ASSESSMENT ON THE KNOWLEDGE, ATTITUDE AND PRACTICE OF CONTACT LENS WEARERS TOWARDS CONTACT LENS HYGIENE AND COMPLICATIONS AMONG STUDENTS IN UNIVERSITY OF BENIN, BENIN-CITY

BY

CHIAMAKA IFEYINWA MBEGBU MED1508684

DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE,

COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN,

BENIN-CITY, EDO STATE.

BEING A ONE YEAR PROJECT PRESENTED TO THE DEPARTMENT OF COMMUNITY HEALTH, SCHOOL OF MEDICINE COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA.

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SEPTEMBER, 2024.

DECLARATION

I hereby declare that this project titled "**KNOWLEDGE, ATTITUDE AND PRACTICE OF CONTACT LENS WEARERS TOWARDS CONTACT LENS HYGIENE AND COMPLICATIONS AMONG STUDENTS IN UNIVERSITY OF BENIN, BENIN-CITY"** was conducted under the supervision of Dr. (Mrs.) O.E Obarisiagbon has not been submitted anywhere else for the award of degree or certificate.

_____ _____

CHIAMAKA MBEGBU Date
MED1508684
07012779063
mbegbuchiamaka@gmail.com

CERTIFICATION

This is to certify that this research study titled **"Knowledge, Attitude and Practice of Contact Lens Wearers towards Contact Lens Hygiene and Complications among students of University of Benin, Benin-City"** was carried out by **MBEGBU CHIAMAKA** with matriculation number **MED1508684** under supervision in the Department of Public health and Community Medicine, School of Medicine, College of Medical Sciences, University of Benin, Benin City, Edo State, Nigeria as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS).

_____

DR. (MRS) O.E OBARISIAGBON
(MBBS, MPH, FMCPH)

PROJECT SUPERVISOR

Associate Professor/Consultant

Department of Public Health and

Community Medicine,

School of Medicine,

College of Medical Sciences,

University of Benin.

Benin City, Edo State,

Nigeria.

_____

DR. (MRS) O.E OBARISIAGBON
(MBBS, MPH, FMCPH)

HEAD OF DEPARTMENT

Associate Professor/Consultant

Department of Public Health and

Community Medicine,

School of Medicine,

College of Medical Sciences,

University of Benin.

Benin City, Edo State,

Nigeria.

DEDICATION

This work is dedicated to God Almighty for giving me the strength to carry out and complete this project. I also dedicate this work to my loving parents, relatives and friends for their constant support and to my teachers for their positive influence and guidance.

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In addition, I extend my thanks to the students of the University of Benin who willingly participated in this research, as well as to the researchers whose works served as valuable references.

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OPERATIONAL DEFINITION OF TERMS

1. **Contact lens**: a medical device[1] placed directly on the surface of the eyes to correct vision or for cosmetic or therapeutic reasons.

2. **Refractive error**: a problem with focusing light accurately on the retina due to the shape of the eye and/or cornea.

3. **Keratoconus**: an eye disease that affects the structure of the cornea, resulting in loss of vision.

4. **Extended wear**: contact lenses worn continuously for up to six nights and seven days.

5. **Soft lens**: made of soft, flexible plastics that allow oxygen to pass through to the cornea.

6. **Hard lens**: also known as Rigid gas permeable lens made of silicone-containing compounds that allow oxygen to pass through the lens material to the eye.

7. **Daily disposable lens**: single-use lenses that are removed and discarded at the end of each day, and a fresh pair of lenses is applied to the eyes the next morning.

8. **Planned Replacement lens**: disposed of and replaced with a new. pair according to a planned schedule, usually daily, biweekly or monthly.

9. **Hybrid lens**: combination of a hard lens and soft lens.

10. **Orthokeratology lens**: use of specially designed and fitted contact lenses to temporarily reshape the cornea to improve vision.

11. **Scleral lens**: large contact lens that rests on the sclera and creates a tear-filled vault over the cornea.

12. **Cosmetic lens**: a type of contact lens that is primarily used for enhancing the appearance of the eyes rather than correcting vision.

13. **Microbial keratitis**: a sight-threatening infection of the cornea.

14. **Corneal ulceration**: an open sore on the cornea.

15. **Acanthamoeba Keratitis**: an eye infection caused by an amoeba that invades the cornea.

16. **Conjunctival hyperemia**: condition characterized by redness and congestion of the blood vessels in the conjunctiva.

17. **Giant Papillary Conjunctivitis**: a condition where there is redness, irritation and swelling of the conjunctiva.

18. **Contemporaneous**: existing, occurring, or originating during the same time.

19. **Anterior Staphyloma**: a localized defect in the anterior eye wall with protrusion of uveal tissue due to alterations in scleral thickness and structure.

20. **Corneal infiltrate**: is a single or group of inflammatory cells in the normally clear cornea.

21. **Corneal abrasion**: is a superficial scratch on the cornea.

22. **Multipurpose solution**: is a solution used to clean, rinse, disinfect, and store lenses.23. **Dry Eye**: is a condition in which a person does not have enough quality tears to lubricate and nourish the eye.

ABSTRACT

Background: There are over a million users globally, contact lenses are particularly popular among women and younger individuals. While advances in lens technology have improved safety, complications such as microbial keratitis can occur, especially when proper hygiene practices are neglected. Despite educational efforts, adherence to care guidelines remains low.

Objectives: To assess the knowledge, attitudes and practice of contact lens wearers towards contact lens hygiene and complications among students of University of Benin, Benin-City.

Materials and Methods: A descriptive cross-sectional study design was utilized for this study. Four hundred participants were selected using multi-stage sampling techniques. Data were collected using a structured interviewer-administered questionnaire comprising both opened ended and closed questions. Data was analyzed using IBM SPSS version 25.0 and a $p < 0.05$ was considered significant.

Results: The mean age of respondents was 20.7 years (±2.539 years) with a predominance of females (82.7%) and Christians (98.8%). Most respondents were single (99.0%) and the largest ethnic group represented was Benin (49.8%). The majority of participants (22.8%) had myopia, while 42.0% wore contact lenses primarily for vision correction. Knowledge of proper contact lens use varied, with better understanding among those aged 23-25 and from the Medicine department. Despite high awareness of cleaning practices, adherence remained low, with 51.7% cleaning their lenses daily. Most respondents identified infected lenses as a major cause of complications, and signs included itching and blurred vision. The study highlights the need for improved education and adherence to hygiene practices to mitigate risks associated with contact lens use among students.

Conclusion: Majority of the respondents are young, predominantly female respondents who wear contact lenses mainly for vision correction and cosmetic purposes, but there is a concerning lack of knowledge and adherence to hygiene practices, indicating a need for targeted educational interventions to improve safe contact lens use.

Keywords: contact lens, hygiene practices, complications, Knowledge, students.

Words Count: 327

CHAPTER ONE

1.1 BACKGROUND

The capacity of contact lenses to enhance the lifestyle of individuals is significant, primarily for the correction of refractive errors but also for various other reasons, including medical indications or specific forms of eye protection.[2]

An estimated 175 million people worldwide use contact lenses.[3] They have become increasingly important for optical correction, especially among women, and are gaining popularity among the younger population, including school, college, and university students, as well as young working adults. Contact lenses are used for refractive correction, cosmetic reasons and therapeutically in eye diseases such as keratoconus or corneal scarring. They are becoming more popular among the younger population due to their ability to improve aesthetics. The medical use of contact lenses has evolved over decades alongside advances in materials and design. There is a growing appreciation for the role a lens can play in stabilizing the ocular surface, neutralizing refractive error and improving visual function. This awareness is combined with an understanding of potential complications.[3, 4, 5, 6]

There are several types of contact lenses, all of which require a prescription from an eye care provider. Contact lenses may differ based on what they are made from (lens material, e.g., soft or hard or rigid gas permeable), how long they are designed for wearing each day (wear schedule, e.g., daily or extended wear), how often they should be replaced (replacement schedule, e.g., daily disposable or planned replacement), and other types of contact lenses for special purposes, such as Hybrid, Orthokeratology, Scleral and Decorative or Cosmetic contact lenses. [7]

Although generally considered safe, contact lens-related complications may occur. These complications are varied and include less severe conditions such as dryness, inflammation, discomfort and more serious, potentially sight-threatening conditions such as microbial keratitis, which leads to corneal ulceration. The risk of significant contact lens-related complications increases when wearers do not adhere to contact lens care guidelines. The lens cases and lens solutions in which lenses are held can become contaminated with various micro-organisms. Once contaminated, lenses can become a medium for the direct ocular transmission of microorganisms. This signifies the need for maintaining the hygiene of the lens care system. [8, 9]

For over 10 years, researchers have observed the relationship between contact lens complications and patients' compliance with the recommended lens care guidelines. Although patients have a responsibility to strictly follow recommended guidelines, they often do not, due to an insufficient understanding of contact lens care guidelines, a lack of awareness regarding risks, or simply consciously ignoring the recommended guidelines. Examples of compliance behaviors include hand washing, rubbing and rinsing contact lenses, attending aftercare visits, avoiding exposure to tap water, and adhering to the prescribed lens-wearing schedule. The level of compliance may be influenced by adherence to aftercare visits, where contact lenses were purchased, and the type of contact lens. Past efforts by practitioners have generally focused on improving hygiene practices through education and by providing information. Despite these efforts, the level of hygiene practice remains low. [9, 8, 10]

Monitoring contact lens prescribing trends allows practitioners to evaluate their own prescribing patterns against national trends. It also serves as a guide to the contact lens industry regarding which products, wearing modalities and replacement frequencies are preferred by practitioners and lens wearers. [11]

In developed countries, contact lenses are widely used for correcting refractive errors, with prevalence rates ranging from 7.2% to 14.7%. However, in Saudi Arabia, the usage is notably high at 70% among female university students. Conversely, in developing countries, contact lens dispensing is less recommended, and traditional spectacle glasses remain the primary treatment for uncorrected refractive errors due to factors such as low patient knowledge, limited supply, practitioner skills, equipment, and cost implications. Japan stands out as a major contact lens prescribing country, where over 10% of the population wears contact lenses. [12, 11]

Studies on contact lens wearers' attitudes toward hygiene and complications in Edo State, Nigeria are scarce. This study aims to identify beliefs, attitudes, and concerns related to contact lens hygiene and complications. Additionally, the study will estimate the prevalence of contact lens use at the University of Benin in Edo State, Nigeria.

1.2 STATEMENT OF THE PROBLEM

Comprehensive statistics on contact lens usage in Nigeria are notably lacking, creating a substantial void in our knowledge of eye care practices within the country. This gap underscores the need for more extensive research and data collection to enhance our understanding of the prevalence and patterns of contact lens use among the population.

In the United States, approximately 45 million people use contact lenses, with a notable majority being females, constituting two-thirds of contact lens wearers.[13] This gender disparity may be attributed to the prevalent use of contact lenses for cosmetic purposes. [14]

Among contact lens wearers in the United States, 8% are under the age of 18, 17% fall within the 18-24 age range, and the majority—75%—comprise adults aged 25 and older.[13]

A prevalent negative attitude and perception towards contact lenses exist among the youth population, potentially impacting their willingness to adopt and use contact lenses correctly. Implementing effective education programs has the potential to address and rectify these negative perceptions and attitudes, ultimately promoting improved and responsible usage of contact lenses among the younger demographic.[15]

While contact lenses are generally deemed safe and effective for vision correction [16], the potential for problems exists. One of the most severe complications associated with contact lens wear is microbial keratitis, a corneal infection that can lead to reduced vision or even blindness.[13] Young individuals, particularly students, often neglect to change contact lenses despite experiencing pain and redness, making them more susceptible to inappropriate and prolonged contact lenses use. [17]

The occurrence of complications in contact lens wear is strongly associated with the extent of compliance in wearing and caring for the lenses. A study disclosed a high percentage of non-compliance to general instructions given regarding care and maintenance. Particularly alarming was the substandard compliance found in the prolonged wearing schedule beyond 8 hours (64% of subjects) and not taking proper care of lens cases (38% of subjects).[18]

Improving patient compliance is challenging, but primary eye care practitioners are crucial in mitigating complications. Emphasizing all aspects of lens care instructions, especially during follow-up visits, aims to minimize the risk of contamination and ocular complications.[18]

In the face of these challenges, studies indicate that young individuals, especially students, exhibit a concerning lack of knowledge about the hygiene and care of contact lenses. For instance, a study revealed that 18.5% continued wearing contact lenses while sleeping, 6.5% washed their lenses with tap water, and 28.3% admitted to swimming in the sea with contact lenses.[17] These findings underscore a pervasive lack of knowledge about contact lens proper care, storage and compliance among contact lens wearers regarding the potential complications associated with contact lens use, despite the exponential increase in their usage.[16]

Observations indicate that students using contact lenses have a notably low level of knowledge about the care and hygiene of contact lenses. Approximately 48.7% of students reported learning how to wear/remove contact lenses from an optician, indicating a significant gap in knowledge acquisition.[17]

Approximately 38.01% of respondents obtained contact lenses without a proper medical prescription over the counter and did not receive adequate usage instructions from the source. This underscores the importance of optometrists intensifying their efforts to inform and educate

wearers about the crucial aspects of contact lens care, especially considering the heightened necessity for hygiene due to frequent usage.[19]

Emphasizing regular eye check-ups is crucial for young contact lens wearers, as only 5.06% of students reported undergoing eye check-ups both before and after wearing contact lenses.[20]

Despite the availability of contact lenses with a wide range of powers, parameters, designs, materials, enhanced performance, and success rates, Africa lags behind other regions in the global contact lens market. This disparity raises questions about the accessibility and awareness of contact lens options in the continent. [21]

In the context of the increasing popularity of contact lenses as a vision correction option, there is a notable gap in our understanding of the knowledge and attitudes of contact lens wearers towards essential aspects of contact lens hygiene and complications. Addressing this gap is vital for improving eye health outcomes and ensuring the safe and effective use of contact lenses.

