Journal of Population Therapeutics & Clinical Pharmacology

ORIGINAL RESEARCH ARTICLE
DOI: 10.53555/nab5x245

EVALUATING AND ENHANCING THE KNOWLEDGE AND AWARENESS OF DIABETIC FOOT DISEASE & RELATED COMPLICATIONS AND DIABETIC RETINOPATHY AMONG MEDICAL AND NON-MEDICAL STUDENTS AT AN EDUCATIONAL INSTITUTE OF PRAYAGRAJ, UTTAR PRADESH

Dr. Swarnima Saxena[1], Dr. Akash Saxena[2*]

[1]Assistant Professor, Department of Ophthalmology, United Institute of Medical Sciences, Prayagraj, Uttar Pradesh
[2*]Assistant Professor, Division of Plastic and Reconstructive Surgery, United Institute of Medical Sciences, Prayagraj, Uttar Pradesh

***Corresponding author**: Dr. Akash Saxena
*Assistant Professor, Division of Plastic and Reconstructive Surgery, United Institute of Medical Sciences, Prayagraj, Uttar Pradesh. Email: akashsaxena.dr@gmail.com

Submitted: 02 May 2023 Reviewed: 23 May 2023 Accepted: 18 June 2023

Abstract

Context: Diabetic retinopathy (DR) and diabetic foot disease are a major cause of varying degree of morbidity, loss to limb &/or life along with visual disability leading to irreversible blindness. Awareness and knowledge of these facts varies in the general population even among educated class like students with different educational backgrounds.

Aim: To assess the awareness of diabetic retinopathy and diabetic foot disease among students at an educational institute in Prayagraj.

Setting and Design: Cross-sectional study conducted at an educational institution.

Materials and Methods: An interviewer-administered, pre-tested, semi-structured questionnaire was used to evaluate various aspects related to the awareness of DR and diabetic foot disease.

Results: A total of 887 subjects (30.4% medical and 69.6% non-medical) were included in the study. Of the 887 subjects, 74.4% among medical group and 45.8% among non-medical group were aware about diabetic retinopathy and diabetic foot disease. The main source of information was books (52.6%) among medical students and knowledge through friends and family (40%) among those with non-medical background. Of the total 887 subjects, 341 (38.4%) had awareness about different diabetic eye and foot screening programs. Of these, 111 were medical and 230 had non-medical background.

Conclusion: Awareness of diabetic foot complications and retinopathy and knowledge regarding the need and about various screening programs was poor among students. There existed major deficits in the knowledge and behavior of students of non-medical background on such issues. There is a need to create awareness about DR and diabetic foot disease and emphasize the importance of eye and foot screening to reduce unfavorable outcomes in the form of visual disability and loss to limb &/or life.

Keywords: Awareness, diabetic retinopathy, screening, diabetic foot disease, complications

INTRODUCTION: Diabetes mellitus, particularly type II, is a prevalent chronic metabolic disorder worldwide, which puts a significant burden on the health system and the individual's lifestyle. It results from prolonged insulin resistance produced by the pancreas, the inability of insulin to act on the target tissues, decreased insulin production, or a combination of these. The feedback loop between insulin production and action gets disturbed, resulting in prolonged and persistent hyperglycemia.
According to the World Health Organization (WHO), 422 million adults worldwide are living with diabetes mellitus type 2, and between 2000 and 2019, there was a 3% increase in diabetes mortality rates by age. It is one of the leading causes of blindness, kidney failure, heart attacks, stroke, and lower limb amputation[1].
The American Diabetes Association (ADA) states that a diabetes patient, in comparison with a non-diabetic one, has an approximately 7-year shorter lifespan due to various comorbidities like diabetic retinopathy, neuropathy, coronary artery disease, stroke, peripheral vascular disease, nephropathy and diabetic foot complications.
Diabetic retinopathy is due to microvascular damage to the retina due to prolonged hyperglycemia. It is irreversible and has become a leading cause of blindness in people with uncontrolled hyperglycemia. A study conducted by the Diabetes Research Center of India of 1000 diabetic patients revealed that retinopathy increases linearly with progressive diabetes[2]. The Madras Diabetes Research Foundation of India conducted another study which revealed that diabetic retinopathy is associated with increased thickness of intima-media and stiffness of ocular vessels. Diabetic retinopathy starts developing years before the diagnosis of diabetes if there is uncontrolled hyperglycemia for 3-4 years[3].
Three major factors play a dominant role in the causation of diabetic ulcers. They are neuropathy, limited joint mobility and ischemia. Majority of ulcers in India occur in a neuropathic foot[4,5] and infection in such ulcers was found to be responsible in 90% of the amputations in one series[4]. Although diabetic retinopathy and foot complications cannot be prevented, the provision of knowledge and awareness to the sufferers and youth can minimize sight and limb threatening complications and incidence.
This paper aims to understand the level of knowledge and understanding regarding diabetes mellitus and its complications, with a special focus on diabetic retinopathy and diabetic foot complications among medical and non-medical students. Comprehensively addressing these aspects, this research paper aims to contribute to the knowledge surrounding diabetic retinopathy and diabetic foot disease, thereby fostering a deeper understanding of its clinical implications and therapeutic avenues. Ultimately, through collaborative efforts in research, education, and healthcare delivery, we strive to alleviate the burden of diabetic retinopathy and diabetic related foot complications, thus improving the quality of life for individuals affected by this sight and limb threatening complication of diabetes mellitus.

MATERIALS & METHOD:

Study population & sampling: This cross-sectional study was conducted at United University, Prayagraj, India. For this study, 273 MBBS students along with 699 students of other courses were selected. From this, 270 & 617 students agreed to participate respectively. The research topic was explained to the students & they were given the option to participate or refuse. Participating students were informed that all information given by them would be secure and would be used for scientific purposes only.
The Sample Size was calculated by using the formula as:

$$n = \frac{Z_{\frac{\alpha}{2}}^2 * P * