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Bacteriological Study of Acute Conjunctivitis in Patients Attending To Rims Hospital, Imphal

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Abstract: *Being the foremast part of the eye, the conjunctiva is frequently exposed to foreign body and exogenous organisms. Conjunctivitis is a contagious ailment, prevalent worldwide and is the most common form of ocular infection occurring in all age groups.*
This cross- sectional study has been undertaken for 2 years in the Ophthalmology department, RegionalInstitute of Medical Sciences and total of 100 patients with conjunctivitis attending the outpatient department have been studied. This study showed that the maximum percentage of patients were between 31 – 40 years (27%) followed by 21 – 30 years (23 %) and were mostly male (55%). The majority of the patients were found to be Hindu (71%) followed by Muslim (20%) and Christian (3%). The patients were mostly from rural areas (53%). The study shows the distribution of organisms in ocular discharge are gram positive (74%) followed by gram negative bacteria (26%).The acute conjunctivitis cases who presented in the hospital were mostly Staphylococcus aureus (37%), followed by streptococcus viridians(20%), methicillin resistant staphylococcus aureus (12%), klebsiella pneumonia (9%), coagulase negative staphylococcus aureus (4%), Escherichia coli and proteus (2%) and streptococcus pneumonia (1%).
Therefore, this study helps in better understanding of the patient profile, common organism involved, the drug sensitivity, thus, helping in better management of the conjunctivitis patients.
Keywords*: conjunctivitis, bacteriology, drug sensitivity, bacteria, ocular discharge.*

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I. Introduction

Being the foremost part of the eye, the conjunctiva is frequently exposed to foreign bodies and exogenous organisms. Ophthalmologists outpatient practice comprise largely conjunctival infection. Conjunctivitis is a contagious ailment, prevalent worldwide and is the most common form of ocular infection occurring in all age groups. The relative incidence of viral and bacterial conjunctivitis also shows a seasonal variation, with bacterial conjunctivitis predominating in the cold season and viral conjunctivitis occurring in the summer season. The conjunctival cul-de-sac harbours bacteria throughout life, beginning from the time of birth. In addition to exogenous bacteria, the normal flora contributes significantly to the pathogenesis of eye infection. Patients with viral conjunctivitis are often predisposed to bacterial super infection. Purulent or mucopurulent discharge often follows and this condition may become chronic if not treated in time.

Ophthalmologists are now familiar not only with the clinical spectrum but also with microbial and antimicrobial agents. In recent years, there has been an emergence of antibiotic resistant strains and a new assay of micro-organisms. Though effective against micro-organisms in the management of bacterial conjunctivitis, antibiotics are not self-limited in their clinical causes. [1]

The conjunctiva in spite of having continuously bathed with tear containing antibacterial lysozyme lactoferrin and immunoglobulins IgG, IgM and IgA; still it is observed that conjunctivitis is a major problem among the people, and if neglected it is one of the major causes of blindness due to corneal infection as its complication.

Bacteria are responsible for 54-73% of all cases.[2] It is all the more important to know the causative organisms in acute conjunctivitis and their susceptibility (drug sensitivity) to the commonly used antibiotics. This will help not only to guide for proper treatment with proper (sensitive) antibiotics but will also help as guide to their prognosis.

As epidemiology and aetiology of acute conjunctivitis vary from region to region, and therefore, proper identification of aetiological agents is necessary for the institution of appropriate therapy. So, the present study is taken up to assess the spectrum of aetiological agents of acute conjunctivitis in patients attending to RIMS

Hospital, Imphal by conducting microbiologic studies of the causative bacteria so as to provide prompt and effective management of acute conjunctivitis.

II. Materials And Methods

Study design: Cross-sectional study
Study location: The study was undertaken in the Department of Ophthalmology, Regional Institute of Medical Sciences (RIMS), Imphal in collaboration with Department of Microbiology, RIMS, Imphal, Manipur.
Study duration: August 2015 to September 2017 (2 years)
Study population: All the patients with clinically diagnosed acute conjunctivitis, who attended Ophthalmology OPD of RIMS Hospital, Imphal formed the study group. Informed written consent was taken before enrolment of the study subjects in the study.
Sampling design: Convenient sampling
Sample size: Sample size was calculated using the following formula,
$n= \{z^2 P(1-P)\} \div d^2$
where P = 29%[20]
z=1.96(confidence level of 95%)
d=10% (absolute allowable error)
calculated sample size=83
Total sample obtained during the study period was 100

Inclusion Criteria: All the cases of clinically diagnosed conjunctivitis, attended the Out-Patient Department of Ophthalmology department, RIMS Hospital, Imphal, whowere willing to participate in the study were included in the study.