1.3 JUSTIFICATION OF STUDY

Studying the knowledge and attitude of contact lens wearers, particularly university students, regarding contact lens hygiene and complications is of considerable importance. This investigation delves into the various facets of awareness and perspectives among this demographic, offering insights that extend beyond individual eye health.

The findings from such a study can directly impact the well-being of contact lens wearers by shedding light on their adherence to recommended hygiene practices. Identifying gaps in knowledge or lapses in compliance can inform targeted educational initiatives aimed at preventing infections and complications associated with contact lens use.

Moreover, this research contributes to the broader public health landscape, especially within university campuses where a concentrated population of young adults resides. Understanding the attitudes and knowledge of this demographic can aid in formulating strategies to reduce the overall incidence of contact lens-related complications.

In addition, insights from the study can inform the development of educational programs tailored to university students. These programs can enhance awareness about the significance of proper contact lens hygiene, fostering a more informed and responsible contact lens-wearing community.

The study's relevance extends to considerations of quality of life for individuals with refractive errors. By ensuring that contact lens users possess accurate information and positive attitudes towards hygiene, the research contributes to a more positive and healthy experience with contact lens wear.

Furthermore, investigating attitudes towards complications provides valuable insights into how seriously contact lens wearers perceive potential risks. This information is crucial for promoting behaviors that support long-term eye health and minimize the risk of chronic issues associated with contact lens use.

Ultimately, the study's outcomes can influence the development or refinement of policies and guidelines related to contact lens use, particularly within educational institutions. This, in turn, contributes to creating a safer environment for contact lens wearers and aligning practices with the broader goal of promoting eye health.

1.4 RESEARCH QUESTIONS

1. Are contact lens wearers aware of the potential complications that can arise frrom poor contact lens hygiene?

2. What is the attitude of contact lens wearers towards contact lens hygiene?

3. Do contact lens wearers observe good hygiene practices?

4. What are the risk factors that influence contact lens wearers' adherence to proper contact lens hygiene practices?

5. Are contact lens worn for prescriptive purposes or cosmetic purposes?

1.5 OBJECTIVES

General Objective

To assess the level of knowledge, attitudes and determinants regarding proper contact lens hygiene among contact lens wearers in University of Benin, Benin-City.

Specific Objectives

1) To ascertain the level of knowledge among contact lens wearers regarding proper contact lens hygiene.

2) To assess the attitude among contact lens wearers regarding proper contact lens hygiene.

3) To identify the practice among contact lens wearers.

4) To identify the risk factors associated with improper contact lens hygiene.

CHAPTER TWO

2.1 KNOWLEDGE AMONG CONTACT LENS WEARERS REGARDING PROPER CONTACT LENS HYGIENE

A cross sectional study was carried out in 2017 among 50 medical students who were contact lens wearers in South India, to assess the knowledge, attitude and practice of medical students using contact lens. A structured interviewer based questionnaire was used and random sampling technique was employed in selecting the participants. About 17(34%) were aware of the over wear syndrome while 33(66%) were not. 31(62%) students were aware of acanthamoeba infection while 19(38%) were not. Only 28 (56%) students were aware that the lens solution can be used only for 3 months, once the seal of the solution bottle is broken.[22]

A cross sectional study was conducted using a structured questionnaire among the contact lens wearers among 121 medical students during their study period in Faculty of Medicine, University of Malaya. The aim of the study was to assess the knowledge related to contact lens wear and practice care of contact lenses among medical students. Multistage sampling technique was used. The result showed that majority of contact lens wearers were females (106, 87.6%); the duration of contact lens wear varied from less than six months to two years or more; 53 (43.8%) cited cosmetic purpose for wearing contact lens; 16 (13.2%) were not removing their contact lenses prior to sleeping at night. Despite 107 (88.4%) were aware of complications of contact lens usage, only 102 (84.3%) were adhering strictly to proper hygiene and contact lens care; and 17 (14%) continued wearing in spite of eye symptoms. Regarding the knowledge about complications associated with contact lens wear, 107 (88.4%) students were aware about the

occurrence of corneal ulcer and/or allergic reactions; 82 (67.8%) students were aware of Pseudomonas aeruginosa and Acanthamoeba as causative organisms for corneal ulcers.[23]

A cross sectional study was carried out in 2021 among 100 participants in India, to evaluate the user's knowledge, attitude, practice while using the contact lens and creating an awareness about their appropriate usage and possible complications of improper usage. A structured questionniare was used and random sampling technique was employed in selecting the participants. The results showed that majority of subjects 63% were aware of the possible symptoms of complications where as 37% admit that they do not know any of them. 91% participants do not wear contact lens when infected with conjunctivitis and rest 9% wore. 49% knew that use of water as cleaning solution for contact lens may cause Acanthamoeba infection. 79% knew that lens solution should not be used more than 6 months. 38% of subjects had no knowledge about microbial Keratitis which can be caused by long term use of same contact lens.[24]

A cross sectional study was carried out in 2019 to determine the prevalence of contact lens use among university students, their awareness on contact lens, and contact lens users' practices for the cleaning and care of contact lens in Turkey. A structured interviewer based questionnaire was used and random sampling technique was employed in selecting the participants. When students' levels of knowledge about the hygiene and care of contact lens were examined in Table 2, 20 (2.2%) of them stated that it would not be a problem to share contact lens, 75 (8.1%) contact lens could be sold outside the optical shops, 16 (1.7%) contact lens would not require the approvals of the Ministry of Health and Food and Drug Administration, 91 (9.8%) it was legal to purchase contact lens without a prescription, and 204 (22%) contact lens were used only for better vision purposes. The survey is included only university students in Sakarya, which may not be represent of the whole community. More comprehensive, multicenter studies could be done.[17]

A cross-sectional questionnaire based study conducted among 440 Jazan university students to determine the knowledge, attitude and practice regarding contact lens wearing and to sketch out the common related complications in Saudi Arabia. The sample was made using multistage simple random stratified technique. Data were collected using well-structured questionnaire. There was significant variation in the level of knowledge with regard to the gender difference (p vale = 0.000). In the female; the level of knowledge was excellent in 162 (59.3%), average in 83 (30.4%) and poor in 28 (10.3%). While in the male; the level of knowledge was excellent in 68 (41.2%), average in 35 (21.2%) and poor in 62 (37.6%). There were no significant differences with regard to specialization, residency and monthly income (p value; 0.191, 0.721, 0.538 respectively). The small sample size used in this study limited the precise results and accurate correlation. Large sampling cross sectional and more qualitative studies are needed for future studying.[25]

A cross-sectional questionnaire based study conducted among 450 adolescents in South Africa to assess and describe the knowledge, attitudes and practices of contact lens wearers aged 18 to 30 years, in the greater Durban area of South Africa. Non-probability purposive sampling was applied to recruit. Data were collected using semi-structured questionnaire. About half (49%; n = 121) of the respondents were aware of the brand name of their contact lens and of these only 43.7% (n = 108) replaced their lenses according to the manufacturer recommended replacement frequency. Knowledge of brand of contact lenses was found to be significantly associated with race ($\chi 2$ =16.89; p = 0.01). Just above half (51.8%; n = 128) of the respondents knew that the main reason for cleaning contact lenses was to reduce the risk of infections. However, a few (5.7%; n = 14) were aware that proper cleaning also aids in the removal of debris off the lens surface which is related to the finding that less than half (40%; n =98) of the respondents felt that

rubbing of the contact lenses during cleaning was necessary. While the majority (86.8%; n = 211) were aware of multi-purpose solutions as an appropriate cleaning and disinfection solution. Only 10.9% (n = 25) of respondents had knowledge of peroxide based cleaning solution. A minimum sample size of 375 was required, only 247 completed questionnaires were included in the analysis due to time constraints which limits generalization of the results.[31]

A cross sectional study was carried out in 2014 among 87 contact lens users in University of Cape Coast, Ghana to identify the demographic profile as well as the knowledge, attitude to wear and care regimen of wearers of contact lenses in Ghana. A semi structured based questionnaire was used and random sampling technique was employed in selecting the participants. When asked if they were informed or knew about the possible complications of wearing contact lenses, out of the 42 respondents, 33 (78.6%) responded YES, 4 (9.5%) responded NO and 5 (11.9%) were not sure. Subjects were asked if they had experienced eye problems due to contact lens wear. Out of the 42 respondents, 17 (40.5%) had experienced dry/gritty sensation in the eye, 11 (26.2%) experienced watering eye, 11(26.2%) experienced red eyes and 3 (7.1%) blurred vision. When asked what they did or would do if they experienced problems due to contact lenses wear/storage, 25 (59.5%) responded that they would report to the eye practitioner, 11 (26.2%) said they would remove the contact lenses, 4 (9.5%) responded that they would do both, 1 (2.4%) would do nothing and another 1(2.4%) would discontinue the use of contact lenses for some time. On how frequently respondents go for follow up visits, 24 (57.1%) said they go for yearly follow-ups, 8 (9.0%) go for monthly visits, 7 (16.7%) visit every six months, 2 (4.8%) visit every three months and 1 (2.4%) every four months. Access to contact lenses user population was difficult since very few visit the eye clinics for aftercare visits or to purchase contact lenses products.[12]

A cross-sectional survey using a structured questionnaire was conducted on 422 adult population of spectacle wearers to assess their knowledge of contact lens wear for vision correction in 2015. The participants were proportionately sampled from three eye clinics in the Cape Coast Metropolis, Ghana. Questionnaires were either self-administered or completed with the help of a research assistant. Of the 422 participants, only 147 (34.8%) knew of contact lens wear for vision correction. The proportion of spectacle wearers reporting history of contact lens wear was 14 (3.3%). Barriers to contact lens wear reported were satisfaction with vision through spectacles 102 (25.0%), lack of adequate information 111 (27.2%), fear of side effects 94 (23.0%) and cost 78 (19.1%). Some limitations must be acknowledged due to the use of both selfadministration and an interviewer for completion of the questionnaires, as well as the absence of a word for contact lens in the Fante language, which could affect knowledge of contact lenses in this population.[36]

2.2 ATTITUDE AMONG CONTACT LENS WEARERS REGARDING PROPER CONTACT LENS HYGIENE.

A cross sectional study was carried out in 2021 among 100 participants in India to evaluate the user's knowledge, attitude, practice while using the contact lens and creating an awareness about their appropriate usage and possible complications of improper usage. A structured questionnaire was used and random sampling technique was employed in selecting the participants. In the study 26% admit that they would surely recommend others to use contact lens, 60% of subjects were not sure and 14% did not suggest at all. 68% of participants choose spectacles over contact lens as there is no trouble of cleaning, disinfecting and storing. Most of the subjects 57% consider the routine care of contact lens (i.e., carrying lens case, spectacles as alternative) as troublesome. 65% of participants thought that use of contact lens restricts them from performing many daily activities (like travelling, swimming). Improvement in overall eye care activities was felt by 54% of the study subjects and 84% felt good and confident about the way they look after wearing contact lens.[24]

A cross sectional study was carried out in 2017 among 50 medical students who were contact lens wearer in South India, to assess the knowledge, attitude and practice of medical students using contact lens. A structured interviewer based questionnaire was used and random sampling technique was employed in selecting the participants. The study showed that 15(30%) students wear daily (<8 hours), 35(70%) wear daily (>8 hours); 2% wear occasional overnight. Around 11(22%) have continued using lenses beyond the expiry date while 39(78%) have never used beyond the expiry date.[22]

A cross sectional study was carried out in 2019 to determine the prevalence of contact lens use among university students, their awareness on contact lens, and contact lens users' practices for the cleaning and care of contact lens. A structured interviewer based questionnaire was used and random sampling technique was employed in selecting the participants. The study showed that 79 (83.2%) used glasses before wearing contact lens, 46 (48.9%) learned to wear/remove contact lens from an optician, 39 (41.1%) wore contact lens for an average of 8-12 hours in a day, 55 (57.9%) had been using contact lens for 2 years and above, 87 (91.6%) used lenses due to visual impairment, 59 (62.1%) purchased the brand recommended by the doctor while purchasing contact lens, 61 (64.2%) price was important while purchasing contact lens, 77 (81.1%) also had glasses at home while using contact lens, 84 (88.4%) purchased contact lens with a prescription, 8 (8.4%) increased the number of contact lens by themselves, 79 (83.1%) purchased contact lens from the optician, 37 (39.4%) had pain/stinging in the eye as a complication/side effect of contact lens, 65 (71.4%) had pain and redness in their eyes during contact lens use and 61 (64.2%) used glasses for a while in this case, 69 (74.2%) went to doctor check in the recent year, 50% (n=46) were informed about the use of contact lens by an ophthalmologist, nurse, or optician in the recent year, and 93 (97.3%) not shared their contact lens. The survey is included only university students in Sakarya, which may not be represent of the whole community. More comprehensive, multicenter studies could be done.[17]

