EXTERNAL EYE INFECTIONS AND PERSONAL HYGIENE PRACTICES AMONG PATIENTS ATTENDING OPTOMETRY TEACHING CLINIC FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI.

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Abstract

External eye infections occur when harmful microorganisms such as bacteria, fungi, protozoan and viruses invade any part of the anterior outer part of the eyeball. This study was carried out to between January 2016 and December 2016 to investigate the external eye infections and personal hygiene practices among patients attending Optometry Teaching Clinic at Federal University of Technology, Owerri, Nigeria. A total of 217 patients with external eye infections who came to the clinic during this period were used for this study. A well-structured questionnaire was used to obtain information on their personal hygiene practices. Swabs collected from the infected eyes were taken to the laboratory for isolation and identification of causative organisms. Ocular examination results showed that bacterial conjunctivitis was the most prevalent external eye infection and was seen in146 (67.28%) patients. Information on hygiene practices showed that 29 (13.36%) of the patients wash their hands with soap and water before eating and 42 (19.35%) wash their hands with soap and water after toilet use. Laboratory results showed that the major causative organism was *Staphylococcus aureus*, isolated in 91 (41.94%) samples. Statistical analysis showed that there was no significant difference in both the gender variations ($P > 0.05$) and age variations ($P > 0.05$) of pathogenic organisms implicated in the external eye infections. Optometrists should educate their patients on the need for good personal hygiene as this will help in preventing external eye infections which can occur from contaminated fingers that come in contact with the eyes.

Keywords: External eye infections, Personal hygiene, Microorganisms, Hand washing

Introduction

Infections are one of the most sight threatening conditions if not treated. Bacteria are the most common pathogens and are involved in infections of all the tissues of the eye. The most frequently affected parts of the eye include the conjunctiva, eyelid and cornea[1]. Bacterial infections of the eyes are usually caused by some predisposing factors such as trauma, poor hygiene, previous surgery, ocular adnexal dysfunction and immune suppression which may alter the defence mechanisms of the external ocular structure and permit bacteria to spread[2]. Infections of the conjunctiva can spread over the cornea causing dryness which will damage the corneal surface[3]. Conjunctivitis, an inflammation of

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the conjunctiva may be bacterial, viral or chlamydial and is a common cause of unilateral or bilateral infected red eyes[4]. Bacterial conjunctivitis, usually caused by *Staphylococcus aureus*, is more common in children. The signs and symptoms include sticky, purulent discharge, foreign body sensation, and peripheral conjunctival redness[4]. The visual acuity is usually unaffected unless there is corneal complication. Bilateral purulent discharge in the newborn requires urgent referral as this may indicate infection with *Neisseria Gonorrhoeae* or possibly *Chlamydia*. *Neisseria Gonorrhoeae* infection may result in loss of sight if treatment is delayed[5]. Viral conjunctivitis is bilateral and more contagious with redness developing acutely in one eye first, followed some days later in the second eye. Signs include serous discharge, tarsal follicles, swollen lids and tender pre-auricular nodes[5]. Other viral infections include herpes simplex, varicella zoster and molluscum contagiosum.

Blepharitis, an inflammation of the eyelids tends to run a chronic course and may occur together with conjunctivitis because the structures involved are anatomically joined[6]. *Staphylococci* species are common pathogens. Signs and symptoms are red, crusty lid margins, mild lid swelling, itchiness, dry sensation and occasional lacrimation[6]. Vision is normal unless the cornea becomes involved.

Personal hygiene may be described as the principle of maintaining cleanliness and grooming of the external body[7]. Personal hygiene habits such as hand washing will protect the body from bacteria, viruses, and illnesses[8]. Poor personal hygiene practices can lead to contamination with microorganisms. These microorganisms can cause ocular infections when they get in contact with the eye. This can occur when cloths or towels used to wipe the face or eyes of an infected person are used to wipe the eyes of an uninfected person[9],[10]. Viral and bacterial conjunctivitis are very contagious and can spread easily from person to person. According to the Center for Disease Control and Prevention[5], people around someone with bacterial conjunctivitis can limit the spread of infection by washing their hands regularly with soap and warm water especially after contact with an infected person, not sharing items used by an infected person such as pillows, washcloths, towels, eye drops, eye makeup, makeup brushes, contact lenses, contact lens storage case, or eye glasses and by avoiding touching the eyes with unwashed hands. Flies are vectors that can carry microorganisms to the eyes of an uninfected person. This is one of the modes of transmission of *Chlamydia* Trachomatis, the causative organism of trachoma[11]. The flies are attracted to purulent discharges from an infected eye and the discharges may contain the infective organism which can be transmitted to the eyes of another person. Unwashed fingers, nasal discharges, exposed feces and rubbish lying in open places will attract flies which will carry the infective organism to infect an uninfected person[12]. Poor environmental sanitation and overcrowded living conditions will predispose people to infections. It is very important to improve both personal hygiene within families and also environmental sanitation. This study covers the personal hygiene practices as well as the sanitation and living conditions of patients with external eye infections.

Materials and Methods

This study was a longitudinal cross sectional analytic study involving 217 patients out of 254 patients with external eye infections who attended Optometry Teaching Clinic, Federal University of Technology, Owerri between January 2016 and December 2016. The patients who satisfied the inclusion and exclusion criteria were used for the study. These are patients of both genders between 1 and 90 years who are not on medication for any infection, patients who are not mentally sick and who gave an informed consent.

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For patients below 18 years, an informed consent was obtained from their parents. Examination of patients included case history, visual acuity, ophthalmoscopy, pen light examination and slit lamp biomicroscopy. Patients with external eye infections were interviewed with a well-structured questionnaire to ascertain their personal hygiene practices and swabs were taken from the sites of infection with sterile swab-sticks to the laboratory to determine the causative organisms. Ethical clearance for this study was obtained from the ethical committee of the School of Health Technology, Federal University of Technology, Owerri.

Preparation of media and diluents

All bacteriological media (Nutrient agar, Salmonella Shigella Agar, Mannitol Salt Agar, Eosin Methylene Blue Agar, Sabouraud Agar and MacConkey Agar) were prepared according to manufacturer's specification. Nutrient agar was used in the isolation of heterotrophic bacteria, MacConkey Agar for faecal coliform bacteria, Eosin Methylene Blue Agar for *Escherichia coli*, Mannitol Salt Agar strictly for *Staphylococcus aureus* and Salmonella Shigella Agar for the isolation of *Salmonella* and *Shigella* species.

Characterization and Identification of Microbial Isolates

Microbial isolates were characterized based on colonial, microscopic and biochemical methods. Microorganisms that were not identified by the colonial and microscopic characteristics were further subjected to few biochemical tests. This included catalase test, coagulase test, oxidase test, and indole test.

Catalase Test

The enzyme catalase is present in most cytochrome containing aerobic and facultative anaerobic bacteria. Catalase has one of the highest turnover numbers of all enzymes such that one molecule of catalase can convert millions of molecules of hydrogen peroxide to water and oxygen in a second. Catalase activity can be detected by adding the substrate H_2O_2 to an appropriately incubated (18-24 hours) tryptic soy agar slant culture. Organisms which produce the enzyme breakdown the hydrogen and the resulting O_2 production produces bubbles in the reagent drop indicating a positive test. Organisms lacking the cytochrome system also lack the catalase enzyme and are unable to breakdown peroxide into O_2 and water and are catalase negative.

Coagulase Test

Coagulase is an enzyme that clots blood plasma by a mechanism that is similar to normal clotting. The coagulase test identifies whether an organism produces this exoenzyme. This enzyme clots the plasma component of blood. The only significant disease causing bacteria of humans that produce coagulase are *Staphylococcus aureus*. Thus this enzyme is a good indicator of *S. aureus*. In the test, the sample is added to rabbit plasma and held at 37^{o}C for a specified period of time. Formation of clot within four hours is indicated as positive result and indicative of a virulent *Staphylococcus aureus* strain. The absence of coagulation after 24 hours of incubation is a negative result indicative of an avirulent strain.

