the prevalence was 55 %

unpublished data). This variation could be due to the fact that most of the patients were adults other than young children. It could also have resulted from the fact that there was a variation in representation by sex as most of the samples were from the males. However the prevalence found in this study was higher than that in some other countries; in the Netherlands, the prevalence of a positive bacterial culture in the study was 32% [3]. This could have been due to the fact that there were more males than females in the study as compared to the study in the Netherlands where there were more females than males. 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*. This may have been due to the fact that *Staphylococcus aureus* has the ability to colonise various body parts hence is a very common microorganism as seen in the various studies.

Out of the 87 positive samples, 58 were males and 29 were females showing that bacterial conjunctivitis affects both sexes as was reported by Tarabishy and Jeng, (2008)[4]. This study shows that males contributed more of the isolates (66.7%) than females (33.3%) which differs from a study in the Miami, where both sexes contributed equal percentage (50.0%) of the isolates and in the Netherlands where there were more females than males. This could have been a result of the time frame within which the samples were collected. In males, *Neisseria gonorrhoea* accounted for 7 (12.069%) and *Staphylococcus aureus* accounted for 51 (87.931%). In 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 ends up affecting eyes of the children as there is a lot of sharing of bathing and cleaning towels between mothers and their children.

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)[5]. 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. Then 12 to 20 years with 12 (13.8%), it was noticed that most of these had wounds in the eyes that had gone without proper treatment for long, it was also noticed that in attempt to remove some foreign bodies dirty materials were used especially in the villages where by some patients confirmed use of vegetation (grass) and sometimes soft wooden materials to remove insects and specks of dust from their eyes. and lastly, 6 to 11 years of age with 11 (12.6%), these were children of primary school, mostly who had problems with adapting to the various weather conditions while travelling to and from school. Their eyes would become teary and itchy, as a result the patients in a bid to reduce the itchiness, scratch and end up contaminating the eyes.

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)[5], and Solari et al, (2002). Out of the tested antibiotics, gentamicin has a good coverage of the isolates in this study, than ciprofloxacin though both of them showed vigorous sensitivity patterns. The good coverage of ciprofloxacin and gentamicin found in this study may be related to its comparatively less frequent use and abuse in our community. Most of the isolates tested were sensitive to

134 ciprofloxacin and gentamycin though there was some resistance of some isolates but on a
135 small scale.

136 The susceptibility pattern of *Staphylococcus aureus* to chloramphenicol was low with
137 16.21% sensitivity to chloramphenicol. The availability of ciprofloxacin in systemic and
138 topical forms gives it an added advantage in ophthalmic practice over the chloramphenicol
139 which is available in systemic form only. The reduced susceptibility of *Staphylococcus*
140 *aureus* to tetracycline and chloramphenicol compared to previous reports may be related to
141 their use as the first line drugs in eye diseases in the community and the fact that they are
142 readily available and affordable. Oxacillin/penicillin has the least bacterial coverage in this
143 study with both *Staphylococcus aureus* as the resistance is high at 86.49% which was also
144 stated in a previous study by Rajadurai et al (2006)[6]

145 **Conclusion**

146 This study showed that the prevalence of bacterial conjunctivitis at Rugarama Hospital eye
147 clinic is significantly high 44.4%. The most common bacterial agent of purulent conjunctivitis
148 in patients attending the eye clinic of Rugarama Hospital, Kabale district is *Staphylococcus*
149 *aureus* and ciprofloxacin, gentamycin, tetracycline have the best coverage for common
150 bacterial agents of conjunctivitis. However, there was an increased resistance to
151 chloramphenicol and penicillin/oxacillin antibiotics implying that their use as treatment
152 regimens for the bacterial conjunctivitis should be discouraged.

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155 **COMPETING INTERESTS**

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157 Authors have declared that no competing interests exist

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160 **ETHICAL APPROVAL**

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

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