A cross-sectional questionnaire based study conducted among 440 Jazan university students to determine the knowledge, attitude and practice regarding contact lens wearing and to sketch out the common related complications in Saudi Arabia. The sample was made using multistage simple random stratified technique. Data were collected using well-structured questionnaire. The study showed 67% of them used contact lens for cosmetic reasons, while 12% of them indicated

their use for medical causes. 55% of the wearers agreed upon the important of having an eye examination before contact lens wearing and 48% agreed upon the important of having periodic check-up. Internet, friends and families represented the main source of information (30%, 29%, and 26 % respectively). The small sample size used in this study limited the precise results and accurate correlation. Large sampling cross sectional and more qualitative studies are needed for future studying.[25]

A cross-sectional survey in September 2018, using convenience sampling and interviewed 400 individuals, aged 16-25, to assess their knowledge, attitude, and practices towards contact lenses in Pakistan. The sample was made using convenient technique. Data were collected using well-structured questionnaire. A greater portion of the participants (n=211, 52.8%) were conscious about the fact that contact lenses should be cleaned daily, while a small portion (n=147, 36.8%) believed that it should be done on weekly basis. We also discovered that almost three-fifths of the participants (n=234, 58.5%) considered laziness as one of the most important reasons that hold people back from cleaning their contact lenses. This study is limited in the sense that it only assesses whether teenagers in Karachi know about contact lenses, further studies should be carried out in other areas of Pakistan which may cover small rural areas and different demographics.[16]

A cross-sectional questionnaire based study conducted among 450 adolescents in South Africa to assess and describe the knowledge, attitudes and practices of contact lens wearers aged 18 to 30 years, in the greater Durban area of South Africa. Non-probability purposive sampling was applied to recruit. Data were collected using semi-structured questionnaire. The majority (77.7%; n = 192) of respondents believed that they were competent contact lens wearers with the older respondents more likely to consider themselves as competent contact lens wearers ($\chi 2 = 68.496$;

p = 0.002). While most of the respondents felt that the cleaning of contact lenses and contact lens cases were necessary (94.4%; n = 233 and 77.3%; n = 191, respectively), 34.9% (n = 86) felt that washing of hands prior to contact lens handling was unnecessary. Almost one-third (32%; n = 79) of the respondents believed that regular aftercare follow-up visits to the optometrist should be optional. Despite the concerning attitudes towards hand hygiene and aftercare visits, 58.2% (n = 146) felt that contact lenses should be replaced according to the wearing schedule and not necessarily only relating to the comfort level. Only 10.9% (n = 25) of respondents had knowledge of peroxide based cleaning solution. a minimum sample size of 375 was required, only 247 completed questionnaires were included in the analysis due to time constraints which limits generalization of the results.[31]

A cross sectional study was carried out in 2014 among 87 contact lens users in University of Cape Coast, Ghana to identify the demographic profile, as well as the knowledge, attitude to wear and care regimen of wearers of contact lenses in Ghana. A semi structured based questionnaire was used and random sampling technique was employed in selecting the participants. Out of the 42 respondents, 30 (71.4%) reported that they clean their contact lenses according to the instructions given to them by eye practitioners during dispensing while 8 (19.1%) said they do so per the instructions on the patients' information leaflet that comes with the product, and 4 (9.5%) said they referred to the internet. All of them confirmed washing the hands before fitting. When respondents were asked if they changed their solutions daily, out of the 42, 30 (71.4%) responded in the affirmative and 12 (28.6%) confirmed they did not change it on daily basis. Out of the 12, 5 (41.7%) said they changed their solutions every two days, 2 (16.7%) changed theirs every three days and 2 (16.7%) changed theirs every five days in a week and 3 (25.0%) failed to indicate how frequently they changed their solution. Access to contact

lenses user population was difficult since very few visit the eye clinics for aftercare visits or to purchase contact lenses products.[12]

A cross sectional study was carried out in 2023 among 171 contact lens wearer in Gauteng, South Africa to identify levels of compliance with recommended care regimens by probing the attitudes and behaviours of soft contact lens wearers. Data were collected quantitatively via convenience sampling, also data were collected from contact lens wearers using semi-structured, self-administered online questionnaires. Just over half (52%) of contact lens participants in this study felt it was necessary to have a pair of current prescription spectacles. Therefore, there is a possibility that close to half of contact lens wearers in this study overwear lenses as they are not in possession of updated spectacles. Interestingly, of the 171 contact lens participants in this study, 77% confirmed that an optometrist provided them with instructions on the contact lens care regimen, while 23% reported never having received instructions. There was a lower uptake rate by participants than anticipated, and this could be attributed to contact lens wearers not being aware of the study, or not wishing to complete a questionnaire because of time constraints.[32]

2.3 PRACTICE AMONG CONTACT LENS WEARERS

A cross sectional study was carried out in 2017 among 50 medical students who were contact lens wearer in South India, to assess the knowledge, attitude and practice of medical students using contact lens. A structured interviewer based questionnaire was used and random sampling technique was employed in selecting the participants. Maximum students 49(98%) use lens solution regularly, while 1(2%)used water to clean lenses. 15(30%) students wear contact lens while swimming.[22]

A cross sectional study was conducted using a structured questionnaire among the contact lens wearers among 121 medical students during their study period in Faculty of Medicine, University of Malaya. The aim of the study was to assess the knowledge related to contact lens wear and practice care of contact lenses among medical students. Multistage sampling technique was used. The result revealed One hundred and ten (90.9%) students washed their hands before handling contact lenses; 102 (84.3%) claimed to adhere strictly to contact lens cleaning and maintenance instructions. Regarding the practice of changing the contact lens storage solution daily at night and washing the contact lens cases daily, 96 (79.3%) students were actually doing so. An even higher number (103, 84.5%) admitted not practicing the use of enzyme tablets weekly to clean their lenses.[23]

A cross sectional study was carried out in 2021 among 100 participants in India, to evaluate the user's knowledge, attitude, practice while using the contact lens and creating an awareness about their appropriate usage and possible complications of improper usage. A structured questionniare was used and random sampling technique was employed in selecting the participants. It was observed that 77% of the participants use contact lens for a minimum of 10 hours whereas 23%

wore them greater than 10 hours. Majority of subjects 91% washed their hands before handling contact lens and 9% did not. 85% of wearers discarded contact lens beyond the expiry date whereas 15% continued to wear contact lens beyond expiry date. Purpose of wearing contact lens for refractive use was observed in 29%, for cosmetic use in 22% of subjects and 49% of them wore contact lens for partly refractive and partly cosmetic purpose. Majority of subjects 54% used to clean their lens case daily, 25% weekly, 7% monthly and 14% rarely. 3% of study subjects replaced lens solution with saline solution for many times and 9% for some time whereas 88% had never replaced it.[24]

A cross sectional study was carried out in 2019 to determine the prevalence of contact lens use among university students, their awareness on contact lens, and contact lens users' practices for the cleaning and care of contact lens. A structured interviewer based questionnaire was used and random sampling technique was employed in selecting the participants. 81 (85.3%) cleaned the lens container and filled it with new solution when the solution in the container was reduced, 17 (18.5%) continued

wearing contact lens while sleeping, 6 (6.5%) washed contact lens with tap water and 26 (28.3%) of them stated that they swam in the sea with contact lens. The survey is included only university students in Sakarya, which may not be represent of the whole community. More comprehensive, multicenter studies could be done.[17]

A cross-sectional questionnaire based study conducted among 440 Jazan university students to determine the knowledge, attitude and practice regarding contact lens wearing and to sketch out the common related complications in Saudi Arabia. The sample was made using multistage simple random stratified technique. Data were collected using well-structured questionnaire.

With regards to sharing of contact lens with others; 61.9% of the wearers never or rarely shared the contact lens with others, while 19.2% of the wearers always or frequently share contact lens with others. 73.1% of the wearers used to clean the contact lenses after each use and only 10.4% rarely or never clean them after each use. The majority of the wearers (83.9%) used to clean their hands before wearing or removing the contact lenses, while only 2.1% of them never clean their hands before wearing or removing of them. With regard to the use of contact lens solution for cleaning; 90% of the wearers used it for cleaning and only 2.1% of them never used it for cleaning. The small sample size used in this study limited the precise results and accurate correlation. Large sampling cross sectional and more qualitative studies are needed for future studying.[25]

A cross-sectional questionnaire based study conducted among 450 adolescents in South Africa to assess and describe the knowledge, attitudes and practices of contact lens wearers aged 18 to 30 years, in the greater Durban area of South Africa. Non-probability purposive sampling was applied to recruit. Data were collected using semi-structured questionnaire. The majority (71.3%) of respondents employed an effective and thorough method of cleaning their hands prior to contact lens handling, which involved utilizing water and soap (73.3%; n = 181)) while 10.9% (n = 27) utilized hand sanitizer only. More than half (58.7%; n =145) of respondents reported complying with the instructions given to them by their optometrist. Contact lenses were cleaned on a daily basis by the majority (77.2%; n = 190) of the respondents, with the frequency of cleaning being significantly associated with wearing schedule ($\chi 2$ =39.013; p= 0.03). Only 10.9% (n = 25) of respondents had knowledge of peroxide based cleaning solution. a minimum sample size of 375 was required, only 247 completed questionnaires were included in the analysis due to time constraints which limits generalization of the results.[31]

A cross-sectional questionnaire based study conducted in 2013 among 242 students of University Of Calabar, Nigeria to assess the level of awareness and use of contact lens among tertiary students and to evaluate lens care practices among contact lens users. Random sampling was applied to recruit participants. Data were collected using self-administer questionnaire. Concerning contact lens care, 52% washed their hands before handling contact lens, while 55.1% followed the regimen of cleaning and disinfection of their contact lenses. 46.9% used the commercially prepared lens solution to clean their contact lens, 21.4% of students used tap water to clean their contact lens.[33]

A cross sectional study was carried out in 2023 among 171 contact lens wearers in Gauteng, South Africa to identify levels of compliance with recommended care regimens by probing the attitudes and behaviours of soft contact lens wearers. Data were collected quantitatively via convenience sampling, also data were collected from contact lens wearers using semi-structured, self-administered online questionnaires. Approximately 53% of participants reported changing their contact lens cases with each new bottle of multipurpose solution opened and 47% did not do so. Two-thirds (66%) of participants used fresh contact lens solution daily. Approximately a third (34%) of contact lens wearers showed low compliance with case hygiene regimen and did not discard solution in the case daily. A third (33%) of participants never slept with contact lens in situ, 29% seldom did so and 26% did so occasionally, while at least 12% slept with contact lens in situ almost all the time. Although the frequency of sleeping with contact lens inserted was generally low, it was significantly higher among the unemployed than the self-employed ($p = 0.01$). Frequency of handwashing before inserting and removing contact lens from the eyes was generally high at 80%. Use of contact lens in situ while showering or swimming was also probed, and it emerged that 47% of participants seldom or never swam or showered while wearing

contact lens; 43% did so occasionally and 10% every time or close to all the time. There was a lower uptake rate by participants than anticipated, and this could be attributed to contact lens wearers not being aware of the study, or not wishing to complete a questionnaire because of time constraints.[32]

2.4 RISK FACTORS ASSOCIATED WITH IMPROPER CONTACT LENS HYGIENE

A cross sectional study was carried out in 2019 among 33 patients attending the university optometry teaching clinic to assess ocular complications in contact lens wear and the risk factors. A structured questionnaire was used and random sampling technique was employed in selecting the participants. Overall, findings indicate that conjunctival hyperemia was the most prevalent complication. Poor lens fit was associated with Limbal Injection and Contact Lens Papillary Conjunctivitis. Sleeping with lenses was the most non-compliant behavior. Eye care practitioners need to be alarmed by these risk parameters among the young wearers. The limitations of the present study are that this is a retrospective analysis where complications were seen only for mild to moderate cases of daily wear, thus not suitable to extrapolate to those using extended wear lenses.[26]

A case–control study was conducted at the University Hospital Southampton Eye Casualty from October to December 2015. Two participant groups were recruited: cases were contact lens wearers presenting with microbial keratitis and controls were contact lens wearers without infection. Participants underwent face-to-face interviews to identify lens wear practices, including lens type, hours of wear, personal hygiene and sleeping and showering in lenses. Overall, 37 cases and 41 controls were identified. Showering in contact lenses was identified as the greatest risk factor (OR, 3.1; 95% CI, 1.2 to 8.5; p=0.03), with showering daily in lenses compared with never, increasing the risk of microbial keratitis by over seven times (OR, 7.1; 95% CI, 2.1 to 24.6; p=0.002). Other risks included sleeping in lenses (OR, 3.1; 95% CI, 1.1 to 8.6; p=0.026), and being aged 25–39 (OR, 6.38; 95% CI, 1.56 to 26.10; p=0.010) and 40–54 (OR, 4.00; 95% CI 0.96 to 16.61; p=0.056).[27]

A study was carried out in 2016 among 210 participants to investigate independent risk factors for contact lens-related microbial keratitis in Singapore and estimate their impact on disease load. A previously validated questionnaire describing contact lens wear history, hygiene and compliance habits, and demographics. In all, 58 cases of microbial keratitis and 152 contemporaneous controls were identified. When controlling for other variables, Chinese had a 7× lower risk compared with other races (95% CI: 2.3–21.3, P = 0.001). Those aged between 25 and 44 years were at 3× increased risk compared with younger wearers (95% CI: 1.1–9.6, P =0.04). Occasional overnight contact lens wear (less often than one night per week) was associated with a 4× higher risk (95% CI: 1.2–15.4, P = 0.03) compared with daily use. Not washing hands before handling was associated with a 13× increased risk (95% CI: 1.9–84.8, P =0.008).[28]

Another study was carried out in 2024 among 895 students aimed to assess the knowledge, attitude and practice in contact lens users registered in various programs in a university in Malaysia. A pilot-tested and pre-validated closed-end questionnaire was administered. The sample size for each group, medical and non-medical students was calculated using a stratified sampling method based on the ratio of university enrollment. The prevalence risk of contact lens users was a little higher in the N group (M=39.0%; N=46.8%) but statistically not significant ($\chi 2$ =3.057, df=1, $p<0.05$). The knowledge about contact lens hygiene and complications was not significantly different between the two groups (U=10370, z=–1.645, $p<0.05$). However, there was a significant difference in the attitude towards contact lens wear and care (U=9268, z= –2.751, $p>0.05$) and practice of lens wear and care (U=8770, z=–3.318, $p>0.05$). The findings of this study are based on subjective patient-reported responses, which may sometimes be

influenced by deceit, yet there is sufficient reason for contact lens practitioners to be concerned about the attitudes and practices of contact lens users.[29]

A study was carried out in 2021 among 319 participants to determine level of compliance with common practices regarding contact lens storage case hygiene and replacement, type of information provided by practitioners and risk perception. The link to the online survey was distributed between March 15, 2021 and April 30, 2021 through personal and social networks of the authors. A snowball sampling strategy was adopted in which respondents were instructed to recruit future subjects from among their circle of acquaintances by sharing with them the link to the survey. Perceived risk associated with poor-compliance practices was high (median values of 4 and 5), and increased with educational level (P= .02, regarding hand-washing; P= .03, regarding case hygiene), years of contact lens wear experience (P< .001, regarding hand-washing) and in those patients provided with specific information on contact lens case care (P= .01, regarding case replacement).[30]

A study was carried out in 2017 among 260 participants to determine the contact lens hygiene-related risk behaviors and to explore the risk of water exposure for developing Al-Kharga in Egypt. A well structured questionnaire was employed. Random sampling technique was also used. The most important risk factors associated with development of Acanthamoeba Keratitis were female sex, sleeping while wearing contact lens and exposure to water resources through different practices. These practices included rinsing the contact lens case in tap water, swimming and/or showering while wearing contact lens, using multipurpose solution for cleaning the lenses, using water from over-building tanks. Rubbing the eyes due to discomfort when applying contact lens was an additional important risk factor associated with Acanthamoeba Keratitis.[34]

A retrospective cohort study was carried out in 2019 in two largest metropolises in Ghana, Accra and Kumasi among 117 patients to determine the complications associated with contact lens wear. A well structured questionnaire was employed. Contact lens complications were more common in females (52.90 %). The majority of complications were in soft contact lens wearers (82.35 %). Refractive error correction was the most common indication for contact lens wear (61.76 %) among those with complications, followed by keratoconus (14.71 %), scarred blind eye (14.71 %), corneal ulcer (5.88 %) and anterior staphyloma (2.94 %). Contact lens complications reported were giant papillary conjunctivitis (41.18 %), corneal infiltrates (23.53 %), bacterial keratitis (14.71 %), corneal abrasion (11.76 %), dry eye (5.88 %) and corneal edema (2.94 %). The causes of contact lens complication were inappropriate lens cleaning (29.41 %), poor hygiene (23.53 %), overnight contact lens wear (17.64 %), poor lens fit (14.71 %) and reaction to contact lens solution (14.71 %). A significant limitation was the small number of contact lens wear cases obtained which could have accounted for some of the differences found between the current and other similar studies.[35]

A cross-sectional survey using a structured questionnaire was conducted on 422 adult population of spectacle wearers to assess their knowledge of contact lens wear for vision correction in 2015. The participants were proportionately sampled from three eye clinics in the Cape Coast Metropolis, Ghana. Questionnaires were either self-administered or completed with the help of a research assistant. Although the number of males who knew of contact lens wear was higher than females, this difference was

not found to be significant (OR: 1.23, 95% CI: 0.68–2.23). Ninety-four (64.0%) of the spectacle wearers who knew of contact lens wear were in the age range 18–30 years. Spectacle wearers aged 41–50 years were significantly less likely (OR: 0.19, 95% CI: 0.04–0.90) to know of

contact lens wear compared to those aged 20 years and below. Also, spectacle wearers that had changed their spectacle lenses 6–10 times and more were significantly more likely to know of contact lens wear than their counterparts that had never changed their spectacle lenses. Other characteristics including the spectacle wearers' educational status, occupation, refractive status, presence of astigmatic correction, presence of near correction and spectacle wear duration were not significantly associated ($p > 0.05$) with knowledge of contact lens wear. Some limitations must be acknowledged due to the use of both self administration and an interviewer for completion of the questionnaires, as well as the absence of a word for contact lens in the Fante language, which could affect knowledge of contact lenses in this population.[36]

CHAPTER THREE

MATERIALS AND METHODS

3.1 STUDY AREA

This study was conducted in the University of Benin (UNIBEN), Edo State, Nigeria. Edo State is one of the 36 states in Nigeria with its capital as Benin City. It is located in the South-South geopolitical zone of Nigeria. Edo State is bounded by the states of Kogi to the northeast and east, Anambra to the east, Delta to the southeast and south, and Ondo to the west and northwest; the Niger River flows along the state's eastern boundary. Benin City is the state capital and largest urban centre. The state consists of closely related ethnic groups including Benin, Esan, Etsako, Owan and other tribes that reside in the state. There are seven (7) universities in the state comprising one federal university, two state universities and four private universities.[37]

The University of Benin is located in Ovia North-East Local Government Area (LGA) which is one of the eighteen (18) Local Government Areas in Edo State. It is a public university owned by the federal government of Nigeria. It was founded in 1970, started out as an institute of technology and was accorded the status of a full-fledged university by the National Universities Commission on the 1st of July, 1971. The university was originally owned by the state government, but became a federal university on the 1st of April, 1975 when it was taken over by the federal government at the request of the state government.[38]

The university has two campuses – Ugbowo and Ekenwan campuses. The current Vice Chancellor is Prof. Lilian I. Salami. The University is officially accredited and recognized by the National Universities Commission, Nigeria. It offers courses and programs leading to officially recognized higher education degrees in several areas of study. It has a student enrollment of

38,309 full-time students; and 4,000–4,499 academic staff. The faculties in UNIBEN include Agriculture, Arts, Education, Engineering, Engineering Sciences, Environmental Sciences, Humanities, Life Sciences, Management Sciences, Pharmacy, Physical Sciences, Social Sciences, Veterinary Medicine and a College of Medical Sciences composed of the Schools of Medicine, Dentistry, Basic Medical Sciences and the Institute of Child Health.[38]

The University has a website where a portal exists and students can log into their personal portal. The students can also monitor their academic progress and also make payments to the institution via the portal after logging in with their student identity number and password.[39]

3.2 STUDY DESIGN

A descriptive cross-sectional study design was used for this study.

3.3 STUDY POPULATION

The study was carried out amongst undergraduates of the University of Benin, Benin-City.

3.4 SELECTION CRITERIA

3.4.1. Inclusion Criteria

1. Undergraduate students who use contact lenses who were available at the time of study and willingly to participateUndergraduate students who have worn contact lens for at least a month.

3.4.2. Exclusion Criteria

1. Undergraduate students who did not use contact lenses.
2. Undergraduate students who did not consent to the study.

3.5 STUDY DURATION

The study was conducted between June 2023 and September 2024.

3.6 SAMPLE SIZE DETERMINATION

This will be calculated using the Cochran's formula for single proportions.

$$\mathbf{n = \frac{Z^2pq}{d^2}}$$

Where,

n = minimum sample size

z = standard normal deviate

p = prevalence or proportion of population with characteristic of interest

q = 1-p

d = degree of precision desired

z = 1.96 at 95.0% confidence interval

p = 0.866 prevalence of 86.6% represented the proportion of respondents that never shared contact lens after receiving a post test in a 2022 Indian study.[40]

q = 1-0.854 = 0.134

d = degree of precision desired set at 0.05

Substituting the above in the equation;

$n = 1.96^2 \times 0.866 \times 0.134 / 0.05^2$

$n = 178.3$

$n = 178.3$

To make room for non response, 10% non response rate will be added to the minimum sample size utilizing the formula of Non response rate

$$n_f = \frac{n}{1 - nr}$$

Where; n_f = Final Minimum Sample Size

n = Minimum Sample Size

nr = Non response rate at 10% = 0.1

$$nf = \frac{178.3}{1 - 0.1}$$

$$nf = \frac{178.3}{0.9} = 198.1$$

A design effect of 2 will be used for this study;

$2 \times 198.1 = 396.2$

However, a total of 400 respondents will be used for this study.

3.7 SAMPLING TECHNIQUE

Respondents for the study were selected using a multi-stage sampling technique that involves four (3) stages. Respondents met the inclusion criteria were selected consecutively until the targeted sample size was reached.

Stage 1: Selection of Faculties

A list of the 15 faculties in the Ugbowo campus was obtained from the Central Records Processing Unit Division, University of Benin. Eight faculties were selected using simple random sampling by balloting.

Stage 2: Selection of Department

The total numbers of departments in each faculty was gotten from the faculty secretary of the respective faculties and one department per faculty were selected using simple random sampling by balloting.

Stage 3: Selection of Respondents

The sampling frame of each stratum was obtained from the administrative offices of the various health institutions. The sample size of each stratum was determined.

Proportional / Ratio allocation was used to determine the number of respondents in each stratum based on the size of the total population, so it is proportionally representative of the total population sample of resident doctors.

Sampling fraction was calculated as follows:

Sampling fraction (SF)= n/N Where:

n = Sample size

N = Population size

Y = number of each population size

S/N	DEPARTMENT	NO OF STUDENTS	NO OF SELECTED STUDENTS
1	Computer Engineering	414	44
2	Dentistry	123	12
3	Geology	228	42
4	Law	874	85
5	Linguistics	867	70
6	Medical Laboratory Sciences	452	44
7	Medicine	738	72
8	Plant Biology and Biotechnology	573	55

3.8 DATA MANAGEMENT

3.8.1 Tools For Data Collection

Structured questionnaire containing open and close ended questions that seek to answer the study objectives was used to collect data. The questionnaire was adapted from a study on knowledge, attitude and practice of contact lens users among South-Indian Population[24]. The questionnaire consist of 34 questions which were modified to answer the objective and was divided into 5 sections.

Section A: Socio-demographic data characteristics

This section gathered information on the respondents' sociodemographic data, seeking to answer questions regarding the respondents' age, gender, ethnic group, religion, marital status, department, type of refractive error and purpose of wearing contact lens.

Section B: Knowledge of proper contact lens hygiene among wearers

This section had 10 questions that assessed their knowledge on contact lens hygiene such as; cleaning contact lens, replacement of contact lens, storage of contact lens, solutions used and complications of use.

Section C: Attitude among Contact lens wearers regarding contact lens hygiene

This section had 9 questions that assessed the attitude of contact lens wearers towards contact lens hygiene to which they answered strongly disagree, disagree, neutral, agree and strongly agree.

Section D: Practice among contact lens wearers

This section had 11 questions that evaluated the practice of contact lens wearers regarding sleeping, sharing, cleaning, duration of time and replacement.

Section E: Risk factors associated with improper contact lens hygiene

This section had 6 questions that identified the risk factors associated with improper contact lens hygiene such as; frequency of replacement, cleaning, sleeping with contact lens.

3.8.2 Method of Data Collection

Questionnaire was self-administered. The respondents were allowed to complete the questionnaires in or around the lecture theaters where they felt safe and their privacy was ensured. Informed consent was obtained from the respondents and they were assured of confidentiality.

3.8.3 Pretest

The questionnaire was pretested at University of Delta (UNIDEL), Agbor, Delta State. This was done to enhance the comprehension, validity, reliability and sensitivity of data tool, with 10% of the minimum sample size (40 students) of the study. Any errors observed were appropriately corrected to improve the questionnaire before the actual study.

3.8.4 Data Analysis

All data was retrieved, sorted, screened for completeness, coded, collated and entered using an electronic statistical package IBM SPSS version 25 software for analysis before scoring. The statistical significance was set at $p< 0.05$ and 95% confidence interval.

3.8.5 Scoring

Data from questionnaires was collated, screened for completeness, correctness and coded.

