https://africanjournalofbiomedicalresearch.com/index.php/AJBR
Afr. J. Biomed. Res. Vol. 27(4s) (December 2024); 12723- 12733
Research Article

A Study On The Microbial Flora In The Spectacles Used By Medical Students In A Tertiary Care Teaching Hospital In Puducherry

K. Nagin Sree[1], E. Kavitha[2], & R. Vinod[2*]

[1]MSc. Microbiology (First Year), Pondicherry University, Puducherry.
[2]Department of Microbiology, SVMCH&RC, Ariyur, Puducherry.

***Corresponding author:** R. Vinod
*Email id: rvinod@svmchrc.ac.in

ABSTRACT:
Spectacles, widely utilized for vision correction, are often in direct contact with facial skin and environmental surfaces, rendering them potential reservoirs of microbial contamination. Wherever the exposure to pathogens is frequent, the role of this issue is noticeable in medical environments, fomites in health care-associated infections (HAIs) is well-documented. The objective of this study was to investigate the spectrum of microbial flora colonizing the surfaces of spectacles used by medical students and to analyze the association between pathogenic and commensal microbes isolated. Samples were collected from 264 medical students' spectacles in a tertiary care hospital using sterile swabs, ensuring proper aseptic techniques. These samples were cultured on nutrient agar, blood agar, MacConkey agar, and Sabouraud dextrose agar to facilitate the growth of bacteria and fungi, respectively. Bacterial isolates were identified using Gram staining and an array of biochemical tests, including catalase, coagulase, oxidase, and carbohydrate fermentation assays. Fungal identification was conducted using lactophenol cotton blue (LPCB) staining and germ tube testing to detect *Candida* spp.
Results revealed the presence of a diverse array of microbes, including *Staphylococcus, Pseudomonas, Escherichia coli, and Candida*. Notably, pathogenic organisms such as *E. coli and Aspergillus* were frequently isolated, raising concerns about the potential role of spectacles as vectors for HAIs. Commensal flora, such as *Micrococci* and *Candida*, was also identified, emphasizing the continuous interplay between resident and transient microbiota.
This study indicates the significance of regular sterilization of spectacles, particularly in clinical settings where microbial colonization poses a significant risk to both users and patients. Implementing regular cleaning protocols and educating health-care workers about hygiene practices may substantially mitigate the risk of spectacles serving as reservoirs for microbial transmission.

KEY WORDS: Eyeglasses, microbial contamination, medical students, pathogenic microbes, clinical settings.

***Author for correspondence: Email:** rvinod@svmchrc.ac.in*

Received: 20/11/2024 *Accepted: 28/11/2024*

DOI: https://doi.org/10.53555/AJBR.v27i4S.6381

INTRODUCTION:

"Spectacles," commonly referred to as eyeglasses, are optical devices made from concave or convex lenses that correct refractive errors by refracting light to focus it properly onto the retina. This process ensures the formation of a clear image. Refractive errors such as myopia, hyper-myopia, and astigmatism are common conditions that impair visual clarity and require correction through eyeglasses. These lenses offer a simple, non-invasive solution by compensating for the eye's inability to focus light accurately[1,2] .

Medical professionals and students, due to their high visual demands, prolonged study hours, and screen exposure, rely heavily on spectacles. Research indicates that myopia is prevalent among these groups due to extended close work and limited natural light exposure. Beyond correcting vision, eyeglasses also alleviate eye strain, improving productivity and overall quality of life, especially for individuals engaged in visually demanding tasks, such as those in the medical field[3-6] .

However, the frequent use of personal items like eyeglasses necessitates routine cleaning and maintenance. This is especially critical in health-care settings, where exposure to pathogens is common. Proper hygiene practices are essential to minimize microbial contamination and reduce the risk of infection. Cleaning glasses involves rinsing them under lukewarm water to remove dust and debris, followed by wiping them with a soft, lint-free cloth like microfiber. For deeper cleaning, specialized lens solutions or disinfectant wipes are effective, particularly in clinical environments with higher contamination risks.[7,8] .

From a microbiological perspective, several factors influence the adhesion of microbes to eyeglass surfaces. Bacteria with high levels of extra-cellular polymeric substances (EPS) or lipopolysaccharides (LPS) exhibit stronger surface attachment. The EPS matrix not only promotes adhesion but also provides bio-films with structural integrity, increasing resistance to cleaning methods. This highlights the importance of consistent and effective cleaning to prevent bio-film formation on spectacles[9] .

In medical settings such as hospitals and clinics, physicians, doctors, and students are frequently exposed to pathogens through contact with bodily fluids, infected patients, and environmental surfaces. Eyeglasses, due to their contact with the face, skin secretions, and surrounding environment, can accumulate significant microbial loads over time. Without proper cleaning, lenses, nose pads, and frames can serve as reservoirs or vectors for pathogens, particularly in settings with lax hygiene practices[10] .