Exclusion Criteria:
- Patients presenting with other causes of red eyes like uveitis, acute glaucoma, episcleritis, sub-conjunctival haemorrhage, scleritis, and acute keratitis.
- Patients who were already under treatment with antibiotics
- cases not willing to take part in the study

Study tools:
1) Conjunctival swab
2) Blood agar, Mc Conkey's agar, Nutrient agar, Chocolate agar
3) Gram's stain

Procedure:
Method of data collection: Informed written consent for each and every patient included in the study was taken. Detailed history of each case regarding age, gender, address, religion, and occupation was recorded in the proforma specially designed for the study.
Collection of specimens: For the collection of conjunctival swabs, autoclaved sterile swab sticks and sterile test tubes were used. Conjunctival swab was taken from each study subjects for the preparation of smear and Gram's staining and the other for culture in blood agar (B.A), Mc Conkey's agar (M.A) and Nutrient agar (N.A).
For the bacterial identification, and culture and sensitivity test, the following materials were used: a) Stain-Gram's stain, b) Media-Blood agar, Mc Conkey's agar, Nutrient agar, Chocolate agar.
Statistical analysis: Data was checked for consistency and completeness. Data was entered in a Statistical package for social science (SPSS) version 21.0 for analysis. Descriptive statistics like number and percentages were used. Results are also presented as graphs.

III. Figures And Tables

During this study duration of 2 years, a total number of 100 OPD patients were taken up, fulfilling the inclusion criteria. A cross-sectional study was done between male and female patients.

In this study, the maximum percentage of patients were between 31 to 40 years (27%) followed by 21 to 30 years (23%). Minimum and maximum age were 1 year and 80 years respectively. Among them 0 to 10 years patients were 12% and 71 to 80 years were 3%. (Fig. 1)
The conjunctivitis patients who presented in RIMS were mostly male (55%) followed by female (45%). (Fig. 2)