Knowledge

Correct questions got a score of 1 and wrong questions got a score of zero. They were subsequently summed up and converted to percentages. Respondents with scores less than 60% had poor knowledge while those more than 60% had good knowledge.

Attitude

Attitude utilized 9 questions using a 5-point Likert scale graded 1 to 5 from strongly disagree to strongly agree. They were subsequently summed up and converted to percentages. Respondents with scores less than 60% had poor knowledge while those more than 60% had good knowledge.

Practice

Correct questions got a score of 1 and wrong questions got a score of zero. They were subsequently summed up and converted to percentages. Respondents with scores less than 60% had poor practice while those more than 60% had good practice.

3.9 DATA PRESENTATION

Results was presented in the form of prose, frequency tables, cross tables and bar charts.

3.10 ETHICAL CONSIDERATIONS

Ethical clearance and approval was sought from Ethical and Research Committee University of Benin Teaching Hospital, Benin-City with a code of ADM/E 22/A/VOL. VII/148654822.

Thereafter, approval was obtained from UBTH. Informed consent was taken from the respondents before administering the questionnaires. Names and addresses were omitted to ensure confidentiality. The respondents were informed, participation is voluntary, they had the right to withdraw from the interview at any time and withdrawal poses no loss or harm.

3.11 LIMITATION OF THE STUDY

The study relied on the information provided by the respondents and was constrained by potential errors arising from response bias, time limitations, or reluctance to participate in the research.

CHAPTER FOUR

RESULTS

A total of 400 respondents participated in this study with a response rate of 100%. The results are presented as follows:

Section A: Socio-demographic characteristics of respondents

Section B: Knowledge regarding contact lens use among respondents

Section C: Attitude among contact lens wearers regarding proper contact lens hygiene

Section D: Contact lens hygiene practice among contact lens wearers

Section E: Factors associated with improper contact lens hygiene

SECTION A:

SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variables	Frequency (n = 400)	Percent (%)
Age (years)		
17 – 19	124	31.0
20 – 22	184	46.0
23 – 25	67	16.8
> 25	25	6.2
Mean age ± SD (20.73 ± 2.539)		
Sex		
Female	331	82.7
Male	69	17.3
Religion		
Christian	395	98.7
Islam	5	1.3
Marital status		
Single	396	99.0
Married	4	1.0

The mean age of the respondents was 20.73± 2.539 SD, with 184 (46.0%) of the respondents falling within the 20 – 22 age group. Respondents aged 17 – 19 years were 124 (31.0%), those aged 23 – 25 years were 67 (16.8%), while >25 years were the least represented group, with only 25 (6.2%) respondents falling within this age bracket.

There were 331 (82.7%) females and 69 (17.3) males in the study. An overwhelming majority of the respondents, 395 (98.7%) were Christians and 5 (1.3%) were Muslims.

Most of the respondents 396 (99.0%) were single, while 4 (1.0%) were married.

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS CONTINUED

Variables	Frequency (n = 400)	Percent (%)
Ethnic group		
Benin	199	49.7
Igbo	71	17.7
Esan	36	9.0
Yoruba	29	7.2
Urhobo	19	4.8
Etsako	12	3.0
Afemai	6	1.5
Isoko	6	1.5
Ika	5	1.3
Owan	5	1.3
Ijaw	4	1.0
Ukwuani	4	1.0
Others*	4	1.0

*Kwale (2), Ibibio (2)

Benin was the most represented ethnic group with 199 (49.7%) respondents followed by Igbo with 71 (17.7%), Esan with 36 (9.0%) and Yoruba with 29 (7.2%).

The least represented ethnic groups were Kwale, Ibibio with 2 (0.5%) respondents each.

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS CONTINUED

Variables	Frequency (n = 400)	Percent (%)
Department		
Medicine	72	18.0
Dentistry	12	3.0
Law	85	21.3
Computer Engineering	40	10.0
Medical Laboratory Science	44	11.0
Linguistics	70	17.5
Geology	42	5.5
Plant Biology and Biotechnology	55	13.7

Most respondents, eighty-five (21.3%) were in Law, 72 (18.0%) were in Medicine, followed by Linguistics which had 70 (17.5%) respondents.

The least represented department was Dentistry with 12 (3.0%) respondents.

TABLE 2: CONTACT LENS RELATED CHARACTERISTICS OF RESPONDENTS

Variables	Frequency (n = 400)	Percent (%)
Type of refractive error		
Myopia	91	22.8
Hyperopia	14	3.5
Astigmatism	27	6.7
Presbyopia	5	1.3
None	263	65.7
Purpose for wearing contact lens		
Vision correctness	168	42.0
Cosmetic	99	24.7
Therapeutic	12	3.0
I don't know	121	30.3

Less than one-third respondents, ninety-one (22.8%) had myopia, 14 (3.5%) respondents had hyperopia, 27 (6.7%) respondents had astigmatism, while 5 (1.3%) respondent had presbyopia. The remaining 263 (65.7%) respondents did not have a refractive error. Most of the respondents, 168 (42.0%), wore contact lens to correct vision, while 99 (24.7%) respondents wore contact lens for cosmetic purpose.

SECTION B:

KNOWLEDGE AMONG CONTACT LENS WEARERS REGARDING PROPER CONTACT LENS HYGIENE

TABLE 3: KNOWLEDGE OF RESPONDENTS REGARDING PROPER CONTACT LENS HYGIENE

Variables	Frequency (n = 400)	Percent (%)
Type of contact lens		
Soft	104	26.0
Scleral	14	3.5
Combination of hard and soft	14	3.5
Rigid/hard	7	1.8
I don't know	261	65.2
Reason for wearing contact lenses*		
Cosmetic reason	148	37.0
Vision correction	193	48.2
Both vision correction and cosmetic reasons	199	49.8
Due to surgery or ocular disease	86	21.5
To see better through them	46	11.5

On type of contact lens worn, 104 (26.0%) respondents wore soft contact lens, 14 (3.5%) respondents each wore scleral lens or a combination of hard and soft lens. Seven (1.8%) wore hard lens, while 261 (65.8%) did not know the type of contact lens they wore.

One hundred and forty-eight (37.0%) respondents identified cosmetic reason as a reason for wearing contact lens, 193 (48.3%) respondents chose vision correctness with 199 (49.8%) respondents choosing both vision correction and cosmetic reason, while 86 (21.5%) respondents picked surgery or ocular disease as a reason for using contact lens.

TABLE 3: KNOWLEDGE OF RESPONDENTS REGARDING PROPER CONTACT LENS HYGIENE

Variables	Frequency (n = 400)	Percentage (%)
When cleaning contact lens		
I just rinse in saline and store in contact lens solution	144	36.0
It is important to rub the lenses slightly to loosen only deposits	92	23.0
It is important to rub the lenses to loosen the bacteria	42	10.5
It is not important to rub the lenses as I use multipurpose solution	26	6.5
I just have to rinse and store in the disinfection solution as it is multi-purpose	96	24.0
Why it is necessary to clean contact lens		
So, I don't get any infections	212	53.0
To remove any debris on my lenses	128	32.0
I don't think it is necessary to clean my contact lenses	14	3.5
To see better through them	46	11.5

On cleaning contact lens, 144 (36.0%) respondents chose rinsing in saline and store in contact lens solution, while the least representation was from 26 (6.5%) respondents who chose that It is not important to rub the lenses as I use multipurpose solution. Two hundred and twelve (53.0%) respondents picked prevention of infection as a reason for cleaning contact lens.

TABLE 3: KNOWLEDGE OF RESPONDENTS REGARDING PROPER CONTACT LENS HYGIENE CONTINUED

Variables	Frequency (n = 400)	Percent (%)
How often do you replace lens		
Daily	41	10.3
Twice a month	45	11.3
Monthly	186	46.4
Only when I cannot see anymore	128	32.0
Minimum hand hygiene before handling contact lens		
Washing your hands with water	63	15.8
Washing your hands with soap and water	241	60.2
Cleaning your hands with hands sanitizer	78	19.5
I don't know what's hand hygiene	18	4.5
Best way to store contact lens*		
Dry, without solution	89	22.3
In saline	130	32.5
In disinfecting solution	190	47.5
In water	38	9.5
In any other liquid	16	4.0

Most respondents, one hundred and eighty-six (46.4%) picked monthly as the frequency of replacing contact lens, 41 (10.3%) chose daily, while 45 (11.3%) chose twice a month. Two hundred and forty-one (60.2%) respondents chose washing hands with soap and water as minimum hand hygiene while handling contact lens, while 18 (4.5%) respondent did not even know the concept of hand hygiene. One hundred and ninety respondents (47.5%) identified disinfecting solution as the best way to store contact lens.

TABLE 3: KNOWLEDGE OF RESPONDENTS REGARDING PROPER CONTACT LENS HYGIENE CONTINUED

Variables	Frequency (n = 400)	Percentage (%)
Causes of contact lens complication*		
Infected lens	285	71.3
Over wearing the lens	103	25.8
A torn lens	133	33.3
Sharing contact lens	217	54.3
Sign or symptom of possible lens complication*		
Itching	255	63.7
Discharge	159	39.8
Pain	157	39.3
Blurred vision	241	60.3
Possible complications of contact lens non-compliance		
Corneal ulcers	146	36.5
Allergic conjunctivitis	204	51.0
Cataracts	169	42.3

On the causes of contact lens complications, majority of respondents, 285 (71.3%) picked an infected lens as a cause of contact lens complication, while 133 (33.3%) chose a torn lens, and 103 (25.8%) picked over wearing the lens. Itching was the most identified sign of contact lens complication accounting for 255 (63.7%) respondents, followed by blurred vision accounting for 241 (60.3%) respondents. Allergic conjunctivitis was the most identified possible complication of contact lens compliance accounting for 204 (51.0%) respondents, followed by cataracts and corneal ulcers accounting for 169 (42.3%) and 146 (36.5%) respondents respectively.

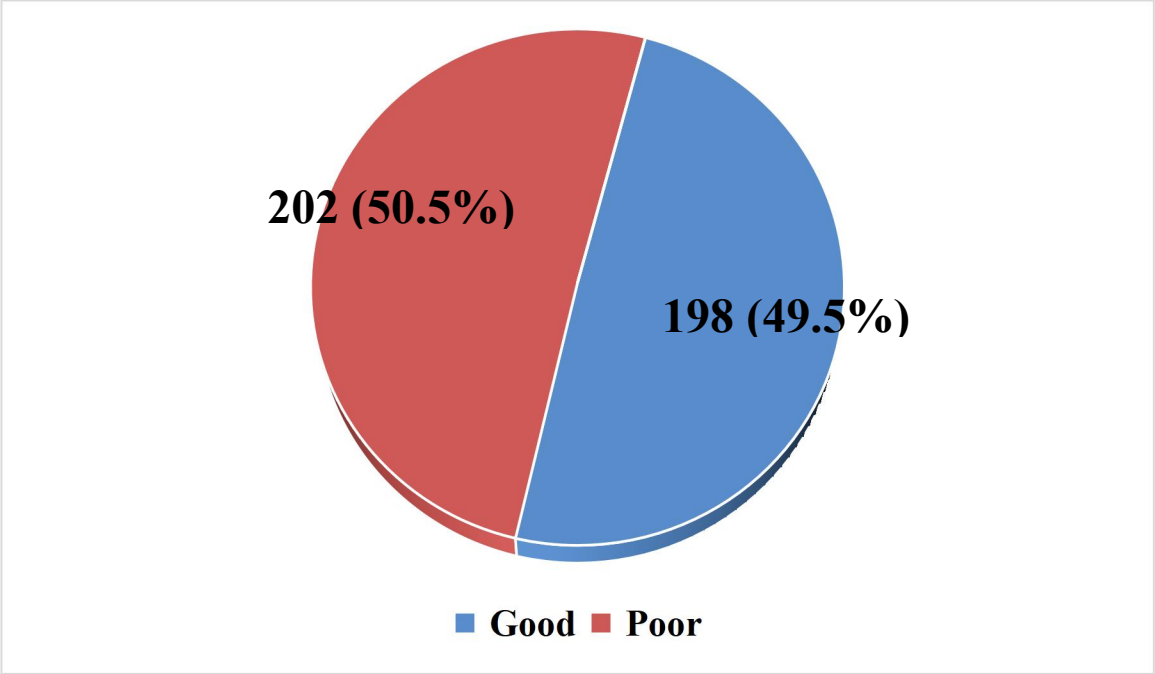

Figure 1: Overall knowledge regarding contact lens use among respondents.

More than half of the respondents had poor knowledge, up to 202 (50.5%) while 198 (49.5%) had good knowledge.

TABLE 4: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND KNOWLEDGE OF CONTACT LENS USE AMONG RESPONDENTS

Variables	Knowledge (n = 400)		Chi-square	p-value
	Good (%)	Poor (%)		
Age				
17 – 19	54 (43.5)	70 (56.5)	9.196	**0.027***
20 – 22	86 (46.7)	98 (53.3)		
23 – 25	43 (64.2)	24 (35.8)		
>25	15 (60.0)	10 (40.0)		
Sex				
Male	27 (39.1)	42 (60.9)	3.587	0.058
Female	171 (51.7)	160 (48.3)		
Religion				
Christianity	195 (49.4)	200 (50.6)	0.223	0.697
Islam	3 (60.0)	2 (40.0)		
Marital Status				
Single	194 (49.0)	202 (51.0)	4.122	**0.042***
Married	4 (100.0)	0 (0.0)		

***** statistically significant

Respondents aged 23 to 25 had better knowledge about contact lens use, with 43 (64.2%) having good knowledge compared to other age groups. The association between age and knowledge of sleep was statistically significant (χ^2=9.196; p=0.027).