Oxidase Test

Oxidase test is an important differential procedure that should be performed on all gram negative bacteria for their rapid identification. The test depends on the ability of certain bacteria to produce indophenol blue from the oxidation of dimethyl-p-phenylenediamine and α-naphthol. This method uses N, N-dimethyl-p-phenylenediamine oxalate in which all Staphlococci are oxidase negative. In the presence of the enzyme cytochrome oxidase (gram negative bacteria) the N, N-dimethhyl-p-phenylenediamine oxalate and α-naphthol react to indophenol blue. Pseudomonas aeruginosa is an oxidase positive organism.

Indole Test

This test demonstrates the ability of certain bacteria to decompose the amino acid-Tryptophan to Indole. The bacteria isolates were inoculated into the

medium and incubated at 37°C for 48 hours. At the end of incubation period, 3 drops of kovac's reagent was added and then shaken. A red color ring at the interface of the medium denotes a positive result.

Results

A total of 217 patients comprising 84 (38.71%) males and 133 (61.29%) females with external eye infections were used for this study. Their ages ranged from 1 to 81 years with a mean age of 36.74±19.66 (males, 39.48±20.27; females, 35.01±19.15) years. Results showed that bacterial conjunctivitis was the external eye infection with the highest frequency with 146 (67.28%). Fungal conjunctivitis was of the lowest frequency with 2 (0.92%). Corneal ulcer was 15 (6.91%); bacterial keratitis, 32 (14.75%); hordeolum, 10 (4.61%); and blepharitis, 12 (5.53%). This is shown in Table 1. The gender distribution of external eye infections showed that bacterial conjunctivitis was 58 (26.73%) patients for males and 88 (40.55%) for females; corneal ulcer, 6 (2.76%) for males and 9 (4.15%) for females; bacterial keratitis, 11 (5.07%) patients for males and 21 (9.68%) for females; hordeolum, 4 (1.85%) patients for males and 6 (2.76%) for females; fungal conjunctivitis, 0 (0.00%) patients for males and 2 (0.92%) for females; and blepharitis, 5 (2.30%) for males and 7 (3.23%) for females. Table 2 showed the age distribution of external eye infections. Among the age group of 1 to 30, bacterial conjunctivitis was of the highest frequency with 49 (22.59%). Corneal ulcer was 4 (1.84%); bacterial keratitis, 7 (3.23%); hordeolum, 4 (1.84%); Blepharitis, 3 (1.38%). Bacterial conjunctivitis was of the highest frequency among the 31 to 60 age group with 78 (35.94%). Corneal ulcer was 8 (3.69%); bacterial keratitis, 23 (10.60%); hordeolum, 6 (2.76%); fungal conjunctivitis, 2 (0.92%); and blepharitis, 8 (3.69%). Bacterial conjunctivitis also had the highest frequency among patients 61 to 90 years with 19 (8.76%). Corneal ulcer was 3 (1.38%); bacterial keratitis, 2 (0.92%); blepharitis, 1 (0.46%).