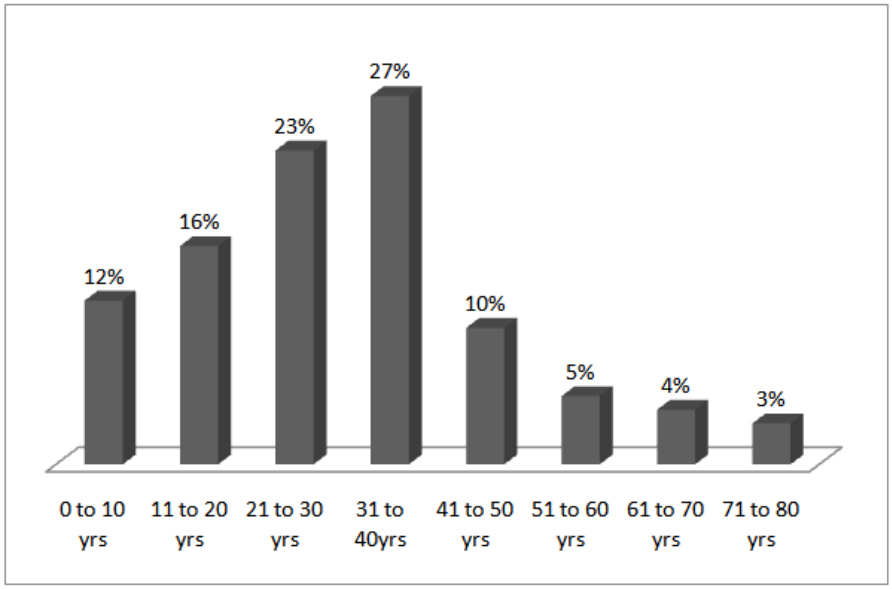

Figure 1: Distribution of study population according to age

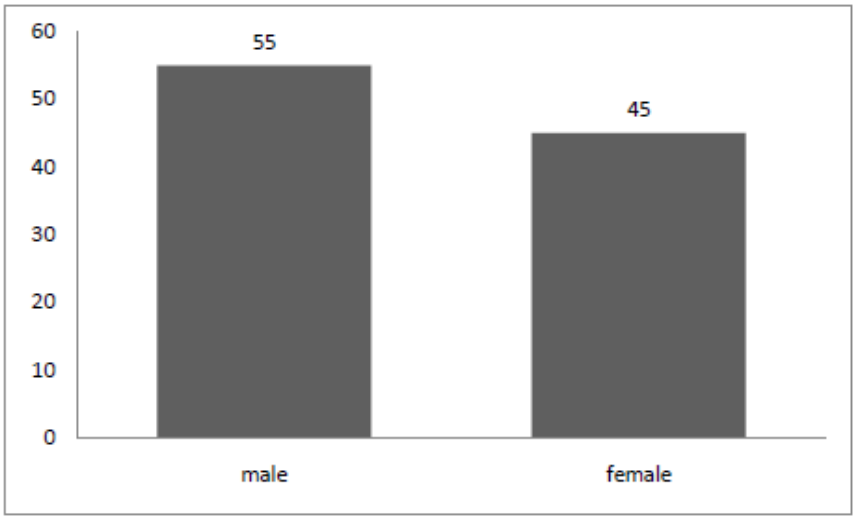

Figure 2: Distribution of study population according to gender (in percentage)

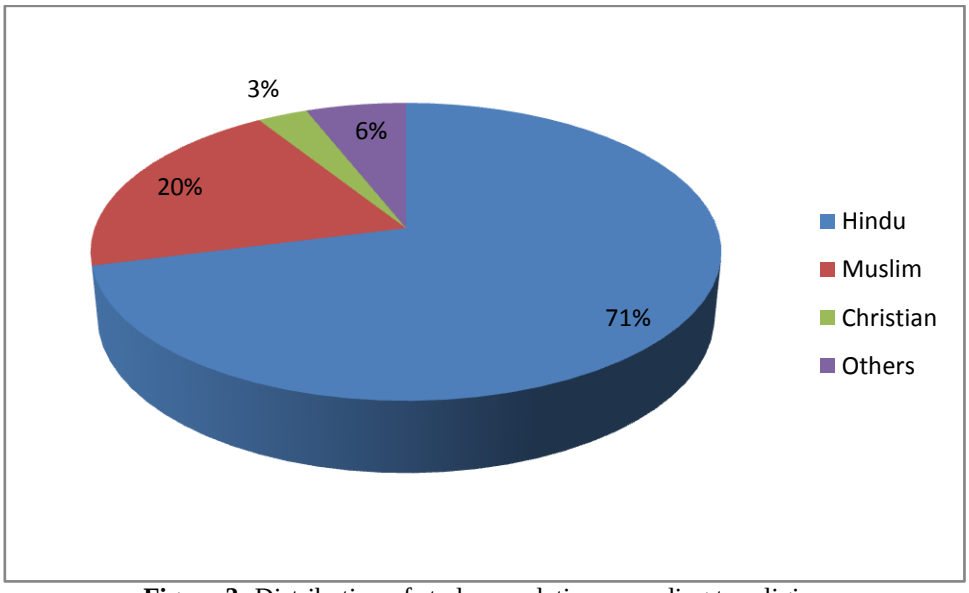

Figure 3: Distribution of study population according to religion

This studyshows that acute conjunctivitis patients presented in the hospital were mostly Hindu (71%), followed by Muslims (20%), others (6%) and Christian (3%), as shown in Fig. 3.

