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Analysis of conjunctival flora in diabetic and non-diabetic individuals and their antibiotic sensitivity pattern

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ABSTRACT

Aim: To compare the conjunctival flora of diabetic individuals and non-diabetic individuals and assess their antibiotic sensitivity pattern.
Materials and Methods: A hospital based cross-sectional and descriptive study was carried out from September 2016 to August 2018 with 92 patients of age group from 40-70 years, to assess the conjunctival flora and antibiotic sensitivity pattern in diabetic and non-diabetic individuals without any pre-existing ocular diseases and adnexal disease.
Result: The rate of positive culture in Group A (Diabetics) was significantly higher as compared to Group B (Non-Diabetics) (21.7% vs. 4.3% respectively) ($p<0.05$). It was noted that there was a significantly higher incidence of the bacteria, Staphylococcus epidermidis in Group A (Diabetics) as compared to Group B (Non-Diabetics) ($p<0.05$). The antibiotic sensitivity of bacteria isolated in patients in Group A (Diabetics) showed the following observations - in Staphylococcus epidermidis, Staphlococcusaureus maximum sensitivity was seen with Gentamicin.
Conclusion: A higher positive culture rate was seen in diabetic individuals as compared to non-diabetic individuals. It was then concluded that, as gentamicin shows maximum sensitivity to gram-posit ive and gram-negative organisms, Gentamicin is the drug of choice which takes cares of gram positive as well as gram negative bacteria and can be considered as routine pre-operative topical medication.
Pre-operative cataract work up.

1. Introduction

Considering the increase incidence of diabetes, every surgeon in India is dealing with the patient of diabetes for cataract. Every second patient is a diabetic (according to Diabetes Atlas 2006 published by the International Diabetes Federation, the number of people with diabetes in India is expected to rise to 69.9 million by 2025, and is currently around 40.9 million, thus urgent preventive steps are taken). Diabetes is a disorder which is prone for infection hence to operate any diabetic patient surgeon is under stress. So, to reduce that stress if we know floral status of conjunctiva with commensals as well as pathogen we have conducted this study.

2. Aim

To compare the conjunctival flora of diabetic individuals and non-diabetic individuals and assess their antibiotic sensitivity pattern.

3. Objectives

To isolate and identify the microorganisms from the conjunctival flora of diabetic and non-diabetic individuals. To compare whether the conjunctival flora is affected by the duration and control of diabetes and to compare the conjunctival flora in diabetic patients on oral hypoglycaemic drugs and tho se on insulin therapy and to decide a strategic

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plan for pre-operative medication.

4. Materials and Methods

A hospital based cross-sectional and descriptive study was carried out from September 2016 to Aug u st 2018 with 92 patients of age group from 40-70 years both diabetic and non diabetic patients without any pre-existing ocular diseases and without any adnexal disease like blepharitis, conjunctivitis or nasolacrimal duct obstruction to assess the conjunctival flora in diabetic and non-diabetic individuals and their antibiotic sensitivity pattern. Institute Ethics committee clearance was obtained before the start of study.

Prior to examination, written and informed consent was obtained from all participants. The patients were classified into the following two groups Group A (Diabetics) – 46 patients and Group B (Non-Diabetics)–46 patients. History was taken and all participants had undergone a thorough ophthalmic evaluation. Vision was evaluated using Snellen's chart, then examination of anterior segment by slit lamp and fundus examination was carried out. The specimen was taken from each participant for the study in front of the microbiologist by rubbing a sterile cotton-tipped swab on the inferior palpebral conjunctiva of both eyes. Local anaesthesia was used. The lower eyelid was pulled down in order to prevent contamination of the cotton swabs by the lid margins and eyelashes. Conjunctival samples were immediately in oculated. Incubation of the samples was done in blood agar, chocolate agar and Sabouraud dextrose agar. Cultures were incubated at 37 degrees centigrade for 24 hours on blood agar and chocolate agar. The Cultures were incubated at 25 degrees centigrade for two weeks on Sabouraud dextrose agar. Isolated microorganisms were identified using routine microbiological methods. Mueller-Hinton agar was used for antibiotic sensitivity testing. If the organism shows susceptibility to a particular antibiotic, it's growth will show inhibition around the disc. This is called zone of inhibition. When there is no such zone, the organism is considered resistant. Haemogram, BSL (Fasting, PP1, PP2), Glycosylated Haemoglobin [HbA1c], Urine (R& M). investigations were done.