Information obtained from the questionnaires on personal hygiene practices of the patients showed that when interviewed on hand washing practices, 29 (13.36%) of the patients responded "Yes" to washing of hands with soap and water before eating; 124 (57.14%) said "Yes" to washing of hands with soap and water after eating; 42 (19.35%) responded "Yes" to washing of hands with soap and water after toilet use; and 12 (5.53%) said "Yes" to sharing of hand towels (Table 3). When the patients were interviewed on their knowledge and awareness on causes of ocular infections, 178 (82.03%) of the patients responded "Yes" to knowing that microorganisms are present in a dirty environment; 155 (71.43%) said "Yes" to knowing that microorganisms are present in dirty clothing; 82 (37.79%) responded "Yes" to knowing that contact with microorganisms can cause eye infections; and 44 (20.28%) said "Yes" to having received an education on ocular hygiene. Table 4 showed the frequency of hand towel washing among the patients. None of the patients washed their hand towels daily; 68 (31.34%) washed them weekly; 125 (31.34%) washed them every 2 weeks; 20 (9.22%) washed them monthly and 4 (1.84%) rarely washed their towels. Information on environmental sanitation showed that 61 (28.11%) of the patients complained of household waste always littered in their compound; 36 (16.59%) complained of drainage; 80 (36.87%) complained of general uncleanliness; while 55 (25.35%) reported that there were no sanitation problems in their compound. On their response to frequency of room cleaning, 37 (17.05%) of the patients said that on the average, they clean their room daily; 131 (60.37%) said weekly; 40 (18.43%), every 2 weeks; and 9 (4.15%) reported that on the average, they clean their room once a month. Their response to room sharing showed that 12 (5.53%) of the patients said that they were staying alone in their room; 26 (11.98%) said they were 2 sharing a room; 48 (22.12%) said they were 3 in a room; 67 (30.87%) said they were 4 in a room; 30 (13.82%) said they were 5 in a room; and 34 (15.68%) said they were more than 5 sharing one bedroom.

Laboratory analysis of swab samples (Table 5) showed that *Staphylococcus Aureus* had the highest frequency of 91 (41.94%). The lowest frequency was *Neisseria Gonorrhoeae* and *Candida Albicans* with 2 (0.92%) each. *Pseudomonas Aeruginosa* was seen in 22 (10.14%) of the samples; *Staphylococcus Epidermidis,* 42 (19.35%); Klebsiella Species, 8 (3.69%); *Streptococcus Pneumoniae*, 6 (2.76%); *Haemophilus Influenzae*, 3 (1.38%); *Corynebacterium Xerosis*, 7 (3.22%);

Escherichia Coli, 11 (5.07%); Proteus Species, 7 (3.22%); Aspergillus Flavus, 5 (2.30%); and Fusarium Species, 3 (1.38%). The Table also showed the gender distribution of microorganisms. Table 6 showed the age distribution of microorganisms among the patients. Staphylococcus Aureus had the highest frequency in all the age groups with 32 (14.75%) among the 1 to 30 age group; 43 (19.82%) for the 31 to 60 age group; and 16 (7.37%) for 61 to 90age group. Statistical analysis with the SPSS version 21 software using the independent sample T-Test at 0.05 level of significance and 95% confidence interval showed that there was no significant difference [P (0.378) > 0.05] in the gender variations of pathogenic organisms implicated in external eye infections (Table 7). SPSS data analysis using the one way ANOVA at 0.05 level of significance and 95% confidence interval also showed no significant difference [P (0.456) > 0.05] in age variations of pathogenic organisms implicated in external eye infections (Table 8).

Table 1
Gender Distribution of External Eye infections among patients

Infection	Total Frequency (n %)	Male Frequency (n %)	Female Frequency (n %)
Bacterial Conjunctivitis	146(67.28)	58(26.73)	88(40.55)
Corneal Ulcer	15(6.91)	6(2.76)	9(4.15)
Bacterial Keratitis	32(14.75)	11(5.07)	21(9.68)
Hordeolum	10(4.61)	4(1.85)	6(2.76)
Fungal Conjunctivitis	2(0.92)	0(0.00)	2(0.92)
Blepharitis	12(5.53)	5(2.30)	7(3.23)
Total	**217(100.00)**	**84(38.71)**	**133(61.29)**

Table 2
Age Distribution of External Eye infections among patients

Infection	1-30 Age Group Frequency (n %)	31-60 Age Group Frequency (n %)	61-90 Age Group Frequency (n %)
Bacterial Conjunctivitis	49(22.59)	78(35.94)	19(8.76)
Corneal Ulcer	4(1.84)	8(3.69)	3(1.38)
Bacterial Keratitis	7(3.23)	23(10.60)	2(0.92)
Hordeolum	4(1.84)	6(2.76)	0(0.00)
Fungal Conjunctivitis	0(0.00)	2(0.92)	0(0.00)
Blepharitis	3(1.38)	8(3.69)	1(0.46)
Total	**67(30.88)**	**125(57.60)**	**25(11.52)**