Additionally, eyeglasses can act as fomites, aiding in the transmission of microbes from one surface to another or between individuals. This is particularly concerning in health-care environments, where nosocomial infections pose significant risks, especially with the rise of antibiotic-resistant pathogens.[11] .

The potential for microbial contamination emphasizes the necessity of regularly disinfecting eyeglasses. Using proper cleaning agents, such as alcohol-based wipes, can significantly reduce microbial loads. Implementing stricter hygiene protocols for personal belongings like eyeglasses in health-care settings can play a vital role in infection prevention and control[12-14] .

MATERIALS AND METHODS:

Sample Size and Participant Selection

Using standard statistical calculations, the minimum sample size required for the study was determined to be 264. Participants were divided into seven groups: five groups consisting of 38 participants each and two groups comprising 37 participants each. A stratified random sampling method was employed to ensure representative sampling within the medical student population.

Data Collection:

Data were collected using a standardized questionnaire designed to gather relevant demographic and behavioural information. The questionnaire consisted of two sections:

1. Demographic Data: This section captured participant age, gender, and occupation.
2. Eyeglass Usage and Hygiene Practices: Questions focused on the type of eyeglasses used, maintenance and cleaning habits, history of eye infections, personal hygiene practices, and behaviour regarding seeking medical attention.

Questionnaires were distributed to participants, and responses were recorded under supervision to ensure clarity and completeness.

Sample Collection

Spectacle samples were collected immediately after the questionnaire was completed. Sterile swab sticks moistened with sterile distilled water were used to collect samples by gently swabbing specific areas of the eyeglasses, including the lenses, nose pads, and temple arms. Each sample was labelled appropriately and transported to the microbiology laboratory for processing under aseptic conditions.

Sample Processing for Bacterial Isolation

1. Primary Inoculation

Swabs were streaked onto nutrient agar plates and incubated at 37°C for 24 hours. Plates displaying visible bacterial growth were selected for further analysis.

2. Sub-culturing

Colonies were sub-cultured using the quadrant streaking method onto specialized media, including MacConkey agar, blood agar, and chocolate agar.

Plates were incubated at 37°C for an additional 24 hours to facilitate isolation of pure colonies.

3. Purification and Identification

Colonies were purified and subjected to Gram staining to classify bacterial isolates.

Gram-negative bacilli (GNB): Biochemical tests, including indole, citrate, urease, and triple sugar iron

(TSI) tests, were conducted. Results were recorded after 24 hours at 37°C.
Gram-positive cocci (GPC): Coagulase testing was performed, and results were noted after 4 hours of incubation.
Gram negative Cocci in chains (GNC): Bile esculin agar (BEA) tests were performed, and results were observed after 10 hours at 37°C[15-18] .

Sample Processing for Fungal Isolation
1. Primary Inoculation
Swabs were streaked directly onto Sabouraud dextrose agar (SDA) plates and incubated at 27°C for 48 hours. Fungal colonies were monitored for growth.

2. Sub-culturing
Fungal isolates were sub-cultured onto additional SDA plates and HiCrome agar for species differentiation. Plates were incubated at 29°C for up to three days to allow sufficient growth.

3. Identification
Detailed identification was performed using the slide culture technique when necessary. Lactophenol cotton blue (LPCB) staining was employed to observe fungal cells under a microscope at 40x magnification.
For Candida species, germ tube tests were conducted by inoculating isolates into serum and incubating at 37°C. Positive germ tube formation confirmed Candida species[19-21] .

Ethics and Participant Consent
The study was conducted following ethical principle, Approval was obtained from the Institutional Ethics Committee of the tertiary care teaching hospital (Reference number[166/SVMCH/IEC-Cert/Sept.24]). Participants were informed about the study's objectives, procedures, and potential risks, and written informed consent was obtained before enrollment. All data collected were anonymized to ensure participant confidentiality. Additionally, permission certificates were obtained from relevant institutional authorities to conduct the study in the specified setting.

Study Design and Setting
This observational study was carried out among medical students enrolled in a tertiary care teaching hospital. The primary objective was to analyze microbial contamination on eyeglasses and investigate associated risk factors, including personal hygiene practices and eyeglass maintenance. The study employed a structured approach to sampling and data collection, ensuring reliable and reproducible results.

Statistical Analysis
The data collected from the questionnaires and microbiological tests were entered in Microsoft Excel 2010 and analyzed using SPSS version 23. Descriptive statistics were used to summarize demographic characteristics and eyeglass usage patterns. Associations between pathogenic microorganism and commensal microbes are evaluated using chi-square tests for categorical variables. Logistic regression analysis was performed to determine significant predictors of microbial contamination. A p-value of <0.05 was considered statistically significant.

RESULTS:
The microflora associated with personal spectacles of 264 medical students in a tertiary care hospital offers a unique perspective into the potential reservoirs of bacteria and fungi. This study aimed to identify and quantify microbial contamination, utilizing statistical analyses to correlate microbial diversity with factors such as usage habits and cleaning frequency. Key findings revealed the predominance of opportunistic pathogens, highlighting the role of personal accessories as potential vectors in healthcare-associated infections. These results emphasize the importance of hygiene practices and awareness to mitigate microbial transmission in clinical settings.