A higher proportion of female respondents, 171 (51.7%), had good knowledge of contact lens use compared to male respondents, 27 (39.1%), but this association was not statistically significant (χ^2=3.587; p=0.058).

Regarding religion, respondents who identified with Islam had a slightly higher proportion of good knowledge, 3 (60.0%), compared to Christian respondents, 195 (49.4%). However, this association was not statistically significant (χ^2=0.223; p=0.697).

A greater proportion of married respondents, 4 (100.0%), had good knowledge of contact lens use compared to single respondents, 194 (49.0%). The association between marital status and knowledge of sleep was statistically significant (χ^2=4.122; p=0.042).

TABLE 5: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND KNOWLEDGE OF CONTACT LENS USE AMONG RESPONDENTS

Variables	Knowledge (n = 400)		Chi-square	p-value
	Good (%)	Poor (%)		
Department				
Medicine	50 (69.4)	22 (30.6)	19.889	**0.006***
Dentistry	6 (50.0)	6 (50.0)		
Medical Laboratory Science	20 (45.5)	24 (54.5)		
Law	37 (43.5)	48 (56.5)		
Linguistics	39 (55.7)	31 (44.3)		
Plant Biology and biotechnology	19 (34.5)	36 (65.5)		
Computer Engineering	17 (42.5)	23 (57.5)		
Geology	10 (45.5)	12 (54.5)		
Refractive error				
Myopia	49 (53.8)	42 (46.2)	3.273	0.513
Hyperopia	8 (57.1)	6 (42.9)		
Presbyopia	3 (60.0)	2 (40.0)		
Astigmatism	14 (51.9)	13 (48.1)		
None	124 (47.1)	139 (52.9)		

* statistically significant

A greater proportion of respondents from the Medicine department, 50 (69.4%), had good knowledge of contact lens use compared to those in other departments, with the lowest being from the Plant Biology and Biotechnology department, where 19 (34.5%) had good knowledge. The association between department and knowledge of contact lens use was statistically significant (χ^2=19.889; p=0.006).

Regarding refractive errors, respondents with myopia had a higher proportion of good knowledge of contact lens use, 49 (53.8%), compared to those with other refractive errors, such as hyperopia, presbyopia, and astigmatism. However, the association between refractive error and knowledge of contact lens use was not statistically significant (χ^2=3.273; p=0.513).

SECTION C:

ATTITUDE AMONG CONTACT LENS WEARERS REGARDING PROPER CONTACT LENS HYGIENE

TABLE 6: RESPONDENTS ATTITUDE REGARDING PROPER CONTACT LENS HYGIENE

Variables	Strongly disagree (n = 400) Freq (%)	Disagree (n =400) Freq (%)	Neutral (n=400) Freq (%)	Agree (n=400) Freq (%)	Strongly Agree (n=400) Freq (%)
Cleaning my contact lenses before wearing them is absolutely necessary	3 (0.8)	19 (4.8)	27 (6.8)	179 (44.8)	172 (43.0)
Cleaning my contact lens case daily is necessary	1 (0.3)	35 (8.8)	85 (21.3)	173 (43.3)	106 (26.5)
Washing your hands before handling contact lens is always necessary	9 (2.3)	5 (1.3)	44 (11.0)	166 (41.5)	176 (44.0)
I am a competent contact lens wearer	15 (3.8)	122 (30.5)	147 (36.8)	80 (20.0)	36 (9.0)
Going for regular contact lens follow-up visit to the optometrist should be necessary	5 (1.3)	9 (2.3)	53 (13.3)	203 (50.7)	130 (32.5)

About one-thirds, 179 (44.8%) of the respondents agreed that cleaning contact lenses before wearing them is absolutely necessary while about one-tenth, 19 (4.8%) disagreed. Over a quarter of the respondents, 173 (43.3%) agreed that cleaning contact lens case daily is necessary. Most respondents, 176 (44.0%) strongly agreed that washing hands before handling contact lens is always necessary. Most respondents 147 (36.8%) were neutral that they are competent contact lens wearer. Going for regular contact lens follow-up visit to the optometrist should be necessary was agreed by 203 (50.7%) of the respondents.

TABLE 6: RESPONDENTS ATTITUDE REGARDING PROPER CONTACT LENS HYGIENE CONTINUED

Variables	Strongly disagree (n = 400) Freq (%)	Disagree (n =400) Freq (%)	Neutral (n=400) Freq (%)	Agree (n=400) Freq (%)	Strongly Agree (n=400) Freq (%)
Contact lenses have been designed primarily to rid you of spectacles and make you look good	4 (1.0)	62 (15.5)	131 (32.8)	150 (37.5)	53 (13.3)
I decide when to replace my contact lens based on the wearing schedule and not necessarily on how they feel on my eye	14 (3.5)	143 (35.8)	106 (26.5)	100 (25.0)	37 (9.3)
The choice of contact lens solution should be based on what is best for safe wear and not I can afford	6 (1.5)	31 (7.8)	66 (16.5)	165 (41.3)	132 (33.0)
I am knowledgeable about contact lens solution	8 (2.0)	88 (22.0)	171 (42.8)	90 (22.5)	43 (10.8)

Over a quarter of the respondents, 150 (37.5%) agreed that contact lenses have been designed primarily to rid you of spectacles and make you look good. One hundred and forty-three (35.8%) respondents disagreed that contact lenses should be replaced according to the wearing schedule and not based on how they feel on the eye. Over one-third of the respondents, 165 (33.0%) agreed that the choice of contact lens solution should be based on what is best for safe wear and not I can afford. Most of the respondents, 171 (42.8%) were neutral on being knowledgeable about contact lens solution.

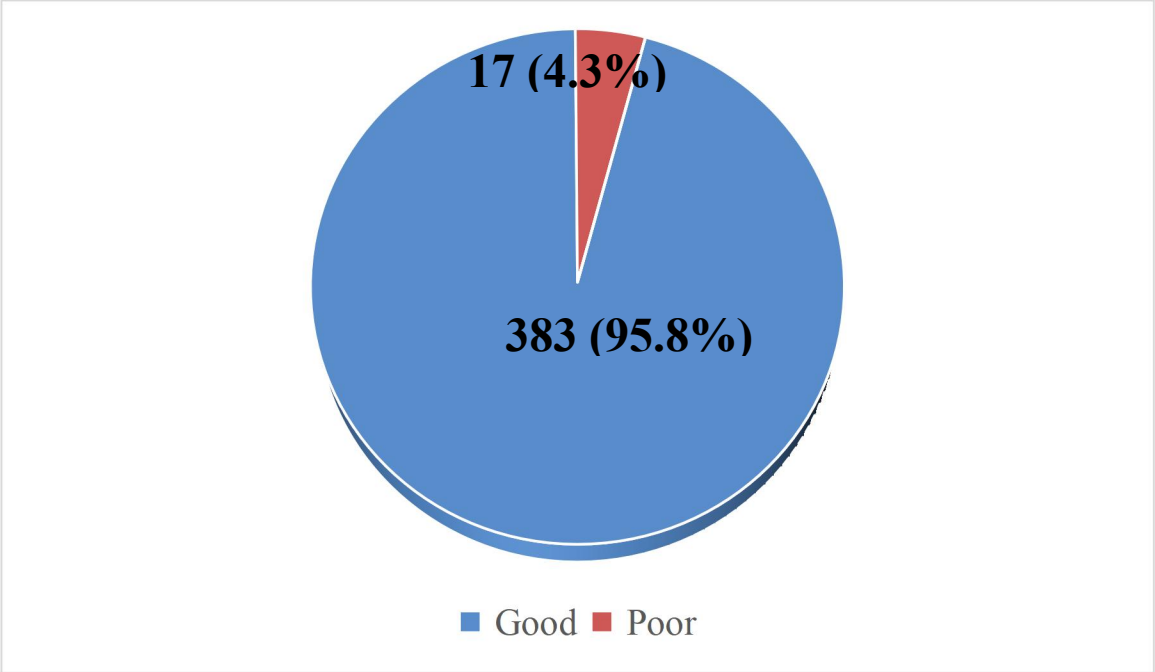

Figure 2: Overall attitude of undergraduate students towards the use of contact lens.

Majority of respondents had good attitude 383 (95.8%) while 17 (4.3%) had poor attitude.

TABLE 7: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND ATTITUDE OF CONTACT LENS USE AMONG RESPONDENTS

Variables	Attitude (n = 400)		Chi-square	p-value
	Good (%)	Poor (%)		
Age				
17 – 19	119 (96.0)	5 (4.0)	4.155	0.245
20 – 22	178 (96.7)	6 (3.3)		
23 – 25	64 (95.5)	3 (4.5)		
>25	22 (88.0)	3 (12.0)		
Sex				
Male	65 (94.2)	4 (5.8)	0.490	0.484
Female	318 (96.1)	13 (3.9)		
Marital Status				
Single	379 (95.7)	17 (4.3)	0.179	0.672
Married	4 (100.0)	0 (0.0)		

Respondents aged 20-22, up to 178 (96.7%) reported the highest positive attitude compared to other age groups. However, the association between age and attitude toward contact lens use was not statistically significant (χ^2=4.155; p=0.245).

A slightly higher proportion of female respondents, 318 (96.1%), had a good attitude toward contact lens use compared to male respondents, 65 (94.2%). This association between sex and attitude was not statistically significant (χ^2=0.490; p=0.484).

Single respondents showed a good attitude toward contact lens use, with 379 (95.7%) reporting a positive attitude, while all 4 (100.0%) married respondents also showed a good attitude. The association between marital status and attitude toward contact lens use was not statistically significant (χ^2=0.179; p=0.672).

TABLE 8: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND ATTITUDE OF NUTRITION ON EYE HEALTH AMONG RESPONDENTS

Variables	Attitude (n = 400)		Chi-square	p-value
	Good (%)	Poor (%)		
Department				
Medicine	66 (91.7)	6 (8.3)	8.199	0.315
Dentistry	12 (100.0)	0 (0.0)		
Medical Laboratory Science	43 (97.7)	1 (2.3)		
Law	80 (94.1)	5 (5.9)		
Linguistics	69 (98.6)	1 (1.4)		
Plant Biology and biotechnology	54 (98.2)	1 (1.8)		
Computer Engineering	39 (97.5)	1 (2.5)		
Geology	20 (90.9)	2 (9.1)		
Refractive error				
Myopia	85 (93.4)	6 (6.6)	3.273	0.513
Hyperopia	14 (100.0)	0 (0.0)		
Presbyopia	5 (100.0)	0 (0.0)		
Astigmatism	27 (100.0)	0 (0.0)		
None	252 (95.8)	11 (4.2)		

All the respondents from Dentistry, 12 (100.0%), had good attitude towards contact lens use compared to those in other departments, with the lowest being from the Geology department, where 20 (90.9%) had good attitude. The association between department and attitude towards contact lens use was not statistically significant (χ^2=8.199; p=0.315).

Regarding refractive errors, respondents with myopia had a lowest proportion of good attitude towards contact lens use, 85 (100.0%), compared to those with other refractive errors, such as hyperopia, presbyopia, and astigmatism. However, the association between refractive error and knowledge of contact lens use was not statistically significant (χ^2=3.273; p=0.513).

SECTION D:

PRACTICE AMONG CONTACT LENS WEARERS

TABLE 9: PRACTICE OF RESPONDENTS REGARDING CONTACT LENS HYGIENE

Variables	Frequency (n = 400)	Percent (%)
Sleep with contact lens		
Yes	12	3.0
No	361	90.3
Sometimes	27	6.8
Share contact lens with others		
Yes	18	4.5
No	375	93.8
Sometimes	7	1.8
Clean hands thoroughly before inserting and cleaning contact lens		
Yes	297	74.3
No	29	7.2
Sometimes	74	18.5
Method of cleaning hands		
Water and soap	257	64.3
Water only	76	19.0
Hand sanitizer	67	16.8
Shower while wearing contact lens		
Yes	37	9.3
No	333	83.3
Sometimes	30	7.5
Swim while wearing contact lens		
Yes	23	5.8
No	350	87.5
Sometimes	27	6.8
Swim while wearing contact lens and goggles		
Yes	51	12.8
No	327	81.8
Sometimes	22	5.5

Three hundred and sixty-one (90.3%) respondents do not sleep with their contact lenses while 12 (3.0%) sleep with theirs. Majority of respondents, 375 (93.8%) do not share their contact lens with others while 18 (4.5%) respondents share contact lens with others. Two hundred and ninety-seven (74.3%) respondents thoroughly clean their hands before inserting and cleaning contact lens, while 29 (7.2%) respondent do not. The use of water and soap was the most used method to clean hands, accounting for 257 (64.3%) respondents, followed by the use of water only and hand sanitizer accounting for 76 (19.0%) and 67 (16.8%) respondents respectively. Majority of respondents, 333 (83.3%) do not shower while wearing contact lenses, whereas 37 (9.3%) respondents do so. Three hundred and fifty (87.5%) respondents do not swim while wearing contact lens while 27 (6.8%) respondents do. Majority 327 (81.8%) of respondents do not swim while wearing contact lens and goggles whereas 51 (12.8%) do so.

