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Prescription Pattern of Antibiotics and Susceptibility of the Pathogens in Infectious Conjunctivitis

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ABSTRACT

Conjunctivitis is usually of infective origin and is caused by bacteria, virus or chlamydia. Antibiotics are mainly prescribed for quick recovery of the patient and for speeding up the eradication. This study was done to evaluate the prescribing pattern of antibiotics in the patients with conjunctivitis and to know the susceptibility of the pathogens to the antibiotic.Based on the inclusion and exclusion criteria, fifty subjects who are having conjunctivitis were selected and evaluated for the prescribing pattern of antibiotics.Conjuctival swab was collected and inoculated in the culture media. The cultures were analysed for growth and the organism was identified based on gram staining and tests. The antibiotic sensitivity tests were done by disc diffusion method. Flouroquinolones were the most commonly prescribed antibiotics (94%). Among the flouroquinolones, Moxifloxacin was the most commonly (52%) prescribed drug.Staphylococcus aureus has the highest occurrence (92.3%) followed by P. aeruginosa at 4% isolated from the conjuctival swab.Moxifloxacin has the highest zone of inhibition followed by ciprofloxacin and ofloxacin in *S.aureus* isolates. Antibiotics were correctly prescribed in case of conjunctivitisof bacterial origin and antibiotics were assumed to be prescribed to prevent secondary infections in suspected case of viral origin.

Key words: Prescription pattern, Antibiotics, Conjunctivitis

INTRODUCTION

Conjunctivitis is defined as the inflammation of the conjunctiva. It is usually of infective origin may be of bacterial, viral or chlamydial. The most common bacterial micro-organisms include *Staphylococcus aureus*, *Streptococcus pneumonia*, *Hemophilusaegyptius, Cornybacterium diphtheria, Neisseria gonorrhoeae, Moraxella lacunata*, etc. Infectious conjunctivitis presents with hyperemia of varying degree, mucopurulent discharge,itching, irritation, foreign body sensation, matting of eyelashes and crusting of eyelids.[1,2]Generally, this condition is usually self-limiting and benign but the clinical course of the infection can be shortened by using antibiotic agents. Not only does the use of antibiotics help in quick recovery of the patient, it also speeds up the eradication of bacteria and decreases risk of spread.[3,6]The health care providers routinely prescribeantibiotics before identifying the causative organism by bacterial culture or performing an antibiotic susceptibility test of the identified organism. But in daily practice, the bacterial culture is not feasible because of the diagnostic delay and the patient needs quick relief from the ocular discomfort. Therefore, the antibiotics prescribed are mostly broad spectrum antibiotics and have a topical route of administration.The common antibiotics (topical) indicated in infectious conjunctivitis includes fluoroquinolones (e.g., ciprofloxacin, levofloxacin, ofloxacin, moxifloxacin), aminoglycosides (e.g., gentamicin and tobramycin) polymyxin-based combinations (e.g., polymyxin B sulfate and trimethoprim), azithromycin and chloramphenicol.[6,7]

Indiscriminate use of antibiotics has been linked with the development of antibiotic resistant strains of bacteria.[3,4,5]The therapeutic efficacy of the drug can be increased by studying the utilization pattern of drugs and this will help to reduce the occurrence of antibiotic resistant strains of bacteria.[8,9] By recording the prescription patterns and performing the antibiotic sensitivity test with the prescribed antibiotics, the susceptibility or resistance of the pathogens to the prescribed antibiotics can be identified. In addition the susceptibility of the pathogen to the commonly prescribed antibiotics is performed too. This comparison will help optimize the prescription pattern.

MATERIALS AND METHODS

This study was a prospective study conducted in the Department of Pharmacology in association with the Department of Ophthalmology and Department of Microbiology, SRM Medical College, Hospital& Research Centre (SRMCH&RC), Tamil Nadu. The study was carried out over a period of three months from July, 2013 to September, 2013 and was approved by the Institutional Ethical Committee (467/IEC/2013). The study population comprised of a sample size of 50 subjects diagnosed with infectious conjunctivitis. The prescriptions were collected and evaluated accordingly for the prescribing pattern.