Table 3
Information on hand washing, knowledge and awareness

Hand Washing Information	Yes Frequency (n %)		No Frequency (n %)	
Hand washing with soap and water before eating	29	13.36	188	86.64
Hand washing with soap and water after eating	124	57.14	93	42.86
Hand washing with soap and water after toilet use	42	19.35	175	80.65
Sharing of hand towel	12	5.53	205	94.47
Knowledge and Awareness				
Presence of microorganisms in dirty environment	178	82.03	39	17.97
Presence of microorganisms in dirty clothing	155	71.43	62	28.57
Contact with microorganisms can cause eye infections	82	37.79	135	62.21
Education on ocular hygiene	44	20.28	173	79.72

Table 4
Hygiene information on the patients

Hand Towel Washing	Frequency (n)	(n %)
Daily	0	0.00
Weekly	68	31.34
Every Fortnight	125	57.60
Monthly	20	9.22
Rarely	4	1.84
Total	**217**	**100.00**
Sanitation Problem		
Household waste	61	28.11
Drainage	36	16.59
General uncleanliness	80	36.87
No problem	55	25.35
Room Cleaning Frequency		
Daily	37	17.05
Weekly	131	60.37
Every Fortnight	40	18.43
Monthly	9	4.15
Total	**17**	**100**
Number sharing a room		
1	12	5.53
2	26	11.98
3	48	22.12
4	67	30.87
5	30	13.82
Above 5	34	15.68
Total	**217**	**100**

Table 5
Gender distribution of microorganisms among patients

Microorganisms	Total Frequency (n %)	Male Frequency (n %)	Female Frequency (n %)
Staphylococcus Aureus	91(41.94)	36(16.59)	55(25.35)
Staphylococcus Epidermidis	42(19.35)	14(6.45)	28(12.90)
Pseudomonas Aeruginosa	22(10.14)	9(4.15)	13(5.99)
Klebsiella Species	8(3.69)	3(1.38)	5(2.30)
Streptococcus Pneumoniae	6(2.76)	3(1.38)	3(1.38)
Corynebacterium Xerosis	7(3.22)	3(1.38)	4(1.84)
Haemophilus influenza	3(1.38)	1(0.46)	2(0.92)
Neisseria Gonorrhoeae	2(0.92)	2(0.92)	0(0.00)
Proteus Species	7(3.22)	2(0.92)	5(2.30)
Escherichia Coli	11(5.07)	4(1.84)	7(3.22)
Aspergillus Flavus	5(2.30)	1(0.46)	4(1.84)
Fusarium Species	3(1.38)	1(0.46)	2(0.92)
Candida Albicans	2(0.92)	0(0.00)	2(0.92)

Table 6
Age distribution of microorganisms among patients

Microorganisms	1 – 30 Age Group Frequency (n %)	31 – 60 Age Group Frequency (n %)	61 -90 Age Group Frequency (n %)
Staphylococcus Aureus	*32(14.75)*	*43(19.82)*	*16(7.37)*
Staphylococcus Epidermidis	*16(7.37)*	*21(9.68)*	*5(2.30)*
Pseudomonas Aeruginosa	*7(3.22)*	*13(5.99)*	*2(0.92)*
Klebsiella Species	*3(1.38)*	*5(2.30)*	*2(0.92)*
Streptococcus Pneumoniae	*1(0.46)*	*4(1.84)*	*0(0.00)*
Corynebacterium Xerosis	*2(0.92)*	*4(1.84)*	*1(0.46)*
Haemophilus influenza	*0(0.00)*	*3(1.38)*	*1(0.46)*
Neisseria Gonorrhoeae	*2(0.92)*	*0(0.00)*	*0(0.00)*
Proteus Species	*2(0.92)*	*4(1.84)*	*0(0.00)*
Escherichia Coli	*3(1.38)*	*6(2.76)*	*1(0.46)*
Aspergillus Flavus	*1(0.46)*	*4(1.84)*	*0(0.00)*
Fusarium Species	*1(0.46)*	*2(0.92)*	*0(0.00)*
Candida Albicans	*0(0.00)*	*1(0.46)*	*1(0.46)*