5. Results

The mean glycolcylated haemoglobin (HbA1c) level of patients in Group A (Diabetics) and Group B (Non-Diabetics) was 5.40 ± 0.92% and 4.85 ± 0.22% respectively. The mean difference was statistically significant as per Student t-test ($p<0.05$). The rate of positive culture in Group A (Diabetics) was significantly higher ascompared to Group B (Non-Diabetics) (21.7% vs. 4.3% respectively). The difference was statistically significant as per Student t-test ($p<0.05$). The most common bacteria isolated in Group A (Diabetics) was Staphylococcus epidermidis (13.2%) followed by Staphylococcus aureus (6.6%) and Klebsiella (2.2%). The most common bacteria isolated in Group B (Non-Diabetics) was Staphylococcus epidermidis (2.2%) and Stap hylococcus aureus (2.2%). It was noticed that there was a significantly higher incidence of Staphylococcus epidermidis in Group A (Diabetics) as compared to Group B (Non-Diabetics) ($p<0.05$). The incidence of Staphylococcus epidermidis in the age group of 61-70 years was higher (8.8%) as compared to 40-50 years (2.2%) and 51-60 years (2.2%). It was also noticed that the incidence of Staphylococcus aureus in the age group of 61-70 years was higher (4.4%) as compared to 51-60 years (2.2%). The incidence of Klebsiella was seen in patient in the age group of 51-60 years. No significant association of bacterial isolates and age of patients in Group A (Diabetics) as per Chi-Square test ($p>0.05$) was seen. The incidence of Staphy lococcus epidermidis was noted to be equal in male and female patients (6.6%), where as, of Staphylococcus aureus was higher in male patients (4.4%) as compared to female patients (2.2%). The incidence of Staphy lococcus epidermidis was equal in patients with diabetes mellitus for 5-10 years and >10 years (6.6%). The incidence of Staphylococcus aureus and Klebsiella in patients with diabetes mellitus for 5-10 years was seen as (6.6%) and in >10 as (2.2%). Bacterial isolate was not seen in patients with diabetes mellitus for <5 years. No significant association between bacterial isolates and duration of diabetes mellitus of patients in Group A (Diabetics) as per Chi-Square test ($p>0.05$) was seen. The antibiotic sensitivity of bacteria isolated in patients in Group A (Diabetics) showed the following observations - in Staphylococcus epidermidis, maximum sensitivity was seen with Gentamicin (100%), Vancomycin (100%), Clindamycin (100%), Linezolid (100%) and Cotrimoxazole (100%) while resistance was seen with Ciprofloxacin (33.3%), Erythromycin (33.3%) and Oxacillin (33.3%). For Staphylococcus aureus, maximum sensitivity was seen with Linezolid (100%), Cotrimoxazole (100%) Gentamicin (100%), Vancomycin (100%) and Oxacillin (100%) while resistance was seen with Clindamycin (33.3%), Ciprofloxacin (33.3%) and Erythromycin (33.3%). The single incidence of Klebsiella showed sensitivity to Chloramphenicol, Norfloxacin, Amikacin, Gentamicin, Cefoxitin, Ceftazidime, Tazebactem and Imipenem and was resistant to Ampicillin, Cotrimoxazole, Cefotaxime and Clavulinic acid.