GENDER OF THE PARTICIPANT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	96	36.4	36.4	36.4
	FEMALE	168	63.6	63.6	100.0
	Total	264	100.0	100.0	

TABLE A: Represents the gender distribution of the study's volunteers. Among the participants, 63.6% were female, indicating a majority, while males accounted for 36.4%. This data highlights a higher representation of female volunteers in the study.

EXPOSURE OF EYEGLASSES TO DUSTY ENVIRONMENT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	232	87.9	87.9	87.9
	NO	32	12.1	12.1	100.0
	Total	264	100.0	100.0	

TABLE B: Illustrates the distribution of dusty exposure among the studied spectacles. A significant majority (232 samples, 87.9%) were exposed to dust, whereas only a small proportion (12.1%) was not exposed. This highlights that dusty exposure is a predominant condition affecting the studied samples.

USAGE OF SPECTACLE CASE WHEN EYE GLASSES NOT IN USE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO USAGE OF CASE	111	42.0	42.0	42.0
	RARELY IN CASE WHEN NOT IN USE	106	40.2	40.2	82.2
	SOMETIMES IN CASE WHEN NOT IN USE	41	15.5	15.5	97.7
	ALWAYS IN CASE WHEN NOT IN USE	6	2.3	2.3	100.0
	Total	264	100.0	100.0	

TABLE C: Demonstrates the frequency of spectacle case usage among participants. Notably, 42% of individuals reported not using their case, while 42.2% used it once a month. Additionally, 15.5% of participants used their case once a week and only 2.3% used it daily. These findings indicate infrequent use of spectacle cases among the majority of participants.

FREQUENCY OF CLEANING THE SPECTACLE CASE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ONCE IN A WEEK	83	31.4	31.4	31.4
	ONCE IN A DAY	20	7.6	7.6	39.0
	ALL THE TIME	2	0.8	0.8	39.8
	NEVER DONE	159	60.2	60.2	100.0
	Total	264	100.0	100.0	

TABLE D: Outlines the cleaning frequency of spectacle cases among participants. The majority (60.2%) reported never cleaning their cases, while 31.6% cleaned them once a week. A smaller proportion, 7.6%, cleaned their cases daily, and only 0.8% maintained constant cleanliness. This data underscores a generally low frequency of spectacle case cleaning among participants.

FREQUENCY OF WIPING THE EYEGLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ONCE IN A WEEK	57	21.6	21.6	21.6
	ONCE IN DAY	169	64.0	64.0	85.6
	EVERY SIX HRS	38	14.4	14.4	100.0
	Total	264	100.0	100.0	

TABLE E: Highlights the frequency of wiping spectacles among participants. The majority (64%) reported wiping their glasses once a day, followed by 21.6% who cleaned them once a week. A smaller group (14.4%) wiped their glasses every six hours. This indicates that daily cleaning is the most common practice among the participants.

FREQUENCY OF CLEANING EYEGLASS PARTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LENS ONLY	242	91.7	91.7	91.7
	LENS AND TEMPLE	22	8.3	8.3	100.0
	Total	264	100.0	100.0	

TABLE F: Illustrates the cleaning practices for spectacles among participants. A significant majority (91.7%) reported cleaning only the lenses, while a smaller proportion (8.3%) cleaned both the lenses and the temple part, indicating that most participants focus solely on the lens when cleaning their spectacles.

SOLUTION USED TO CLEAN THE EYEGLASSES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LENS CLEANING SOLUTION	46	17.4	17.4	17.4
	OTHERS	218	82.6	82.6	100.0
	Total	264	100.0	100.0	

TABLE G: Presents the types of cleaning solutions used by participants for their spectacles. Only 17.4% of participants used lens cleaning solutions, while the majority (82.6%) relied on alternatives such as sanitizer or alcohol wipes. This suggests that most individuals opt for non-specialized cleaning methods for their spectacles.

MATERIALS USED TO WIPE THE EYEGLASSES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	TISSUE PAPER	2	0.8	0.8	0.8
	PART OF THE CLOTHES	142	53.8	53.8	54.5
	MUSLIN CLOTH	120	45.5	45.5	100.0
	Total	264	100.0	100.0	

TABLE H: Illustrates the materials used by participants to clean their spectacles. A small percentage (0.8%) used tissue paper, while the majority (53.8%) opted for parts of their daily wear clothes. Additionally, 45.5% of participants used lens cleaning materials, such as muslin cloth. This indicates a preference for using everyday items, with muslin cloth being the most common choice for cleaning the lenses.

HISTORY OF EARLIER SYMPTOMS OF AN EYE INFECTION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	PAINFUL EYE	2	0.8	0.8	0.8
	EYE STRAIN	2	0.8	0.8	1.5
	NONE	260	98.5	98.5	100.0
	Total	264	100.0	100.0	

TABLE I: Presents the history of eye-related symptoms among participants. A very small percentage (0.8%) reported experiencing eye pain and eye strain, while the vast majority (98.5%) reported having no symptoms. This indicates that eye-related symptoms were rare among the participants.