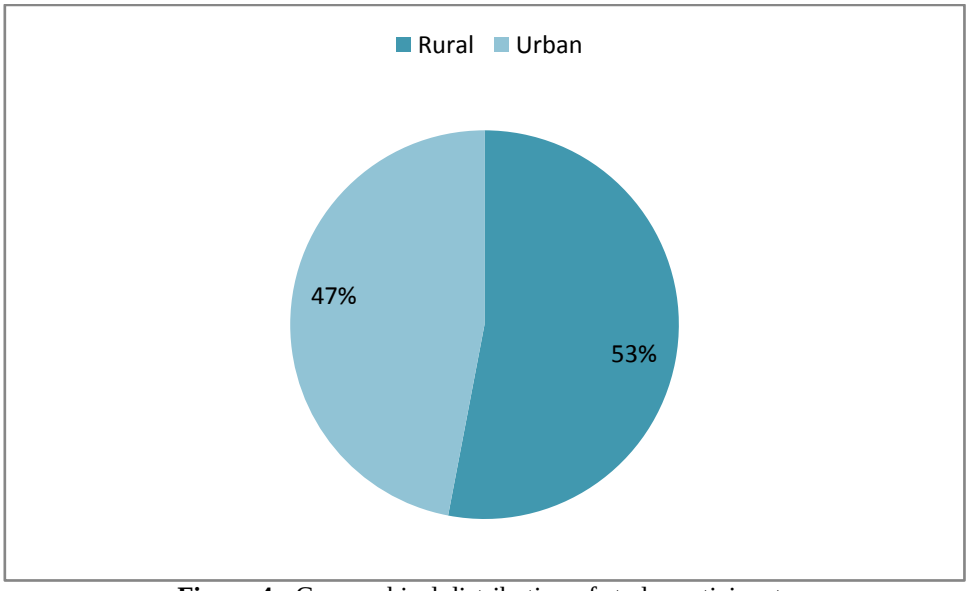

Figure 4: Geographical distribution of study participants

Conjunctivitis patients who presented in the hospital were mostly by rural (53%) followed by urban (47%) (Fig. 4)

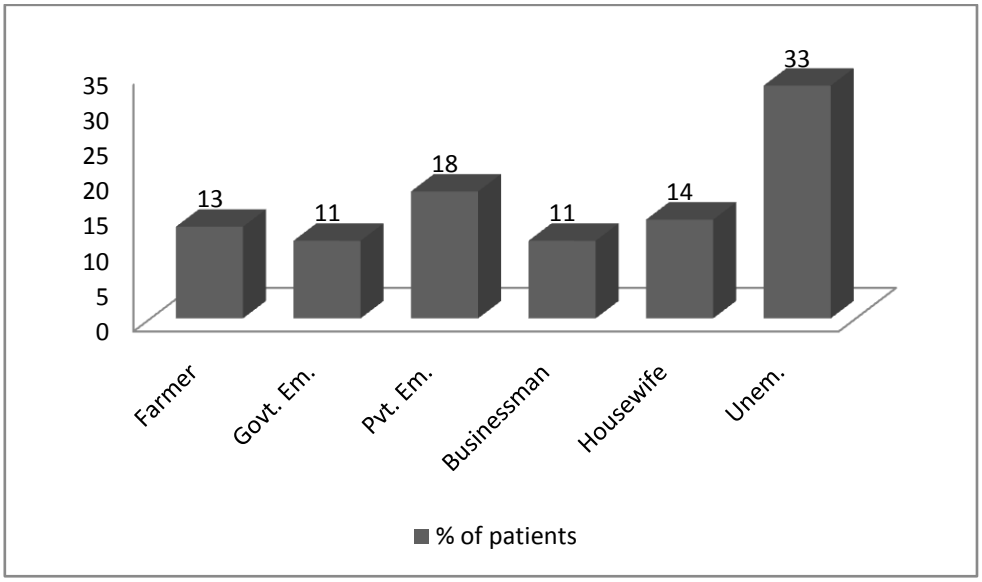

Figure 5: Distribution of study population according to occupation

This study shows that the conjunctivitis patients presented in the hospital were mostly Unem (unemployed) (33%), followed by Pvt.Em. (private employee) (18%), Housewife (14%), Farmer (13%), Govt.Em. (government employee) and businessman (11%). (Fig. 5)