The inclusion criteria for selecting the patients were beingof any age and sex,diagnosed with infectious conjunctivitis and prescribed some antibiotics. The exclusion criteria were those patients who were prescribed outside the hospital and the patients who had previously been undergoing antibiotic treatment (local or systemic).According to the inclusion and exclusion criteria, the prescription were selected and evaluated for the prescribing pattern of antibiotics for conjunctivitis. The demographic profiles of the patients were analysed. The different prescription indicators like average number of drugs per prescription, average number of antibiotics prescribed, percentage of fixed dose combination, drugs prescribed from National List of Essential Medicines of India (NLEM, 2011).A patient consent form was presented to the subjectin the regional language, Tamil, and English based on the preference of the patient prior to collecting the swab for the interventional procedure.

Collection of swab[2, 10]

Conjunctival swab was collected from the affected eye with sterile cotton tipped applicator wiped twice across the conjunctiva of lower fornix from the temporal to nasal side. The swab was put into a transport medium (Stuart's transport medium) and labeled. Then they were taken to the laboratory within two hours of collection. Upon arrival, the sample was inoculated onto MacConkey agar, Blood agar and Chocolate agar.

Preparation of Medium[2, 10]

All the media plates for culture were prepared at the laboratory. The powdered medium was mixed well with water and heated with frequent agitation to dissolve the agar. Sterilization of the media was done in an autoclave at 121 degree celsiusfor about 15 minutes. The media was then allowed to cool at 45 degree celsiusat which temperature it still remains molten. The molten media was then poured into sterile petri dishes (20ml in each dish) and was left undisturbed until the agar solidified. Blood agar was prepared by mixing with 5% sheep blood before pouring into the plates. Chocolate agar was prepared by heating Blood agar to 70 degree Celsius till the chocolate colour is observed.

Inoculation of Medium[10]

The swabs were inoculated onto MacConkey, Blood agar and Chocolate agar plates by using the streaking method with a sterile inoculation loop. The plates were then incubated for 24 hours at 37 degree Celsius.

Analysis of Culture

The cultures were analysed for growth.In cases of positive culture, the organism was identified based on gram staining and by using routine standard biochemical tests like Coagulase test, Catalase test and Oxidase test.

Antibiotic Sensitivity test

The antibiotic sensitivity tests were done by disc diffusion method.The inoculum was streaked evenly over the entire surface of the media in the

petridish with a sterile cotton swab. Disc impregnated with corresponding prescribed antibiotic solution and other broad spectrum antibiotic solutions was placed in the petri dish containing agar. Inhibition of growth around 5mm around the antibiotic disc indicated sensitivity to that particular antibiotic and total absence of such zone indicated resistance.After identifying and assessing the sensitivity, a comparison was done with the sensitivity of the causative organism to the prescribed antibiotic and the other broad spectrum antibiotics.

Statistical analysis

The data for prescription was collected in the predesigned proforma and was expressed as mean ± SD. The descriptive tables were generated and appropriate proportions were calculated.

RESULTS

During the study period, the prescriptions of the patients were analysed for demographic profile. The average age of the patients was 29.04 ± 15.79 years. The number of female patients was 42% and male patients were 58%. About 14% of the patients were in pediatric age group and 8% were in geriatric age group. The average number of drugs prescribed was 1.54 ±0.57. The most commonly prescribed formulation was eye drops (100%). Accompanying the eye drops, ointment preparation of antibiotics were prescribed in 14% of cases. Flouroquinolones were the most commonly prescribed antibiotics (94%). Only 6% of cases, aminoglycoside was prescribed. Among the flouroquinolones , Moxifloxacin (52%), Ofloxacin (26%) and Ciprofloxacin (16%) were

Table 1: Characterization and identification of bacterial isolates

Morphology	Gram stain	Catalase	Coagulase	Oxidase	Probable identity of the isolates
Cocci in clusters	+	+	-	+	*Staphylococcus aureus*
Rods in long chain and clusters	-	-	+	-	*Pseudomonas aeruginosa*

Table 2: Zone of inhibition of different drugs against isolated microorganisms

Microorganism	Ciprofloxacin	Ofloxacin	Moxifloxacin	Amikacin	Tobramycin
Staphylococcus aureus	16 mm	13 mm	18 mm	9 mm	11 mm
Pseudomonas aeruginosa	16 mm	12mm	5mm	13 mm	15 mm

Fig. 1(a):

Fig. 1(b):

prescribed. Tobramycin was the only aminoglycoside which was prescribed in 6% of patients. Out of the 50 prescriptions the antibiotic with proper dosage form, frequency and duration mentioned were 100%, 100% and 38% respectively. The drugs were prescribed in generic names in 24% and with brand names in 76% cases. In only 42% of cases the antibiotics were prescribed from the National List of Essential Medicines of India (NLEM, 2011). Carboxymethylcellulose sodium was prescribed in 40% of cases as a concomitant drug in conjunctivitis. The common prescription writing errors were minimum. There was no evidence of polypharmacy.