Table 7
Gender variations of pathogenic organisms implicated in external eye infections

F-value	P-value	t-value	Degree of freedom	Mean Difference	Std. Error Difference
0.779	0.378	-0.460	196	-0.164	0.357

Table 8
Age variations of pathogenic organisms implicated in external eye infections

Source of Variation	Sum of Squares	Degree of freedom	Mean Square	F-value	P-value
Between groups	13.425	2	6.713	0.786	0.456

Discussion

Bacterial conjunctivitis was the most prevalent external eye infection found in 67.28% of patients in this study. Esenwah, *et al*.[13] carried out a similar study in Northern Nigeria and also found bacterial conjunctivitis to be the most prevalent external eye infection among the patients studied. If not properly treated, this infection could extend to other tissues of the eye including the cornea, eyelid and sclera. Iwuagwu[14], in a review paper reported *Staphylococcus aureus* as the major cause of bacterial conjunctivitis. The bacterium can be contacted from dirty surroundings or contact with an infected person.

Bacterial infection of the cornea causes bacterial keratitis and corneal ulcer. These infections were also found among the patients in our study. A corneal ulcer can cause a significant reduction in vision and can lead to total blindness. Corneal ulcer has been reported by Iwuagwu and Ngumah[15] as one of the causes of poor visual acuity among patients. In another study in Southeast Nigeria, a prevalence of 1.35% of cornea opacity was reported among the major causes of low vision and blindness[16]. The extent and position of the opacity usually determines the extent of vision loss. Blepharitis, which is an inflammation of the eyelid is another external eye infection found in 5.53% of the patients in this study. Onu, et al.[17] reported blepharitis among the prevalent eyelid disorders among geriatrics in Southeast Nigeria with 3.04%. The infection could be ulcerative or seborrheic. Antibiotic ointments are needed for effective treatment. Abdalla, et al.[18] studied cases of ulcerative blepharitis and seborrheic blepharitis. They implicated Staphylococcus aureus and Staphylococcus epidermidis as the major pathogenic causes. In another related study, Azuamah, et al.[19] identified blepharitis, bacterial conjunctivitis and corneal ulcer as major ocular infections among youths in Southern Nigeria.

Fungal conjunctivitis was the only fungal infection found in this study. It was seen in 2 (0.92%) patients. This infection is quite rare and is not seen in the clinic as frequently as bacterial infections. *Aspergillus flavus, Candida albicans* and *Fusarium* species were the fungal organisms isolated with a prevalence of 2.30%,0.92% and 1.38% respectively. Esenwah, et al.13 isolated Aspergillus in 1.6% of the patients in their study. Fungal organisms are found mostly in vegetation habitats and as such people infected with fungus are usually exposed to plants and wood[20].

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Most patients with fungal conjunctivitis acknowledge that they were either in the farm recently or cutting wood at home. Confirmation of fungal conjunctivitis must be from laboratory findings as its signs and symptoms can resemble that of bacterial conjunctivitis.

Microorganisms tend to thrive in an unhygienic environment and thus, a questionnaire was used to obtain information on the personal hygiene, water sanitation and environmental sanitation practices of the patients. A large number of the patients (80.65%) admitted that they do not wash their hands with soap and water after toilet use. Those that wash their hands usually do so with water only. In so doing, they do not successfully remove the germs that are present in their hands after toilet use. Osuji, *et al*.[21] reported that 75.3% of subjects interviewed in their study washed their hands with water alone after toilet use while 24.7% washed their hands with soap and water. Once the individual rubs his/her fingers on their eyes in order to relieve an itch, this can easily lead to an eye infection by transferring the infective organisms to the eye. Sharing of hand towels is another common way of transmitting infections as these materials are used to clean the face including the eyes. About 5.53% of our patients admitted to sharing of a hand towel with another member of their household. In addition to this, the frequency with which these items are washed is quite poor. Over 60% of the patients admitted to washing their hand towels every 2 weeks or more. Some don't wash them in months. All these factors make it easy for them to get infected especially when there are too many people sharing a room. Over 60% of the patients have at least 3 other people sharing their room with them making it 4 in a room. It is inevitable in this condition that people will share items or use a roommates item without his/her permission. Ogbulie[22] published an article on acceptable housing standards. He advocated a maximum of 2 persons in a room regardless of size.