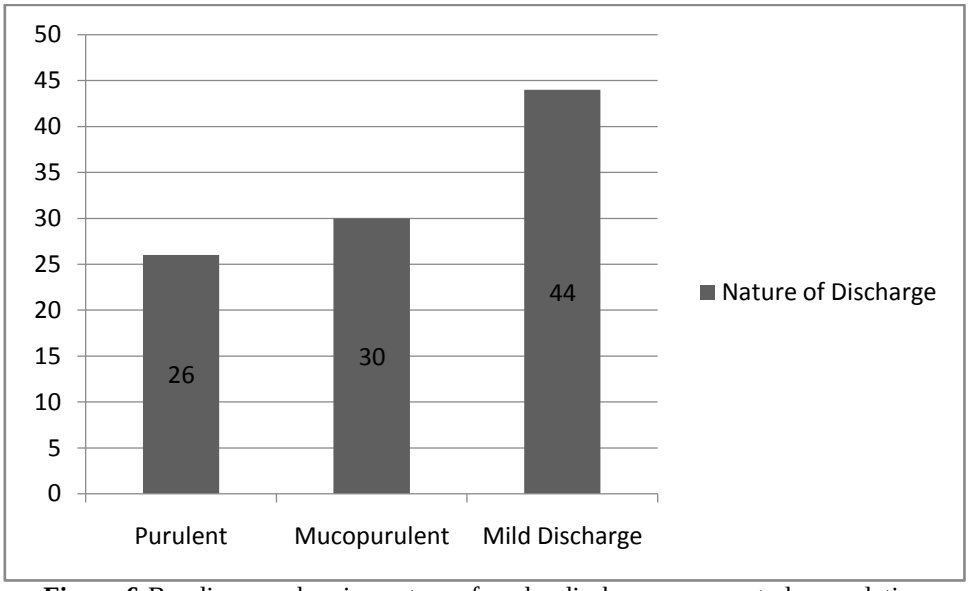

Figure 6: Bar diagram showing nature of ocular discharge among study population

The acute conjunctivitis patients presented in the hospital were mostly mild discharge (44%), followed by mucopurulent discharge (30%) and purulent discharge (26%).

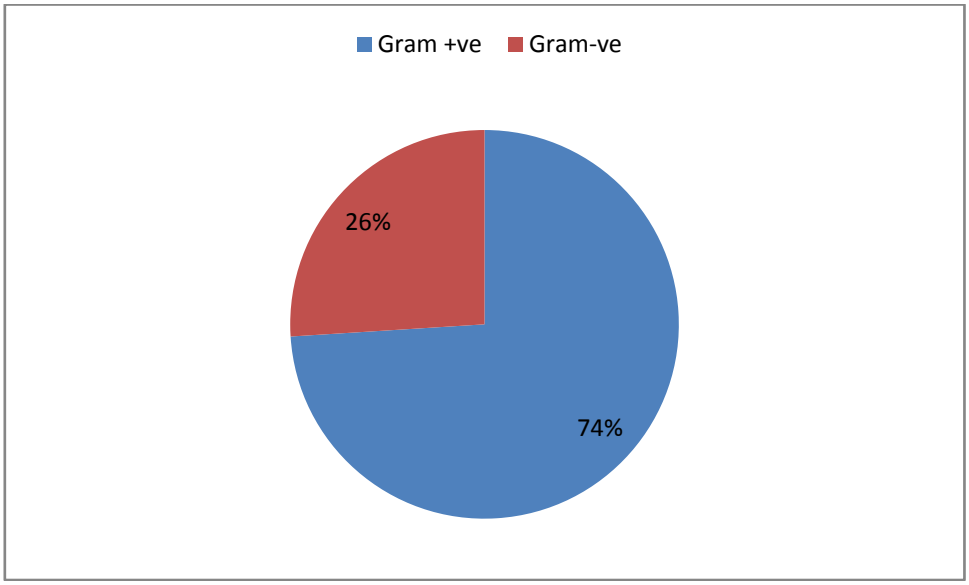

Figure 7: Pie diagram showing distribution of organisms in ocular discharge

The studyshows the distribution of organisms in ocular discharge are gram positive bacteria (74%) followed by gram negative bacteria (26%)(Fig. 7). The acute conjunctivitis cases who presented in the hospitalwere mostly Staphylococcus aureus (37%), followed by streptococcus viridans(20%), methicillin resistant staphylococcus aureus (12%), klebsiella pneumonia (9%), coagulase negative staphylococcus aureus (4%), Escherichia coli and proteus (2%) and streptococcus pneumonia (1%). (Fig. 8)