Diabetic patients are prone to develop eye infections such as blepharitis, conjunctivitis, keratitis, stye, chalazion and orbital cellulitis. It was found that these patients have an increased quantity of glucose present in their tears in comparison to non-diabetics which may be a factor in the development of ocular infections. Hence the present study was done at our tertiary care centre to assess the antibiotic sensitivity pattern of conjunctival bacterial flora in healthy individuals and diabetic patients.[1]

Due to constant blinking which clears the conjunctiva at regular intervals. The tears wash away any foreign bodies and bacteria. Bacteriostatic substances like lysozyme, IgA and IgG, lower temperature of conjunctiva because of evaporation of tears and moderate blood supply hamper the growth of bacteria. However, unchecked use of antibiotics lately has led to changes in the normal flora as well as pathogenic bacteria.[2] The microorganisms within the ocular flora interact with immune system, defense mechanisims and each other as well. Tears also act as an antimicrobial defense, by washing away pathogens by the mechanical action of the eyelids and also contain the enzyme lysozyme which has antimicrobial properties. This therefore results in preventing the overgrowth of a particular microorganism and infection.[1]

75–82% of conjunctival cultures have been found to be positive for at least one organism, using chocolate agar or blood agar plate, broth culture.

No difference was found in the ocular flora of diabetic patients with normal and altered HbA1c levels. In contrast, a US based study from 2010, previously referenced for the data on MRSA colonization in healthcare workers, found diabetic patients to be less likely to be colonized by MR organisms ($P = 0.02$). A study in Bangladesh, in 2014, showed 64% and 38% culture-positive rates for diabetic ($n = 50$) and non-diabetic ($n = 250$) patients respectively, with an additional observation of higher rates of S. aureus isolation in diabetic patients.[3]

Ocular microbiota revealed 12 genera that could be viewed as constituting the core of the conjunctival microbiome. These included Pseudomonas sp (20% of the detected genera), Propionibacterium (20%), Bradyrhizobium (16%), Corynebacteria (15%), Acinetobacter (12%), Brevundomonas (5%), Staphylococcus (4%), Aquabacterium (2%), Sphingomonas (1%), and Streptococcus (1%).[4]

The most common organism was found to be Coagulase-negative Staphylococcus (CONS) followed by S. aureus and Streptococcus out of 50 to 85% of the cultures taken from vitreous aspirate.[5]

The main causative agents of endophthalmitis in diabetic patients have been found as Gram-negative bacteria and coagula se-negative staphylococcus these are the part of normal flora of conjunctiva and eyelids[6,7]

Table 1: Comparison of mean Glycated Haemoglobin (HbA1c) lelvel between groups

Parameter	Group A (Diabetics)		Group B(Non-Diabetics)		
	Mean	SD	Mean	SD	P Value
HbA1c	5.40	0.92	4.85	0.22	P<0.05

Table 2: Distribution of patients according to Duration of DM in Group A (Diabetics)

Duration	Group A (Diabetics)	
		%
< 5 Years	36	78.3%
5-10 Years	7	15.2%
> 10 Years	3	6.5%
Total	46	100.0%

Table 3: Distribution of patients according to Treatment for DM in Group A (Diabetics)

Treatment	Group A (Diabetics)	
		%
Oral hypoglycaemics	40	86.90%
Insulin therapy	6	13.10%
Total	46	100%

5.1. Antibiotic resistance in ocular microorganisms

An experimental study was conducted on rabbits and it was found that endophthalmitis caused by resistant S. epidermidis caused more ocular tissue destruction and inflammation than non-resistant strains.[8] A nationwide US-based multicenter surveillance program, TRUST, was established in 1996, in which isolates are sent, from over 200 clinical laboratories to an independent central laboratory for in vitro susceptibility testing. A sub study was initiated in 2005, which was ocular-specific (Ocular TRUST1), looking to gather prospective data each year as well as to retrospectively analyze ophthalmic samples from previous years. The TRUST study specifically looks at three microorganisms — Haemophilus influenza, Staphylococcus aureus, Streptococcus pneumoniae S. aureus further being divided as methicillin-susceptible (MSSA) or methicillin-resistant (MRSA). A similar surveillance program, ARMOR[9] study, was specifically set up to monitor ocular pathogens across the United States. Initial results were published in 2011 (ARMOR 2009) and the study was based on isolates which were collected from 34 institutions in 2009, and subsequent data from 2009 through 2013 (ARMOR 2013) were published this year. The ARMOR study extends data collected for TRUST studies with analysis of Pseudomonas aeruginosa and CoNS.3237 isolates were analyzed in the ARMO R 2013 study and is the largest study of its kind till date.