HAND HYGIENE AFTER TOILETING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	WASHING WITH WATER	4	1.5	1.5	1.5
	WASHING WITH SOAP	260	98.5	98.5	100.0
	Total	264	100.0	100.0	

TABLE J: Shows the hand hygiene practices among participants. A small proportion (1.5%) washed their hands with water, while the majority (98.5%) used soap for hand washing. This indicates that soap was the preferred method for hand hygiene among the participants.

ROUTINE EYE CHECK-UP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	EVERY 6 MONTHS ONCE	85	32.2	32.2	32.2
	YEARLY ONCE	104	39.4	39.4	71.6
	LONG BACK AGO	63	23.9	23.9	95.5
	DID NOT CHECK UP YET	12	4.5	4.5	100.0
	Total	264	100.0	100.0	

TABLE K: Presents the frequency of eye checkups among participants. A significant portion (39.4%) reported having an eye checkup once a year, while 32.2% had an eye checkup every six months. Additionally, 23.9% of participants indicated that their last checkup was long ago, and 4.5% had never had an eye checkup.

This highlights that while regular checkups are common, a notable proportion of participants have either infrequent or no eye checkups at all.

COMPLIANCE GRADE OF EYEGLASS MAINTENANCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	GOOD	96	36.4	36.4	36.4
	NEUTRAL	146	55.3	55.3	91.7
	SHOULD IMPROVE	22	8.3	8.3	100.0
	Total	264	100.0	100.0	

TABLE L: Shows the participants' self-assessed grade of compliance in maintaining their spectacles. A majority (55.3%) rated themselves as neutral in their maintenance practices, while 36.4% considered themselves good at maintaining their spectacles. A smaller group (8.3%) felt they should improve their maintenance habits. This suggests that while most participants view their maintenance practices as adequate, there is room for improvement in some cases.

FREQUENCY OF CLEANING THE EYEGLASS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	RARELY IN A WEEK	19	7.2	7.2	7.2
	ONE DAY AFTER	36	13.6	13.6	20.8
	EVERY 6 HOURS	128	48.5	48.5	69.3
	JUST FEW HOURS AGO	81	30.7	30.7	100.0
	Total	264	100.0	100.0	

TABLE M: Shows the timing of the last cleaning of spectacles among participants. A small percentage (7.2%) cleaned their glasses once in a week, while 13.6% cleaned them the day after. A significant proportion (38.5%) cleaned their glasses every six hours, and 30.7% cleaned them immediately before the survey. This indicates that the majority of participants cleaned their glasses frequently, with many doing so within a short time frame.

MICROORGANISMS OBSERVED IN THIS STUDY ARE GIVEN BELOW

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO BACTERIUM	32	12.1	12.1	12.1
	E. coli	22	8.3	8.3	20.5
	Streptococcus	9	3.4	3.4	23.9
	Pseudomonas	1	0.4	0.4	24.2
	Klebseilla	7	2.7	2.7	26.9
	Enterococci	9	3.4	3.4	30.3
	Staphylococcus	7	2.7	2.7	33.0
	Micrococci	23	8.7	8.7	41.7
	Aerobic Bacilli	27	10.2	10.2	51.9
	NO FUNGUS	45	17.0	17.0	68.9
	Aspergillus	53	20.1	20.1	89.0
	Emmonsia	1	0.4	0.4	89.4
	Alternaria	4	1.5	1.5	90.9
	Mucor	9	3.4	3.4	94.3
	Penicillium	6	2.3	2.3	96.6
	Candida	5	1.9	1.9	98.5
	Actinobacterium	4	1.5	1.5	100.0
	Total	264	100.0	100.0	

TABLE N: Presents the distribution of microorganisms identified among the study samples. A notable portion (12.1%) showed no bacterial presence, while the most commonly identified bacteria included *E.coli* (8.3%), *Streptococcus* (3.4%), and *Enterococci* (3.4%). Other bacterial species such as *Pseudomonas* (0.4%), *Staphylococcus* (2.7%), and *Micrococci* (8.7%) were also found. Regarding fungal species, 17% of samples showed no fungal presence, but *Aspergillus* was the most prevalent fungus (20.1%). Other fungi identified

included *Emmontia* (0.4%), *Alternaria* (1.5%), *Mucus* (3.4%), *Penicillin* (2.3%), *Candida* (1.9%), and *Actinobacterium* (1.5%). These findings highlight the diversity of both bacterial and fungal organisms present across the samples, with *Aspergillus* being the most common fungal organism and *E. coli* the most prevalent bacterium.