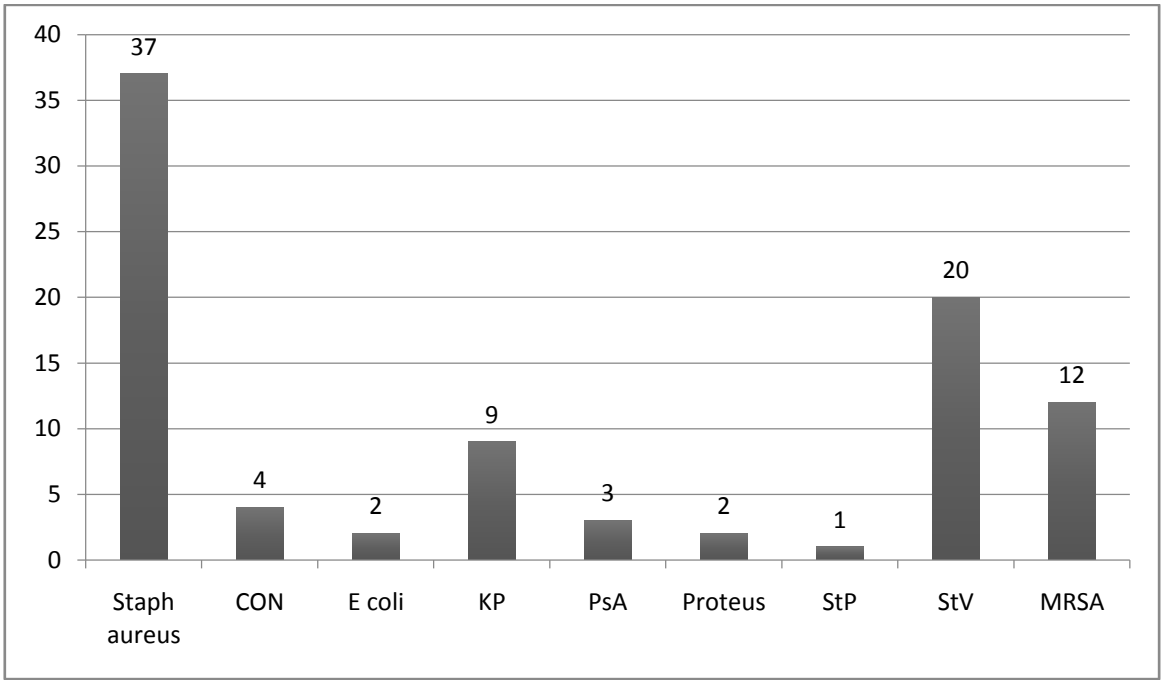

Figure 8: Distribution of organisms in ocular discharge of study participants

Table 1: Drug sensitivity pattern of identified bacterial organisms among patients with acute bacterial conjunctivitis (n=100)

Organism	Drug Sensitivity															
	P	V	G	E	COT	MOX	CEF	CIP	LZ	AZI	AMOXCV	AMI	CLIN	TAZ	CEFI	IMI
Staph aureus	9 36%	25 100 %	22 88%	17 68%	14 56%	24 96%	25 100%	18 72%	25 100%	18 72%	11 4%	19 76%	20 80%			
E coli	- -	-	2 100 %	1 50%	2 100 %	1 50%		- -			- -	1 50%		1 50%	2 100 %	2 100 %
CONS	3 21.4 %	14 100 %	13 92.9 %	11 78.6 %	11 78.6 %	13 92.9 %	14 100%	9 64.3%	14 100%	11 78.6 %	11 78.6%	12 85.7 %	13 92.9 %			
Klebsiella	1 11.1 %		7 77.8 %		7 77.8 %	8 88.9 %		6 66.7%			- -	8 88.9 %	3	7 77.8 %	7 77. 8%	9 100 %
Pseudomonas	- -		3 100 %		2 66.7 %	2 66.7 %		2 66.75 %			- -	3 100%	2 66.7 %	2 66.7 %	2 66. 7%	3 100 %
Proteus	- -		2 100 %		2 100 %	2 100 %		2 100%			- -	2 100%		2 100 %	- -	2 100 %
Strep pneumonia	1 100 %	1 100 %	1 100 %	1 100%	1 100 %	- -	1 100%	1 100%	1 100%	1 100 %	- -	1 100%	1 100 %			
Strep viridians	19 59.4 %	32 100 %	30 93.8 %	31 96.9 %	32 100 %	32 100 %	32 100%	26 81.3%	32 100%	24 75%	14 43.8%	29 90.6 %	28 87.5 %			
MRSA	1 8.3%	12 100 %	11 91.7 %	9 75%	6 50%	10 83.3 %	- -	6 50%	12 100%	9 75%	6 50%	7 58.3 %	10 83.3 %			

Abbreviations: P-penicilline, V- vancomycin, G-gentamycin, E-erythromycin, Cot-cotrimoxazole, Mox-moxifloxacin, CEF-ceftriaxone, CIP-ciprofloxacin, LZ-linezolid, AZI-azithromycin, AMOX-CV- amoxicillin-clavulinic acid, AMI-amikacin, CLIN-clindamycin, TAZ- tazobactum, CEFI- cefixime, IMI-imipenem

IV. Discussion

Majority of the patients in the present study were between 31 and 49 years of age. A similar observation was seen in a study conducted by Perween N et al [3] where median age was 36 years and ageof the patients ranged from 14 to 70 years. Majority of the study subjects were between 20 and 40 years of age, which is very similar to present study.