Adam M et al[10] investigated aerobic bacteria in the conjunctival flora of diabetic patients in comparison with that of non-diabetic individuals and found that in the diabetic group there were 34 (64.15%) women and 19 (35.85%) men; in the control group there were 26 (60.45%) women and 17 (39.55%) men. The average age of the patients in the diabetic group was 53.94±9.24 years (range, 38-70 years) and in the control group was 55.23±10.97

Table 4: Comparison of Bacterial Isolates from conjunctival swab between groups

Bacterial Isolates	Group A (Diabetics)		Group B (Non-diabetics)		P Value
		%		%	
Staphylococcus epidermidis	6	13.20%	1	2.20%	p<0.05
Staphylococcus Aureus	3	6.60%	1	2.20%	p>0.05
Klebsiella	1	2.20%	0		p>0.05

Table 5: Association of Bacterial Isolates and Treatment of DM of patients in Group A (Diabetic)

Treatment	CONS		MSSA		Klebsiella		P Value
		%		%		%	
Oral hypoglycaemics	2	4.40%	3	6.60%	0	-	
insulin therapy	4	8.80%	0	-	1	2.20%	p>0.05
Total	6	13.2%	3	6.60%	1	2.20%	

Table 6: Antibiotic sensitivity of bacteria isolated in patients in Group A (Diabetic)

Bacteria Isolate	Genta micin	Vanco mycin	Linezolid	Contrimox azole	Clindamycin	Ciproflo xacin
CONS	6 (100%)	6 (100%)	6 (100%)	6 (100%)	6 (100%)	4 (66.7%)
MSSA	3 (100%)	3 (100%)	3 (100%)	3 (100%)	2 (66.7%)	2 (66.7%)
Klebsiella	-	-	-	-	-	-

Bacteria Isolate	Erythro mycin	Oxacilin	Chlor amph enicol	Norflo xacin	Amikacin	Cefoxitin
CONS	4 (66.7%)	4 (66.7%)	-	-	-	-
MSSA	2 (66.7%)	3 (100%)	-	-	-	-
Klebsiella	-	-	1 (100%)	1 (100%)	1 (100%)	1 (100%)

Table 7: Antibiotic sensitivityof bacteria isolated in patients in Group B (Non- Diabetics)

Bacteria Isolate	Gentamicin	Vancomycin	Linezolid	Cotrimoxazole	Clindamycin	Ciprofloxacin
CONS	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)
MSSA	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)	1 (100%)

years (range, 40-71 years). No noteable differences were observed between the two groups in terms of demographic characteristics (gender, p=0.71; age, p=0.89). Suresha K et al[11] compared the normal conjunctival flora of non diabetics with that of diabetics and antibiotic sensitivity pattern of the organisms identified was carried out. It was found that age demographics of the patients varied from 17-85 years. There were 49 male patients and 51 female patients. Suto C et al[12] study compared the isolates from the conjunctival sac before cataract surgery and the differences of isolates and resistance to antimicrobial agents was studied. It was found positive in 234 males (40.4%) and 345 females (59.6%). The range in age was from 51 to 100 years (mean ± standard deviation: 71.7 ± 9.5 years).

Hayashi Y et al[13] retrospective study compared isolates from the conjunctival sac bacterial flora prior to cataract surgery and identified differences of isolates and resistance to antimicrobial agents. They found 90 patients (3.3%; 83 eyes of 30 females and 42 eyes of 30 males) in a total of 3754 eyes of 2384 patients. The mean age of the subjects with duct obstruction was 79 ± 8.5 years.