PATHOGEN&COMMENSAL CROSS TABULATION

			COMMENSAL			
			Yes	No	Absent	Total
PATHOGENIC MICROBES	Yes	Count	0	127	0	127
		% within pathogenic microbe	0.0%	100.0%	0.0%	100.0%
	No	Count	60	0	0	60
		% within pathogenic microbe	100.0%	0.0%	0.0%	100.0%
	Absent	Count	0	0	77	77
		% within pathogenic microbe	0.0%	0.0%	100.0%	100.0%
Total		Count	60	127	77	264
		% within pathogenic microbe	22.7%	48.1%	29.2%	100.0%

TABLE O: Compares the prevalence of pathogenic organisms, commensal, and samples with no microbial growth. Among the samples, 22.7% contained pathogenic organisms, while 48.1% harbored commensal organisms. Additionally, 29.2% of the samples showed no growth of any microbes. This indicates that commensal organisms were the most commonly found, while pathogenic organisms were less prevalent in the samples.

STATISTICAL ANALYSIS

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	528.000[a]	4	0.0001
Likelihood Ratio	553.410	4	.000
Linear-by-Linear Association	64.017	1	.000
N of Valid Cases	264		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.64.

TABLE P: Calculates the Yates' Chi-Square value=515.186, P - value = 0.0001(<0.001) very highly significant. The very high chi-square value (515.186) and the extremely low p-value (0.0001) suggest that the observed differences in microbial presence (bacteria, fungi, pathogenic vs. commensal) are not due to random variation. This implies a strong and significant relationship between the variables studied, such as hygiene practices, cleaning frequency, or exposure to environmental factors.

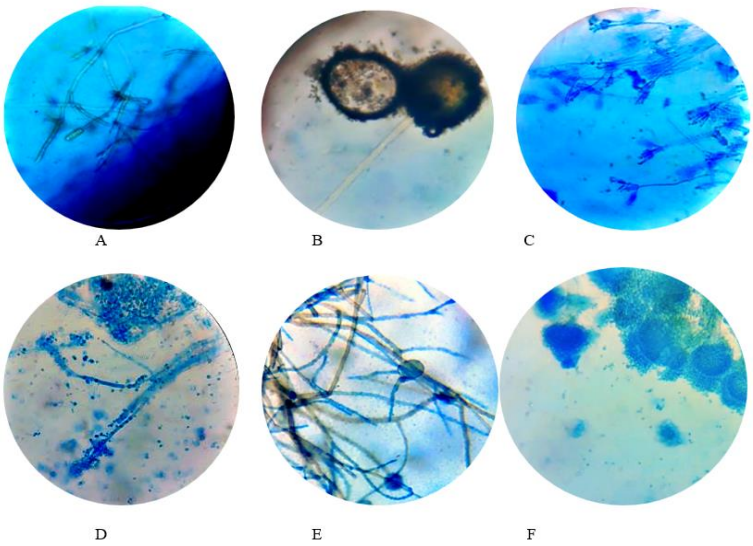

FIG 1: Microscopic images of Fungus; (A) distinct conical narrowing or beak at the apical end of *Alternaria*, (B) dark brown spores from their conidial heads of *Aspergillus niger*, (C) branching pattern of the conidiophore in ***Penicillium*, (D) Septate hyaline hyphae, conidiophores *Emmonsia*, (E) The conidia are characteristically green and sclerotia mass with a deep brown color *Aspergillus flavus*, (F) unbranched sporangiophores without basal rhizoids of *Mucor***

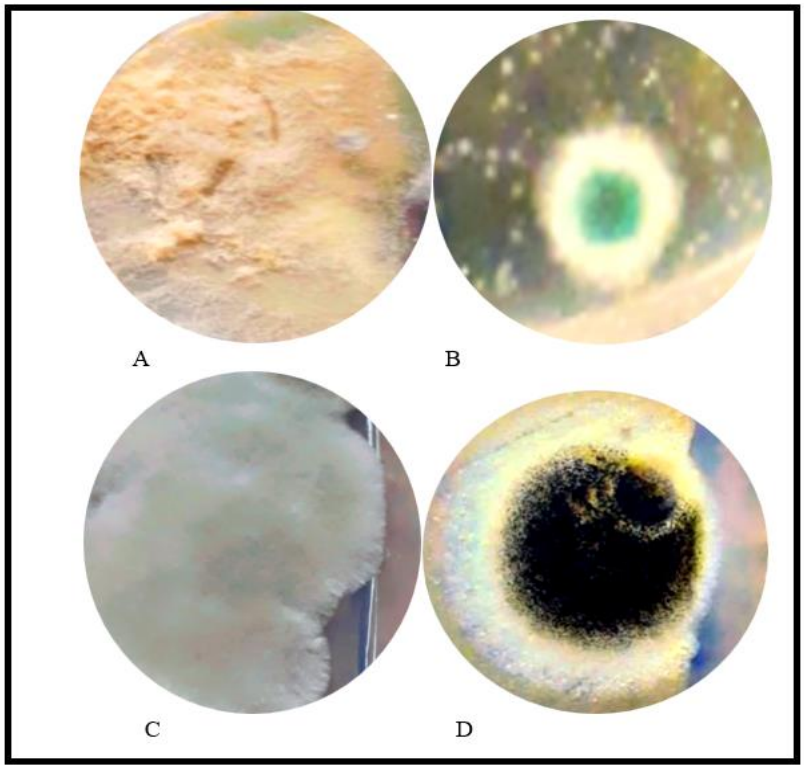

FIG 2: Colony morphology of Fungus in SDA;(A) blue green velvet colony of *Penicillium*, (B) Velvet tan center and white bottom colony of *Emmonsia*, (C) Grey fluffy colony of *Mucor*, (D) White felt with black conidiophore colony of *Aspergillus*