The bacterial isolates from the conjuctival swabs were of staphylococcus aureus and Pseudomonas origin based on the gram staining and catalase, coagulase and oxidase tests (Table1). Staphylococcus aureus was isolated in 92.3% of cases and Pseudomonas aeruginosa in 4% cases (Figure 1a,1b,1c). Moxifloxacin has the highest zone of inhibition followed by ciprofloxacin and ofloxacin in *S.aureus*isolates and Ciprofloxacin followed by Tobramycin and amikacin in *P.aeruginosa* isolates (Table 2, Figure 2).

Fig. 1(c):

Fig. 2:

DISCUSSION

Bacterial conjunctivitis is mostly a self-limiting disorder. However some studies have shown that treatment with an antibiotic associated with significant better rates of early clinical remission. In our study, it was observed that antimicrobials are invariably prescribed in conjunctivitis patients. But only about half of the conjuctival swabs collected showed positive bacterial culture (52%) which means that the antimicrobials are commonly prescribed to all the patients irrespective of the type of origin of infection. Prescribing of antibiotics was rightly indicated according to the diagnosis except for viral conjcutivitis whose treatment is nonspecific, but in our study we found that the antibiotics were prescribed in about 48% of negative culture cases probably to prevent secondary infection.[9] The most common antimicrobials prescribed were flouroquinolones which correlates with the findings of Yashmeen *et al.*[12]. The fourth generation flouroquinolones like Moxifloxacin was the highest prescribed antimicrobial among all. A broad spectrum of bacteria (both gram positive and gram negative) like *Staphylococcus aureus, Staphylococcus epidermidis*, *Streptococcus pneumonia*, *Haemophilus influenza*, *Klebsiella* spp., Moraxella catarrhalis are susceptible to Moxifloxacin. Only in few cases aminoglycoside like Tobramycin was prescribed. The antibiotics were prescribed with proper dosage form, frequency and duration. Most of the drugs were prescribed by their brand names. This results is similar to the findings of Yashmeen et al .[12]

In our study, Staphylococcus aureus was the most common bacteria isolated from the culture. Studies have shown that Staphylococcus aureus is the most frequent cause of bacterial conjunctivitis

worldwide.[13,14]The gram negative bacteria like Pseudomonas aeruginosa was isolated only in few cases (4%).

The antibiotic sensitivity tests revealed that Moxifloxacin has the highest sensitivity over other antibiotics in cases where Staphylococcus aureus has been isolated followed by Ciprofloxacin and Ofloxacin. In gram negative isolates (Pseudomonas aeruginosa), Ciprofloxacin was found to be most sensitive followed by Tobramycin and Amikacin (aminoglycoside). Our study results indicate that newer generation fluoroquinolones is the preferred antibiotics than the old generation flouroquinolones due to its broader antibiotic susceptibility.[15]In all of the positive culture cases, the bacterial isolates were susceptible to the prescribed antibiotic which was evident through the Antibiotic Sensitivity Tests. Hence, the antibiotics are correctly prescribed in most cases (52%). In the other 48%, antibiotics were prescribed in culture negative cases, which may be of viral origin.

CONCLUSION

The study has shown that the common prescription writing errors were minimal and there was no evidence of polypharmacy. The study has also shown that the most common causative organism in bacterial conjunctivitis is Staphylococcus aureus. The bacteria isolated in this study were susceptible to the commonly prescribed broad spectrum antibiotics like fluoroquinolones (Moxifloxacin, Ciprofloxacin, Ofloxacin) and aminoglycosides (Tobramycin and Amikacin). Moxifloxacin was the most effective in isolates of Staphylococcus aureus followed by Ciprofloxacin and Ofloxacin whereas in isolates of Pseudomonas aeroginosa Ciprofloxacin was most effective followed by Tobramycin and Amikacin. The most commonly prescribed antibiotic is Moxifloxacin, a newer generation fluoroquinolones. Antibiotics were correctly prescribed in 52% of cases. But in 48% of culture negative cases which could be of viral origin, antibiotics were assumed to be prescribed to prevent secondary infections.

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