In our study, the mean fasting blood sugar level of patients in Group A (Diabetics) and Group B (Non-Diabetics) was 100.48 ± 20.68mg/dl and 86.93 ± 4.72mg/dl respectively. The mean difference was statistically significant as per Student t-test ($p<0.05$). The mean glycocylated haemoglobin (HbA1c) level of patients in Group A (Diabetics) and Group B (Non-Diabetics) was 5.40 ± 0.92% and 4.85 ± 0.22% respectively. The mean difference, as per Student t-test, was statistically significant ($p<0.05$). The duration of diabetes mellitus in majority of patients in Group A (Diabetics) (78.3%) was <5 years while 7 (15.2%) and 3 (6.5%) patients had diabetes was 5-10 years and >10 years respectively. 40 (86.9%) patients in Group A (Diabetics) were on oral hypoglycaemics while 6 (13.1%) patients were on insulin therapy for treatment of diabetes mellitus. Adam M et al[10] study investigating the aerobic bacterial conjunctival flora in diabetic patients and comparing it to non-diabetics reported that in the diabetic group,[3] 83 % individuals were on an oral anti-diabetic and

17% were on insulin. The mean duration of diabetes was 7.81±5.77 years (range, 1-20 years). Diabetic retinopathy (DR) was seen in 12 patients (22.6%).

It was observed in our present study that the rate of positive culture in Group A (Diabetics) was significantly higher as compared to Group B (Non -Diabetics) (21.7% vs. 4.3% respectively). The difference was statistically significant as per Student t-test ($p<0.05$). This is comparable to the studies of Adam M et al,[10] Suresha K et al,[11] Suto C et al[12] and Hayashi Y et al.[13] Suresha K et al[11] comparative study comparing the normal conjunctival flora of non-diabetics with that of diabetics and identifying the organisms from the conjunctival flora and their antibiotic sensitivity pattern reported total positive cultures in 148 from 100 patients (diabetic=72 and non-diabetics=74). 20 patients had negative cultures. Adam M et al[10] study investigating the aerobic bacterial conjunctival flora in diabetic patients and comparing it to non-diabetics reported growth in 38.5% of diabetics and 34.9% of non-diabetic individuals. Suto C et al[12] study comparing isolates from the conjunctival sac bacterial flora prior to cataract surgery and identifying differences of isolates and resistance to antimicrobial agents reported bacteria were isolated from 227 (39.2%) of the 579 eyes. Out of these, one isolate was found in 179 eyes (78.9%), 2 isolates were found in 39 eyes (17.2%), 3 isolates were found in 8 eyes (3.5%), and 4 isolates were found in one eye (0.4%). Hayashi Y et al[13] retrospective study comparing isolates from the conjunctival sac bacterial flora prior to cataract surgery and identifying differences of isolates and resistance to antimicrobial agents reported microbial growth from the swab samples in 56 of 125 subjects from 90 patients at the initial bacterial culturing (44.8%).

The most common bacteria isolated in Group A (Diabetics) of our study was Staphylococcus epidermidis (13.2%) followed by Staphylococcus aureus (6.6%) and Klebsiella (2.2%) and in Group B (Non-Diabetics) was Staphylococcus epidermidis (2.2%) and Staphylococcus aureus (2.2%). There was significantly higher incidence of Staphylococcus epidermidis in Group A (Diabetics) as compared to Group B (Non-Diabetics) ($p<0.05$). This is concordant to the studies of Suto C et al[12] and Hayashi Y et al.[13] Suto C et al[12] study comparing isolates from the conjunctival sac bacterial flora prior to cataract surgery and identifying differences of isolates and resistance to antimicrobial agents reported Gram-positive cocci (191 strains), accounting for 67% of all isolates, (44.5%) of methicillin-sensitive coagulase negative staphylococci (127 strains), (12.7%) of methicillin resistant coagulase-negative staphylococci (37 strains), (2.9%) of methicillin-sensitive Staphylococcus aureus (8 strains), (1%) of methicillin-resistant S. Aureus (3 strains). Out of 76 isolates of Gram-positive bacilli (26.7%), all belonged to genus Corynebacterium. Only one Gram-negative coccus (0.4%), Moraxella catarrhalis was isolated. 16 Gram-negative bacillary isolates were seen (5.9%), including three isolates of Escherichia coli (1.0%); two isolates (0.7%) each of Pseudomonas aeruginosa, Acinetobacter spp, and nonglucose -fermenting bacteria; and one isolate (0.4%) each of Proteus vulgaris, Proteus mirabilis, Enterobacter aerogenes, Serratiamarcescens, Klebsiellaoxytoca, and Alcaligenes spp. Hayashi Y et al[13] retrospective study comparing isolates from the conjunctival sac bacterial flora prior to cataract surgery and identifying differences of isolates and resistance to antimicrobial agents reported reported percentages as follows: Gram-positive cocci (64%), Gram-positive rods(24%), Gram-negative bacilli (11%), and fungi (1%). Among 125 eyes with positive results for bacteria, coagulase-negative Staphylococcus (CNS) was found in 28 eyes, Corynebacterium species was found in 17 eyes, and S. aureus was found in 7 eyes. Methicillin-resistant S. aureus (MRSA) was found in two of seven eyes with S. aureus.