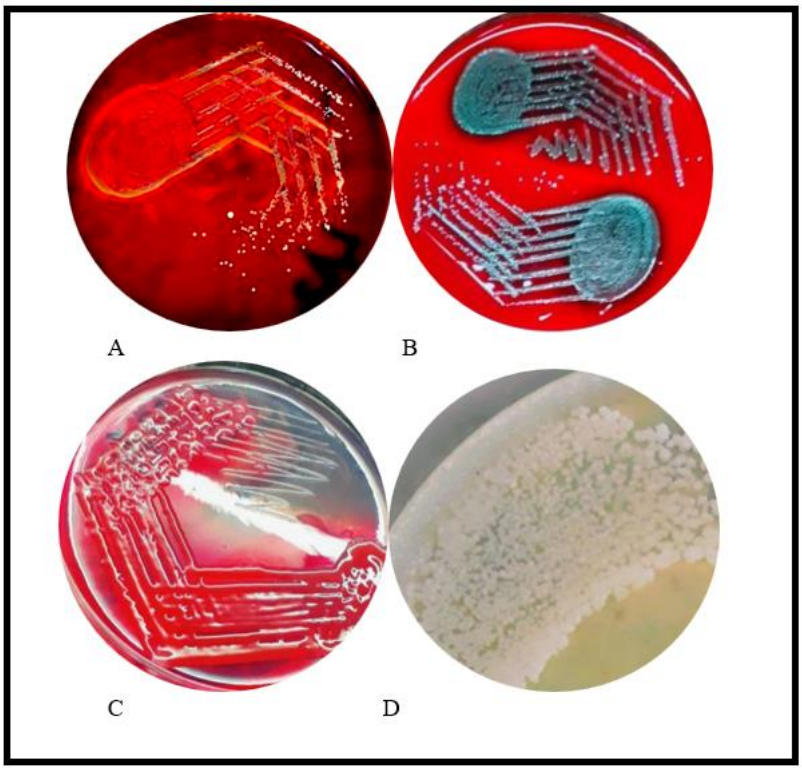

FIG 3: Colony morphology of Bacteria; (A) Beta haemolysis of *Staphylococcus* in blood agar, (B) Alpha haemolysis of *Stretococcus* in blood agar, (C)Large mucoid colony from red to pink *Klebsiella* in mac conkey, (D) White flaky colony of aerobic *Bacilli* in nutrient agar

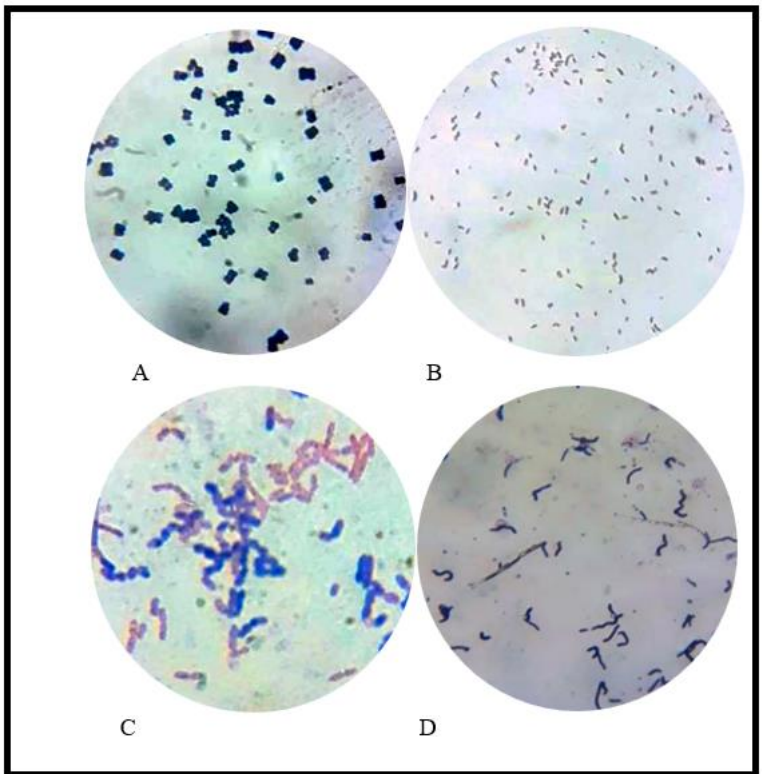

FIG 4: Microscopic images of (A) Tetrads as *Micrococci*, (B) Gram negative bacilli as *E. coli*, (C) Gram positive and gram negative *cocci* chains, (D) Gram positive *Bacilli* chains