Present study found that among subjects of acute conjunctivitis, male were 55% and female 45%. Similar result was observed in a study conducted by Perween N et al [3],where among 91 cases, male were 54% followed by 46% female. Our study found that conjunctivitis patients presented in the hospital were generally from rural (53%) as well as urban (47%). Another study byGumshi.T[4]found that rural (70%) patients with acute conjunctivitis were much higher than from urban (30%).

In our study, we found that conjunctivitispatients presented in the hospital were mostly unemployed (33%), followed by private employee (18%), house wife (14%), farmer (13%), government employee and businessman (11%). A study byGumshi.T[4] found that farmer (22.33%), employees (16.66%), business men and women (13.66%), house wives and children (47.33%).

In our study, we found that acute conjunctivitis patients presented in the hospital were mostly mild discharge (44%), followed by mucopurulent discharge (30%) and purulent discharge (26%). However, in study conducted byGumshi.T[4] observed that purulent discharge (28%), mucopurulent (17.5%) and inflamed conjunctiva with mild discharge (54.50%). Tarabishy AB and Jeng BH [5] conducted a study which showed that bacterial conjunctivitis is common and occurs in patients of all ages. Typical signs are red eye and purulent drainage that persists throughout the day which is similar to our study.

In our study, we found that majority were gram- positive bacteria (74%) followed by gram-negative bacteria (26%). This was similar to what was obtained by other authors Tesfaye T et al [6]. In their study, theyobserved that the gram-positive bacteria comprised 52.0% and gram-negative 48%. However, in anotherstudy byShiferaw B et al [7] among 160 patients with external ocular infections at Borumeda hospital, Northeast Ethiopia, gram-positive were found to be 93.7% and gram-negative 6.3%.

Our study found that 37% staphylococcus aureus presented among 100 patients which is the highest percentage among the isolate followed by 20% streptococcus viridians, 12% methicillin–resistance staphylococcus aureus, 9% klebsiella sp, 4% coagulase-negative staphylococcus, 3% pseudomonas aeruginosa, 2% E. coli and proteus and 1% streptococcus pyogens.

Mahajan VM [8] in his study on acute conjunctivitis, 543 outpatient department cases were examined where majority was Staphylococcus aureus 37.4%,Staphylococcus epidermidis 44.2%, Streptococcus pneumonia 8.75%, Pseudomonas aeruginosa 5.6%, Acinetobacter 2.1%, Coliforms 0.8%, mixed growth 0.8%.

Another study by Gumshi.T[4]conducted among 300 acute conjunctivitis cases showed that staph.aureus 16.5%, klebsiella 8.5%, ps.aerugenosa 3.5%, proteus 1% and st.viridans 1%. After correlating with other studies, it can be safely said that most common causative organism is staphylococcus aureus in acute bacterial conjunctivitis.

Present study shows that gram-positive bacteria (staphylococcus aureus, coagulase negative staphylococcus aureus, streptococcus pneumonia, streptococcus viridans, methicillin-resistant staph. Aureus) are sensitive to moxicillin, vancomycin, gentamycin, linezolid and resistant to penicillin whereas in some cases amoxicillin-clavulanic acid, ciprofloxacin, cotrimoxazole, cefoxitin are resistant. However, gram-negative bacteria are sensitive against gentamycin, cotrimoxazole, moxifloxacin, ciprofloxacin, amikacin, tazobactam and imipenem. Gram-negative bacteria are resistant to penicillin, vancomycin, erythromycin, ceftriaxone, linezolid, azithromycin, amoxicillin- clavulanic acid, clindamycin and cefixime.

Similar study, conducted bySeal DV et al [9] found that gentamycin remains the antibiotic of choice for Pseudomonasaeruginosa infection whereas, in our study, gentamycin is 100% sensitive to pseudomonas.