In our study, the association of Bacterial Isolates and Age of patients in Group A (Diabetics) showed that the incidence of Staphylococcus epidermidis was higher in the age group of 61-70 years (8.8%) as compared to 40-50 years (2.2%) and 51-60 years (2.2%). Also the incidence of Staphylococcus aureus was higher in the age group of 61-70 years (4.4%) as compared to 51-60 years (2.2%). The incidence of Klebsiella was seen in patient in the age group of 51-60 years. There was no significant association of bacterial isolates and age of patients in Group A (Diabetics) as per Chi-Square test ($p>0.05$). The association of Bacterial Isolates and Sex of patients in Group A (Diabetics) showed that the incidence of Staphylococcus epidermidis was present equally in male and female patients (6.6%). The incidence of Staphylococcus aureus was higher in male patients as compared to female patients (4.4% vs. 2.2%). The incidence of Klebsiella was seen in a female patient. There was no significant association of bacterial isolates and sex of patients in Group A (Diabetics) as per Chi-Square test ($p>0.05$). The association of Bacterial Isolates and Duration of Diabetes Mellitus (DM) of patients in Group A (Diabetics) showed that the incidence of Staphylococcus epidermidis was present equally in patients with diabetes mellitus for 5-10 years and >10 years (6.6%). The incidence of Staphylococcus aureus and Klebsiella was seen in patients with diabetes mellitus for 5-10 years (6.6% and 2.2% respectively). No bacterial isolate was seen in patients with diabetes mellitus for <5 years. There was no significant association of bacterial isolates and duration of diabetes mellitus of patients in Group A (Diabetics) as per Chi-Square test ($p>0.05$).

The association of Bacterial Isolates and Treatment of Diabetes Mellitus (DM) of patients in Group A (Diabetics) showed that the incidence of Staphylococcus epidermidis was higher in patients on insulin therapy as compared to oral hypoglycaemics (8.8% vs. 4.4%). All the incidence of Staphylococcus aureus was seen in patients on oral hypoglycaemics (6.6%). The incidence of Klebsiella was seen in patient on insulin therapy (2.2%). There was no significant association of bacterial isolates and treatment of diabetes mellitus of patients in Group A (Diabetics) as per Chi-Square test (p>0.05). These findings were consistent with the studies of Suto C et al,[12] Adam M et al[10] and Suresha K et al.[11] Adam M et al[10] study investigated the aerobic bacterial conjunctival flora in diabetic patients and compared it with that of non-diabetics and it was found that the bacteria found in cultures from the nondiabetic group was Staphylococcus aureus (gram-positive cocci) in 8 cultures (53.3%); coagulase-negative Staphylococci (CONS, gram positive cocci) in 4 cultures (26.7%); Klebsiella pneumonia (gram-negative bacilli) in 1 culture (6.7%) and more than one species of bacterium in 2 cultures (13.3%). In the diabetic group, 6 cultures identified Sta phylococcus aureus (30%); Escherichia coli (gram-negative bacilli) in 4 cultures (20%); CNS in 2 cultures (10%); Klebsiella pneumoniae in 2 cultures (10%); and more than one species of bacterium in 6 cultures (30%). There was no difference between the diabetic and non-diabetic groups in the ratio of positive cultures (chi-square=0.129, p=0.719), but gram-negative bacteria were more common in diabetics than in non-diabetics. Suresha K et al[11] comparative study comparing the normal conjunctival flora of non-diabetics with that of diabetics and identifying the organisms from the conjunctival flora and their antibiotic sensitivity pattern reported most common organism isolated was Staphylococcus aureus in the diabetic group (40.2%) as well as in the non-diabetic group (58.1%). Diphtheroids were more commonly isolated in the diabetic group (18%). The gram negative bacilli were very few in number, EnterobacterSp (69.9%) being the most common in the diabetic group.