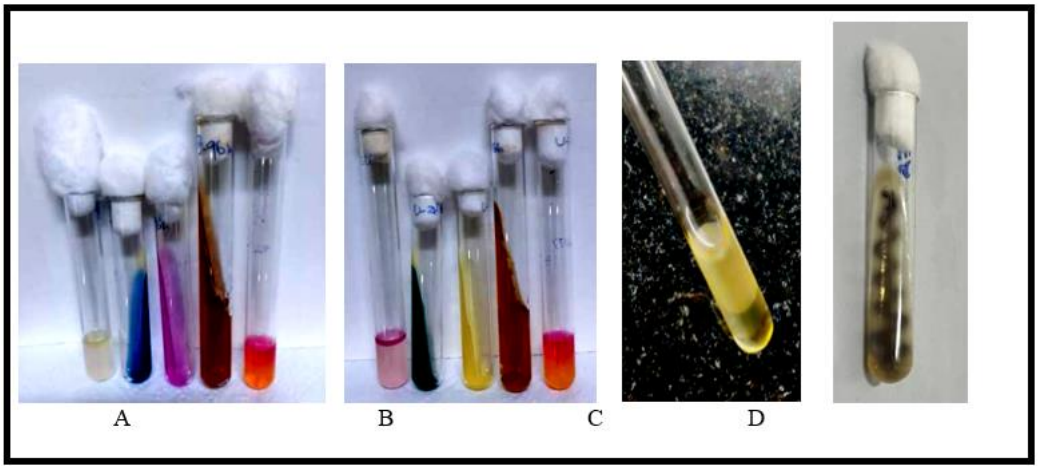

FIG 4: Various biochemical test; (A) Indole negative, Citrate positive, Urease positive, TSI with gas formation, MMM as fermenting and motile, (B) Indole Positive, Citrate negative, Urease negative, TSI with K/K, MMM as fermenting and motile, (C) Coagulase positive test for *Staphylococcus*, BEA test positive for *Enterococcus.*

DISCUSSION:

The present study investigated the microbial contamination of eyeglasses worn by medical students in a tertiary care hospital. The results revealed that the most prevalent pathogens were *Escherichia coli* and Streptococcus, Enterococci (bacteria), and Aspergillus (fungi). This is consistent with previous studies, such as the one conducted in South-West Nigeria by Enitan.et.al [25] which also identified E. coli as a dominant pathogen on eyeglass surfaces. Pathogenic organisms accounted for 22.7% of the total microbial load, while 38.1% of isolates were commensal organisms, and 29.2% of samples exhibited no microbial growth.

The contamination observed in this study can be attributed to improper cleaning of spectacle cases and muslin cloths, which has been similarly noted in other studies. Poor cleaning practices contribute to the persistence of microbial contamination, posing potential health risks, especially in healthcare settings. This study recommends regular cleaning of muslin cloths and the use of disinfectant solutions or alcoholic wipes to mitigate contamination levels and reduce the likelihood of infection.

Additionally, a noteworthy finding from this study was the development of immune adaptation in spectacle wearers. Initial skin irritations, such as pimples and irritation on the face, were observed but subsided over

time without progressing to infection. This suggests that repeated exposure to hospital-associated microbes may lead to immune tolerance, a phenomenon that warrants further investigation.

In conclusion, the findings of this study underscore the importance of regular hygiene practices in reducing microbial contamination on eyeglasses. Given the high prevalence of opportunistic pathogens, the use of appropriate cleaning methods is essential in minimizing the risk of infections, particularly in healthcare environments.

CONCLUSION:

The study's conclusion underscore the critical importance for medical personnel, particularly those working in hospital settings, to regularly clean and maintain their eyewear. Glasses can act as potential reservoirs or vectors for microbial contamination due to their frequent exposure to harmful microorganisms in clinical environments. This study highlights the need for strict hygiene protocols for personal items like eyewear, emphasizing the diverse microbial flora that can colonize spectacles, including rare isolates such as *Emmonsia.*

Given that the study identifies a frequently overlooked source of microbial transmission, its implications are particularly relevant to hospital infection control strategies. By promoting consistent cleaning practices and raising awareness, this research contributes to the broader objective of reducing healthcare-associated infections (HAIs). It serves as a reminder for medical professionals to prioritize personal hygiene, not only for their own health but also to prevent cross-contamination with patients and colleagues.

The paper aims to encourage healthcare workers to incorporate preventive measures, such as using proper cleaning techniques for eyewear, into their daily routines to create a safer and healthier medical environment. By addressing gaps in hospital infection control, this study fosters a culture of health consciousness and highlights the importance of vigilance against microbial threats in all aspects of medical practice.[22-24] .

Acknowledgements:

I thank Dr. Senthilvel Vasudevan, Biostatiscian, Dr. K. Revathi, Dr. E. Logeswari, Dr. V. Arvind from Research Cell, Medical Students of SVMCH&RC and the Management. My special thanks to the Department of Microbiology, Dr. R. Vinod & Dr. E. Kavitha.