Again, Kowalski RP et al [10] in their study on antibiotic susceptibility found that staphylococcus aureus is sensitive to erythromycin, clindamycin, ampicillin, tetracycline, cefazoline, vancomycin. Streptococcus pneumonia is resistant to neomycin, gentamycin, tobramycin. Gram-negative bacteria are sensitive to erythromycin, gentamycin, neomycin, ofloxacin and resistant to tetracycline, erythromycin, penicillin. Same study shows that, methicillin-resistant staphylococcus aureus is sensitive to vancomycin, chloramphenicol, bacitracin, gentamycin, cefazolin and resistant to tobramycin, ciprofloxacin where as in our study we found that in the same organism is sensitive to vancomycin, gentamycin, erythromycin, linezolid and resistant to tazobactam, cefixime, imipenem and penicillin.

Abdullah FE et al [11]conducted a study in order to identify the etiological agent in bacterial conjunctivitis and to determine the antibiogram of bacterial isolates. Resistance profile of gram-positive isolates shows cefixime 91.4%, doxycycline 57.9%, cotrimoxazole 29.3%, ampicillin 22.9%, ciprofloxacin 13.4%, cephradine 8.3%, cefuroxime 7.1%, Fosfomycin 4.7%, ceftriaxone 3.6%, co-amoxiclav 3.6%, cefotaxime 3.5%, vancomycin 2.6%.

Adebayo A et al [12]conducted a study found that gram-positive isolates were least resistant to vancomycin, and gram-negative isolates were least resistant to imipenem. The lowest broad-spectrum antibiotic resistance was observed in the case of moxifloxacin, gatifloxacin, and aminoglycosides which is similar like our study.

Kim BL et al [13] did one retrospective study of the 113 cases of neonatal conjunctivitis. S.aureus was low sensitive to penicillin (14.6%), tetracycline (6.7%), and erythromycin(14.6%) and gram positive bacteria are highly resistant to erythromycin and tetracycline.

Giardini F et al [14] conducted a two years study and found that levofloxacin was highest susceptible for all bacterial isolates. Marangon FB et al[15] in their cross-sectional study and found that for MRSA gentamycin susceptibility was 86% and higher resistance was found for ciprofloxacin 95.7% whereas, in our study we found that for MRSA, gentamycin is sensitive 91.7% and ciprofloxacin is sensitive 50%.

Duggirala[16] et al in their study found that levofloxacin, gatifloxacin and moxifloxacin are statistically more effective against gram-positive bacteria, the latter two being equally effective.

Ciprofloxacin remains the most effective fluroquinolone against gram- negative bacteria. In our study, we found that gatifloxacin and moxifloxacin are most effective against gram-positive bacteria and ciprofloxacin is effective against gram-negative bacteria.

Stroman DW [17] et al in their study found that the fourth-generation fluroquinolones, such as moxifloxacin and gatifloxacin, have enhanced activity against gram-positive bacteria while in our study we found that moxifloxacin and gatifloxacin are sensitive against gram-positive bacteria.

V. Conclusion

The present study is a cross-sectional study which include 100 study subjects. Our study found that conjunctivitis patients presented in hospital were generally rural (53%) as well as urban (47%). In the present study, 37% staphylococcus aureus presented among 100 patients which is the highest percentage among the isolate followed by 20% streptococcus viridians, 12% methicillin-resistance staphylococcus aureus, 9% klebsiella sp, 4% coagulase-negative staphylococcus, 3% pseudomonas aeruginosa, 2% E.coli and proteus and 1% streptococcus pyogens. Present study shows that gram-positive bacteria (staphylococcus aureus, coagulase-negative staphylococcus aureus, streptococcuspneumonia, streptococcus viridans, methicillin-resistant staphylococcus aureus) are sensitive to moxicillin, vancomycin, gentamycin, linezolid and resistant to penicillin whereas in some cases amoxicillin-clavulanic acid, ciprofloxacin, cotrimoxazole, cefoxitin are resistant. However, gram-negative bacteria are sensitive against gentamycin, cotrimoxazole, moxifloxacin, ciprofloxacin, amikacin, tazobactam and imipenem. Gram-negative bacteria are resistant to penicillin, vancomycin, erythromycin, ceftriaxone, linezolid, azithromycin, amoxicillin- clavulanic acid, clindamycin and cefixime.
Therefore, this study helps in better understanding the patient profile, and hence helping us to spread awareness regarding prevention and cure. Also, this study gives us an idea regarding the most common organisms involved and their presentation, so as to help in decision making regarding the drug of choice keeping in mind the organism involved and the drug sensitivity of the organism.

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