In the present study, the antibiotic sensitivity of bacteria isolated in patients in Group A (Diabetics) showed the following observations - in Staphylococcus epidermidis, maximum sensitivity was seen with Linezolid (100%), Cotrimoxazole (100%), Gentamicin (100%), Vancomycin (100%), and Clindamycin (100%) while resistance was seen with Ciprofloxacin (33.3%), Erythromycin (33.3%) and Oxacillin (33.3%). In Staphylococcus aureus, maximum sensitivity was seen with Linezolid (100%), Cotrimoxazole (100%), Gentamicin (100%), Vancomycin (100%) and Oxacillin (100%) while resistance was seen with Clindamycin (33.3%), Ciprofloxacin (33.3%) and Erythromycin (33.3%). The single incidence of Klebsiella showed sensitivity to Chloramphenicol, Norfloxacin, Amikacin, Gentamicin, Cefoxitin, Ceftazidime, Tazebactem and Imipenem and was resistant to Ampicillin, Cotrimoxazole, Cefotaxime and Clavulinic acid.

In our study, the antibiotic sensitivity of bacteria isolated in patients in Group B (Non-Diabetics) showed the following observations - in Staphylococcus epidermidis and Staphylococcus aureus, maximum sensitivity was seen with Gentamicin (100%), Cotrimoxazole (100%), Clindamycin (100%), Ciprofloxacin (100%), Vancomycin (100%), Linezolid (100%), Erythromycin (100%) and Oxacillin (100%). Similar observations were noted in the studies of Adam M et al,[10] Suto C et al[12] and Suresha K et al.[11] Adam M et al[10] study investigating the aerobic bacterial conjunctival flora in diabetic patients and comparing it with non-diabetics reported positive culture ratio (33.3%) in patients having proliferative diabetic retinopathy (PDR) and 55.6% in patients on insulin therapy; however, both groups did not show a significant difference from the control group in the frequency of positive cultures. There was no correlation between diabetes duration and positive cultures. Suresha K et al[11] comparative study comparing the normal conjunctival flora of non- diabetics with that of diabetics and identifying the organisms from the conjunctival flora and their antibiotic sensitivity pattern reported that among gram positive cocci, Erythromycin (38%) showed maximum resistance among the diabetic group. In the non diabetic group (30%), maximum resistance was seen with Ampicillin. Among the gram negative bacilli, Ampicillin showed maxim um resistance in both groups (56%). Klebsiella showed intrinsic resistance to Ampicillin.

6. Conclusion

A higher positive culture rate was seen in diabetic individuals as compared to non-diabetic individuals. Higher fasting blood sugar levels and higher glycosylated haemoglobin levels to be significant factors in diabetics. Diabetic individuals are at a higher risk of developing postoperative endophthalmitis and other ocular infections as they are more prone to have a positive culture rate of microorganisms. Significant factors are higher blood sugar levels and higher glycated haemoglobin levels.

Gentamicin shows maximum sensitivity to gram-positive and gram-negative organisms alike and can be considered as a routine pre-operative topical medication. We can deduce from this study that for preoperative antibiotic treatment, Gentamicin is the drug of choice which takes cares of gram positive as well as gram negative bacteria.

Hence, this study implies that pre-operative antibiotic medication is helpful to prevent post operative grievous complications like endophthalmitis and aid in better visual recovery for elderly diabetic patients.

7. Source of Funding

None.

8. Conflict of Interest

None.

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