REFERENCES:

1. Jobke S, Kasten E, Vorwerk C. The prevalence rates of refractive errors among children, adolescents, and adults in Germany. Clin Ophthalmol. 2008;2(3):601-7.
2. Hashemi H, Pakzad R, Yekta A, Mohammad K, Fotouhi A, Khabazkhoob M. Global and regional estimates of prevalence of refractive errors: systematic review and meta-analysis. J Curr Ophthalmol. 2018;30(1):3-22.
3. Al-Bdour MD, Akkash L, Abu Samra KM. Refractive errors and their associations with visual symptoms among medical students. Clin Ophthalmol. 2013;7:1293-8.
4. Garg P, Singh L, Singhal N, Sachdeva S. Prevalence of refractive errors among medical students. Int J Res Med Sci. 2017;5(9):3926-9.
5. Kathrotia RG, Dave AG, Dabhoiwala ST, Oommen ER, Avashia TM. Prevalence and progression of refractive errors among medical students. Int J Biol Med Res. 2012;3(1):1385-7.
6. Onyemaechi JU, Oreh AC, Orebiyi GO. Refractive errors among medical students in Enugu, Nigeria. Niger J Clin Pract. 2019;22(9):1237-41.
7. Mohapatra S. Sterilization and disinfection. In Essentials of neuroanesthesia 2017 Jan 1 (pp. 929-944). Academic Press.
8. Weaver JL, DePriest PT, Plymale AE, Pearce CI, Arey B, Koestler RJ. Microbial interactions with silicate glasses. npj Materials Degradation. 2021 Mar 19;5(1):11
9. Tortora GJ, Funke BR, Case CL. Microbiology: An Introduction. 13th ed. Pearson; 2018.
10. Anjani HL, Purwanta M, Rochmanti M. Identification of bacterial contaminants on glasses used by students of Faculty of Medicine Universitas Airlangga, Surabaya, Indonesia class of 2016. Majalah Biomorfologi. 2021;31(1):18-23.
11. Pfaller MA, Diekema DJ. Epidemiology of invasive candidiasis: a persistent public health problem. Clin Microbiol Rev. 2007;20(1):133-163.
12. Muhammad AU, Chinonso MH, Onyinyechi ME, Alawo AI, Idris AT, Abubakar YU, Umar AZ, Abubakar A, Taura DW, Salihu UY. Isolation and identification of bacterial isolates associated with spectacle lens surface. Magna Scientia Advanced Biology and Pharmacy. 2023;9(2):054-60.
13. Fritz B, Jenner A, Wahl S, Lappe C, Zehender A, Horn C, et al. A view to a kill? – Ambient bacterial load of frames and lenses of spectacles and evaluation of different cleaning methods. Gupta V, editor. PLOS ONE. 2018 Nov 28;13(11):e0207238.
14. Vicklund RE. Preventing the Fungus Fouling of Optical Instruments. Industrial & Engineering Chemistry. 1946 Aug;38(8):774-9
15. Bergey DH, Holt JG. Bergey's Manual of Determinative Bacteriology. 9th ed. Williams & Wilkins; 1994.
16. Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl DA. Brock Biology of Microorganisms. 14th ed. Pearson; 2015.
17. Forbes BA, Sahm DF, Weissfeld AS. Bailey & Scott's Diagnostic Microbiology. 13th ed. Mosby; 2013.
18. Koneman EW, Allen SD, Janda WM, Schreckenberger PC, Winn WC. Color Atlas and Textbook of Diagnostic Microbiology. 6th ed. Lippincott Williams & Wilkins; 2005.
19. Kurtzman CP, Fell JW, Boekhout T. The Yeasts: A Taxonomic Study. 5th ed. Elsevier; 2011.

20. De Hoog GS, Guarro J, Gené J, Figueras MJ. Atlas of Clinical Fungi. 3rd ed. CBS-KNAW Fungal Biodiversity Centre; 2020.
21. Larone DH. Medically Important Fungi: A Guide to Identification. 5th ed. ASM Press; 2011.
22. Willey JM, Sherwood LM, Woolverton CJ. Prescott's Microbiology. 10th ed. McGraw-Hill Education; 2017.
23. Kirk PM, Cannon PF, Minter DW, Stalpers JA. Dictionary of the Fungi. 10th ed. CAB International; 2008.
24. Kumar A, Sharma P, Singh R. Incidence of bacterial contamination on the spectacles and comparative analysis on the efficacy of spectacle cleaning agents. Int J Curr Microbiol App Sci. 2023;12(4):1234-1242.
25. Enitan S, Edafetanure-Ibeh O, Eleojo I, Dada M, Mensah-Agyei G, Akele R, Makanjuola S, Ajike S, Ogbonna N, Jamiu MO. Bacterial pathogens associated with eyeglasses and risks of infection: A cross-sectional study in South-West Nigeria. Trends Infect Glob Health. 2023;2(2):49-60. doi: 10.24815/tigh.v2i2.28488.