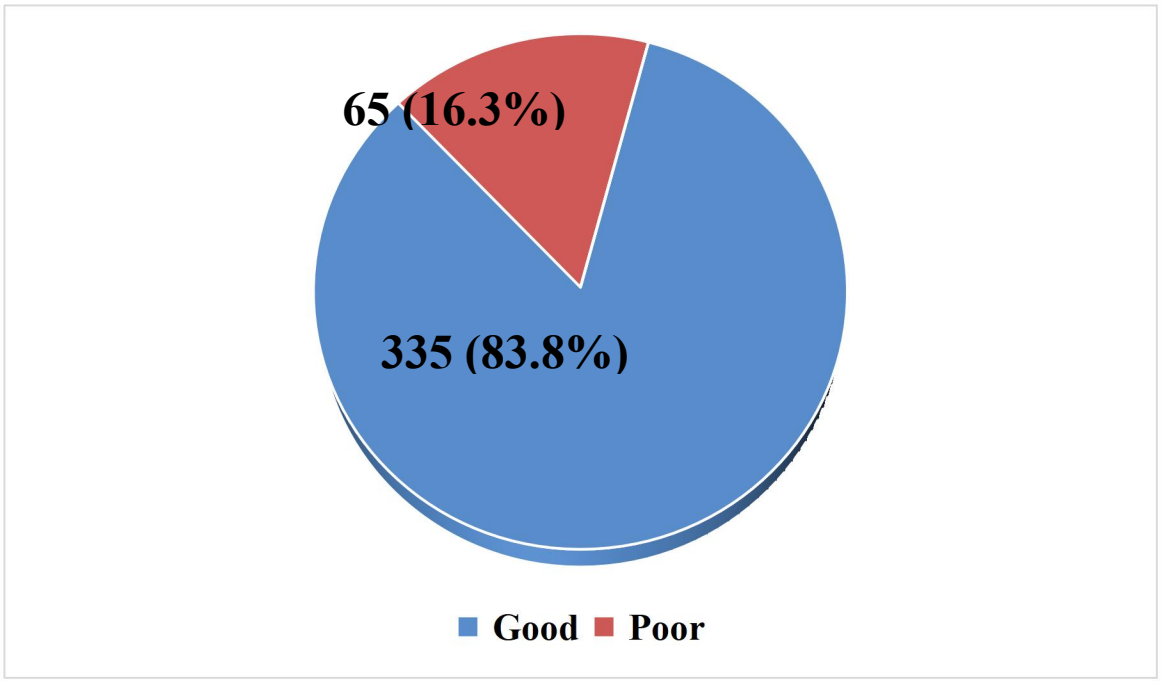

Figure 3: Overall practice of undergraduate students towards the use of contact lens.

TABLE 10: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND PRACTICE REGARDING CONTACT LENS USE AMONG RESPONDENTS

Variables	Practice (n = 400)		Chi-square	p-value
	Good (%)	Poor (%)		
Age				
17 – 19	100 (80.6)	24 (19.4)	1.633	0.652
20 – 22	155 (84.2)	29 (15.8)		
23 – 25	58 (86.6)	9 (13.4)		
>25	22 (88.0)	3 (12.0)		
Sex				
Male	60 (87.0)	9 (13.0)	0.630	0.427
Female	275 (83.1)	65 (16.9)		
Marital Status				
Single	331 (83.6)	65 (16.4)	0.784	0.376
Married	4 (100.0)	0 (0.0)		

Respondents older than 25 years had the best practice with 122 (88.0%) reporting a positive practice compared to other age groups. However, the association between age and practice toward contact lens use was not statistically significant (χ^2=1.663; p=0.652).

A slightly higher proportion of male respondents, 60 (87.0%), had a good practice toward contact lens use compared to female respondents, 275 (83.1%). This association between sex and practice was not statistically significant (χ^2=0.690; p=0.427).

All married respondents showed a good practice toward contact lens use, with 4 (100.0%) reporting a positive practice, while 331 (83.6%) single respondents also showed a good practice. The association between marital status and practice toward contact lens use was not statistically significant (χ^2=0.784; p=0.376).

TABLE 11: SOCIO-DEMOGRAPHIC CHARACTERISTICS AND ATTITUDE OF NUTRITION ON EYE HEALTH AMONG RESPONDENTS

Variables	Practice (n = 400)		Chi-square	p-value
	Good (%)	Poor (%)		
Department				
Medicine	66 (91.7)	6 (8.3)	8.057	0.328
Dentistry	9 (75.0)	3 (25.0)		
Medical Laboratory Science	36 (81.8)	8 (18.2)		
Law	72 (84.7)	13 (15.3)		
Linguistics	61 (87.1)	9 (12.9)		
Plant Biology and biotechnology	42 (76.4)	13 (23.6)		
Computer Engineering	32 (80.0)	8 (20.0)		
Geology	17 (77.3)	5 (22.7)		
Refractive error				
Myopia	76 (83.5)	15 (16.5)	3.888	0.421
Hyperopia	10 (71.4)	4 (28.6)		
Presbyopia	3 (60.0)	2 (40.0)		
Astigmatism	23 (85.2)	4 (14.8)		
None	223 (84.8)	40 (15.2)		

Respondents from Medicine, 66 (91.7%), had the highest proportion of good practice towards contact lens use compared to those in other departments, with the lowest being from the Plant Biology and biotechnology department, where 42 (76.4%) had good practice. The association between department and attitude towards contact lens use was not statistically significant (χ^2=8.057; p=0.328).

Regarding refractive errors, respondents with astigmatism had a highest proportion of good practice towards contact lens use, with 23 (85.2%), compared to those with other refractive errors, such as hyperopia, presbyopia, and myopia. However, the association between refractive error and knowledge of contact lens use was not statistically significant (χ^2=3.888; p=0.421).

SECTION E:

RISK FACTORS ASSOCIATED WITH IMPROPER CONTACT LENS HYGIENE

TABLE 12: RISK FACTORS AMONG RESPONDENTS ON IMPROPER CONTACT LENS HYGIENE

Variables	Frequency (n = 400)	Percentage (%)
How often do you clean your contact lens		
Everyday	207	51.7
Every 2-4 days	94	23.5
Every week	61	15.3
Every month	32	8.0
Never	6	1.5
Do you clean your contact lens strictly following the instructions of your optometrist or optician		
Yes	245	60.5
No	64	16.0
Sometimes	94	23.5
Do you use contact lens solution		
Yes	246	61.5
No	80	20.0
Sometimes	74	18.5
Do you use your contact lens solution past the expiry date		
Yes	28	7.0
No	322	80.5
Sometimes	50	12.5
How often do you replace your contact lens case		
Every month	154	38.5
Every three months	103	25.8
Every six months	59	14.8
Rarely/never	84	21.0
How often do you clean your contact lens case		
Daily	177	44.3
Weekly	126	31.5
Monthly	52	13.0
Rarely/never	45	11.3

Do you wash your hands thoroughly before handling your contact lens		
Always	248	62.0
Sometimes	111	27.7
Rarely	28	7.0
Never	13	3.3
How often do you sleep with your contact lenses		
Never	257	64.3
Rarely	96	24.0
Occasionally	44	11.0
Always	3	0.8
How often do you replace your contact lens according to recommendation		
Regularly, as advised by my eye care professional	240	60.0
Occasionally but not always according to schedule	102	25.5
Rarely, I tend to wear them longer than recommended	37	9.3
Never, I don't follow a replacement schedule	21	5.3
Do you regularly clean your contact lens with the recommended solution		
Always	214	53.5
Sometimes	130	32.5
Rarely	31	7.8
Never	25	6.3

Most respondents 207 (51.7%) clean their contact lens every day while 6 (1.5%) respondents have never cleaned their contact lens. Two hundred and forty-five (60.5%) respondents clean their contact lens strictly following the instructions of their optometrist, while 64 (16.0%) respondents do not. Majority of respondents 246 (61.5%) use contact lens solution, whereas 80 (20.0%) respondents use their contact lens past the expiry date.

CHAPTER FIVE

5.1 DISCUSSION

Contact lenses are common optical correction devices used worldwide that are particularly popular among the youth.[16] However, not much is known about the knowledge, attitude and practice of undergraduates towards contact lenses. Thus, this study evaluated the knowledge, attitudes, quality, and factors that influence contact lens use among undergraduates revealing poor knowledge but good attitude and practice.

Findings from this study showed that majority of respondents were within the age group of 20 – 22 years. The mean age of 20.73 ± 2.539 SD suggests a concentration of respondents in the early twenties. This is because the study was conducted among a youth population. This finding is in similar with a 2019 Pakistan study that showed that the mean age of respondents was 20.3±1.7 years. It is important that youths are targeted towards proper knowledge, attitude and practice towards contact lens use.

Our study revealed that majority of respondents were females. This was probably because more females have been shown to use contact lens in comparison with males. This is similar with a Malaysian study among medical students where over 80% of contact les wearers were females.[23] Gender balance is essential for ensuring diverse perspectives in the study and reflects the overall gender distribution within the academic setting.

Over a third of the participants were Benin. This is possibly because the study was conducted in Benin City and as expected will contain indigent respondents. Majority of the respondents were Christians. This is expected as the study was carried out in southern Nigeria where Christianity is predominant.

On the type of contact lens, more than half of respondents were unaware of the types. This highlights a gap in knowledge from the optician or ophthalmologist to contact lens users at the

point of purchase. Similar results were obtained from a South African study where less than half of respondents were aware of the brand name of their contact lens.[31] Knowledge of the type of contact lens used will aid in the ease of getting a new one when the time arises. Contact lens wearers should endeavor to purchase their lenses from the right place and opticians and ophthalmologists should provide all forms of knowledge regarding contact lens use.

Over half of respondents identified preventing infections as a reason for cleaning contact lens. Increased awareness on hygiene among youth could be responsible for this finding. The finding is in tandem with a finding where about 51% of respondents knew that the main reason of cleaning contact lens was to reduce the risk of infection.[31] Cleaning of contact lens also helps remove debris in addition to preventing infections. Increased efforts should be made by eye specialists and health care professionals to enlighten the youths about proper cleaning of contact lens.

Majority of respondents were aware of the symptoms of possible contact lens complication indicating that respondents were aware of some of the draw backs of contact lens. A 2021 Indian study showed that nearly two-thirds of respondents had knowledge of the symptoms of contact lens complication.[24] Knowledge of the symptoms of complication of contact lens will aid in prompt eye healthcare seeking on emergence of any symptom.

On the relationship between gender and knowledge of contact lens hygiene, more females showed to have better knowledge than males however, the relationship was not statistically significant. The fact that more females use contact lens could be a reason for their better knowledge levels. In a Saudi Arabian study, females significantly had better knowledge scores when compared to their male counterparts.[25;] It is important that everyone irrespective of gender possess the right knowledge regarding contact lens use to ensure good eye health among all

individuals. More efforts should be put in place by contact lens experts to bridge the knowledge regarding contact lens hygiene gap between males and females.

Age and department of study had statistical significant relationship with knowledge of contact lens hygiene. Older respondents significantly had better knowledge when compared to younger respondents and those in medical related courses like medicine and dentistry had better knowledge than those in other departments. This could be because of better exposure on health related matters by older respondents and those in medical related courses. Contrasting findings were found in a Saudi Arabian study where there was no significant difference with regards to specialization. The contrasting findings could be due to socio-cultural differences. All students irrespective of their course of study should have the necessary knowledge regarding contact lens hygiene.

Majority of respondents agreed and strongly agreed that going for regular contact lens follow-up visits to the optometrists should be necessary. Knowledge of the symptoms of complications which aid prompt eye health seeking could be a reason for the finding. A South African study showed that almost one-third of respondents believed that regular after care follow up visits to the optometrists should be optional.[31]. Regular follow up visits to eye specialists will aid in early detection of symptoms and contact lens complication.

Less than one-tenth of respondents swim while wearing contact lens. Poor knowledge levels among some respondents could be responsible for this finding. A 2017 South Indian study revealed that 30% of students wear contact lens while swimming.[22] Wearing contact lens while swimming puts one at risk of infections and contact lens complications. It is thus important for students to be aware of the consequences of swimming with contact lens.

Majority of respondents washed their hands thoroughly before inserting and cleaning contact lens. Knowledge of good hand washing practices among the youth population could be responsible for this finding. A Malaysian study among medical students showed that 90% of respondents washed their hands before handling contact lens.[23]Proper hand washing practice while using contact lens is an important way of preventing complications due to contact lens use.

Sleeping with contact lens was observed by less than 10% of respondents. A South African study showed similar findings as only 12% of respondents slept with their contact lens.[32] Sleeping with contact lens is an unhealthy practice that can affect the eye health of an individual. It can predispose one to coming down with Acanthamoeba Keratitis.[34]

Over two-thirds of respondents do not share contact lens with others. Similar findings were identified in Saudi Arabia where less than 20% of respondents share their contact lens with others.[25] Sharing contact lens with others is a possible way of transferring infection from one person to another, and as such should be avoided.