Environmental sanitation practices of the patients also fell short of what is acceptable to ensure a clean and germ free environment. Microorganisms tend to thrive in a dirty environment. Over 75% of the patients also complained of drainage problems and general uncleanliness in their compound. Some studies[23,24] have linked poor environmental sanitation to ocular infections affecting the conjunctiva and cornea. Trachoma is one of the leading causes of blindness and is caused by Chlamydia trachomatis, a gram-negative bacterium that has been associated with poor sanitation and hygiene[25]. It causes complications in the cornea, conjunctiva, eyelid and other tissues of the eye.

Education is an important tool in empowering the people toward prevention of ocular infections. About 60% of patients in this study did not know that contact with microorganisms could lead to eye infections and more than 80% have not received any form of education or awareness on ocular hygiene. Studies[26,27] have shown that people who are educated on ocular hygiene suffer less ocular infections because they take the necessary precautions to avoid infection. In the Southeast Nigeria, Optometrists have been engaged in community health outreach programmes in order to educate and bring eye care services to people in the rural communities. Most of these programmes are sponsored by the optometrists themselves and in some cases, fees are charged though at a reduced rate in order to offset the expenses. These outreach programmes are very important as those in the rural areas are most affected and these rural communities lack the health facilities or practitioners where they can easily go for eye check-up. Etya'ale[28] reported in his study that people from slums and rural areas, women, the blind and severely visually impaired, the poor and destitute as people with the most difficult access to eye care services.

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Most eye clinics are located in the urban centers and so patients are forced to make the journey of travelling to the urban center for treatment. This however, is after they have exhausted other options like local herbs, patent chemists and self-medication. This is very dangerous as applying the wrong medication such as a corticosteroid to a case of herpetic epithelial keratitis will worsen the condition[29]. Patients are not aware of this and some think that all eye drops are the same and any eye drop can be applied to the eye no matter the condition. It is usually when they have made their problem much worse that they decide to see the Optometrist. People need to be educated on the dangers of applying the wrong medication to an ocular infection so that they do not worsen the problem.

Some people, especially in the rural areas of Nigeria still strongly believe on the traditional ways of treating ailments that was passed on from their fore-fathers to the present generation. These are called folk medications. For example, some people believe that applying breast milk from a nursing mother to an infected eye will cure that infection. Others resort to urine, olive oil and other local preparations. Smitherman, et al.[30] reported that the use of folk medicine was mainly due to cultural beliefs rather than decreased access to health care. Nwankwo[31] studied the resilience of folk medicine among the Igbos of Southeast Nigeria and found that folk medicine was preferred by people with low education. He recommended that folk medicine be supported by government through adequate funding and research initiatives as well as training of traditional healers. There are also strong beliefs in spiritual connections to health problems among people. They resort to prayers and spiritual healers to solve their problems. They believe strongly in their folk culture and so the Optometrist must try to show understanding and respect for their culture while educating them on the need to see a professional medical practitioner.

Conclusion

Bacterial conjunctivitis was the most common external eye infection found in this study. Others are corneal ulcer, bacterial keratitis, hordeolum, blepharitis and fungal conjunctivitis. Staphylococcus aureus was the most prevalent causative organism. Others include Staphylococcus epidermidis, Escherichia Coli, Klebsiella Species and Pseudomonas aeruginosa. Information obtained from the patients revealed that most people do not observe simple hand washing practices with soap and water. Sharing of hand towels and other personal items is still common and general cleanliness of personal rooms and surroundings is still poor. There is a need for increased awareness campaigns by eye care practitioners, governmental and non-governmental organizations toward educating the public on common external eye infections and the need to practice good personal hygiene.

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