5.2 CONCLUSION

A little above half of the respondents had poor knowledge regarding contact lens hygiene with age and department of study showing significant findings.

Majority of respondents showed to have good attitude towards contact lens hygiene indicating a positive mindset towards the concept.

Despite the poor knowledge, respondents had good practice regarding contact lens use indicating other factors that affect practice than knowledge.

Some identified risk factors include not cleaning contact lens cases regularly, and not using the recommended solution to clean contact lens.

5.3 RECOMMENDATIONS

To the State Government

1. They should allocate more funds towards the provision of contact lens services for university students.
2. They should make contact lenses only available at recommended sources like optometrists and opticians.

To the University Institution

1. Organize workshops and seminars aimed at improving the knowledge of contact lens use among students.
2. Integrate lectures on contact lens into the curriculum in a bid to better undergraduates' knowledge.

To Undergraduates

1. Follow the proper guidelines associated with the use of contact lens to reduce and avoid complications.
2. Be aware of symptoms associated with contact lens complication to enable them seek care promptly.

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APPENDIX I

QUESTIONNAIRE

KNOWLEDGE, ATTITUDE AND PRACTICE OF CONTACT LENS WEARERS TOWARDS CONTACT LENS HYGIENE AND COMPLICATIONS

I am a 600 level medical student of the University of Benin, Benin City conducting a research project on hygiene practices on contact lens among students in University of Benin, Benin-City with a view to making recommendations that will improve health care. Please answer all questions as accurately as possible, as all information given will be treated with utmost confidentiality.

Thank you.

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Age (as at last birthday).....

Gender: Male [ ] Female [ ]

Ethnic Group…….....

Religion: Christianity [ ] Islam [ ] Traditional worshipper [ ] Others.....

Marital Status: Single [ ] Married [ ] Cohabiting [ ] Separated [ ] Divorced [ ] Widowed [ ]

Department.....

Type of refractive error: Myopia [ ] Hyperopia [ ] Presbyopia [ ] Astigmatism [ ] None [ ]

Purpose for wearing contact lens: Vision Correctness [ ] Therapeutic [ ] Cosmetic [ ] I don't know [ ]

SECTION B: KNOWLEDGE AMONG CONTACT LENS WEARERS REGARDING PROPER CONTACT LENS HYGIENE.

1. What type of contact lens do you wear? Soft [ ] Rigid (hard) [ ] Scleral [ ] Combination of hard and soft [ ] I don't know [ ]
2. What are the reasons contact lenses are worn? (Multiple answers allowed): Vision correction

   [ ] Cosmetic reason [ ] Due to surgery or ocular disease [ ] Both vision correction and cosmetic reasons [ ]
3. When cleaning your contact lenses: I just rinse in saline and store in contact lens solution [ ] It is important to rub the lenses slightly to loosen only deposit [ ] It is important to rub the lenses to loosen the bacteria [ ] It is not important to rub the lenses as I use multipurpose solution [ ] I just have to rinse and store in the disinfection solution as it is multi-purpose [ ]

4. Why do you think it is necessary to clean your contact lenses?: So, I don't get any infections[ ] To remove any debris on my lenses[ ] I don't think it's necessary to clean my contact lens[ ] To see better through them[ ]
5. How often do you replace your lenses? : Daily[ ] Twice a month[ ] Monthly[ ] Only when I cannot see clearly anymore[ ]
6. What is the minimum hand hygiene with respect to before you handle contact lenses?: Washing your hands with water[ ] Washing your hands with soap and water[ ] Cleaning your hands with hands sanitizer[ ] I don't know what's hand hygiene[ ]
7. It is best to store contact lenses **(multiple answers allowed):** Dry, without solution[ ]In disinfecting solution[ ] In saline[ ] In water[ ] In any other liquid[ ]
8. What can cause or lead to contact lens complications? **(Multiple answers allowed):** Infected Lenses[ ] Over wearing the lenses[ ] A torn lens[ ] Sharing contact lens[ ]
9. What could be a sign or symptom of a possible contact lens complication**?(Multiple answers allowed):** Itching[ ] Discharge[ ] Pain[ ] Blurred vision[ ]

10. Which of the following are possible complications of contact lens non-compliance? **(Multiple answers allowed):** Corneal ulcers [ ] Allergic conjunctivitis [ ] Cataracts [ ]

SECTION C: ATTITUDE AMONG CONTACT LENS WEARERS REGARDING PROPER CONTACT LENS HYGIENE.

S/N	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
11	Cleaning my contact lenses before wearing them is absolutely necessary				
12	Cleaning my contact lens case daily is necessary				
13	Washing your hands before handling contact lens is always necessary				
14	I am a competent contact lens wearer				
15	Going for regular contact lens follow-up visit to the optometrist should be				

	necessary				
16	Contact lenses have been designed primarily to rid you of spectacles and make you look good				
17	I decide when to replace to my contact lenses based on wearing schedule and not how they feel on my eye				
18	The choice of contact lens solution should be based on what is best for safe wear and not what I can afford.				
19	I am knowledgeable about contact lens solutions				

SECTION D: PRACTICE AMONG CONTACT LENS WEARERS

20. Do you sleep with your contact lenses? Yes [ ] No [ ] Sometimes[ ]
21. Do you ever share your contact lenses with any one?: Yes[ ] No[ ] Sometimes[ ]
22. Do you clean your hands thoroughly before inserting and cleaning contact lenses?: Yes [ ] No
    [ ] Sometimes [ ]
23. How do you clean your hands?: Water[ ] Water and soap[ ] Hand sanitizer[ ]
24. Do you shower while wearing your contact lenses?: Yes[ ] No[ ] Sometimes[ ]
25. Do you wear contact lens to swim?: Yes[ ] No[ ] Sometimes[ ]
26. Do you wear contact lens and goggles to swim?: Yes[ ] No[ ] Sometimes[ ]
27. How often do you clean your lenses?: Everyday[ ] Every 2-4 days[ ] Every week[ ] Every month[ ] Never clean them[ ]
28. Do you clean your contact lens adhering strictly to the instruction of optometrist/optician?: Yes
    [ ] No[ ] Sometimes[ ]
29. Do you use contact lens solution?: Yes[ ] No[ ] Sometimes[ ]
30. Do you use your contact lens solution past the expiry date?: Yes[ ] No[ ] Sometimes[ ]

SECTION E: RISK FACTORS ASSOCIATED WITH IMPROPER CONTACT LENS HYGIENE

31. How often do you replace your contact lens case? Every month [ ] Every 3 months [ ] Every 6 months[ ] Rarely or never[ ]
32. How often do you clean your contact lens case? Daily[ ] Weekly[ ] Monthly[ ] Rarely or never[ ]
33. Do you wash your hands thoroughly before handling your contact lenses? Never[ ] Rarely[ ] Sometimes[ ] Always[ ]
34. How often do you sleep in your contact lenses? Never [ ] Rarely [ ] Occasionally [ ] Always [ ]
35. How often do you replace your contact lenses according to the recommended schedule? Regularly, as advised by my eye care professional [ ] Occasionally but not always

according to schedule[ ] Rarely, I tend to wear them longer than recommended[ ] Never, I don't follow a replacement schedule[ ]

36. Do you regularly clean your contact lenses with the recommended solution? Never [ ] Rarely

[ ] Sometimes [ ] Always [ ]

THANK YOU

APPENDIX II

ETHICAL APPROVAL

HEALTH RESEARCH ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL

P.M.B. 1111 BENIN CITY NIGERIA Telephone: 052-600418 Website: ubth.org

CHIEF MEDICAL DIRECTOR
Prof. Darlington E. Obaseki
E-mail: darlobaseki@gmail.com

DIRECTOR OF ADMINISTRATION
Jim Uwadie, Esq

CHAIRMAN
Prof. (Mrs.) Antoinette N. Ofili

HREC OFFICE:
Committee email: ubthresearchethics@gmail.com
Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/148654822

PROPOSAL TITLE: **"KNOWLEDGE, ATTITUDE AND PRACTICE OF CONTACT LENS WEARERS TOWARDS CONTACT LENS HYGIENE AND COMPLICATIONS AMONG STUDENTS IN UNIVERSITY OF BENIN, BENIN-CITY"**

PRINCIPAL INVESTIGATOR(S): **CHIAMAKA IFEYINWA MBEGBU**

DEPARTMENT/INSTITUTION: **DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA.**

DATE CONSIDERED: JULY 5TH, 2024

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 5/7/2024 TO 4/7/2025. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI **SIGNATURE & DATE.....** 5/7/2024

UNIVERSITY OF BENIN TEACHING HOSPITAL & RESEARCH OFFICE Sign..... Date..... BENIN CITY P.M.B. 1111

SUPERVISOR (S): DR (MRS) O.E. OBARISIAGBON

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification

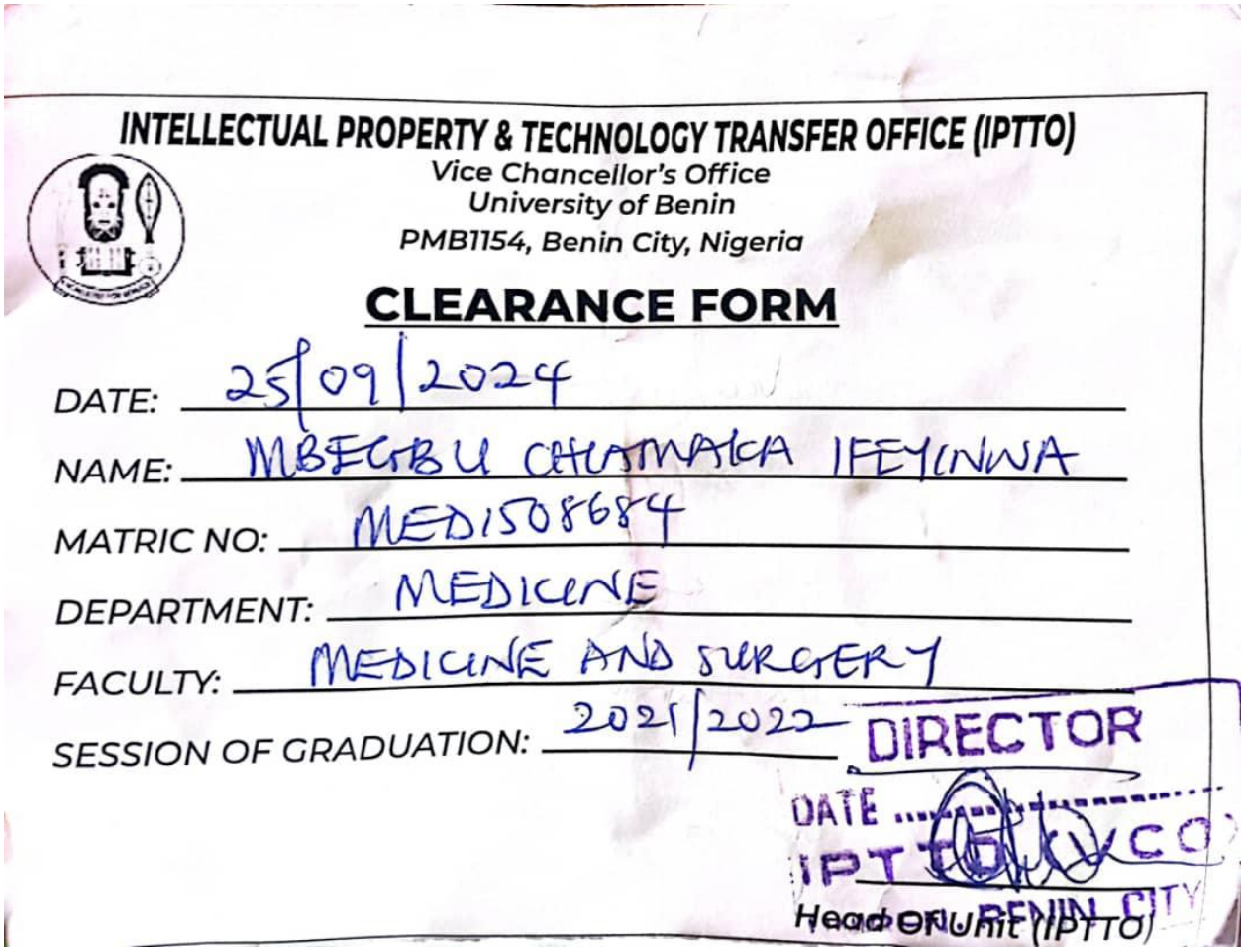
Signature & Date..... 24/09/24

ubthresearchethics@gmail.com

Registration Number: NHREC/24/01/2020

APPENDIX III

CLEARANCE FORM



INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)

Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 25/09/2024

NAME: MBEGBU CHUKWUKA IFEYINWA

MATRIC NO: MED1508684

DEPARTMENT: MEDICINE

FACULTY: MEDICINE AND SURGERY

SESSION OF GRADUATION: 2021/2022

DIRECTOR
DATE .....
IPTTO UNIVERSITY OF BENIN CITY
Head of Unit (IPTTO)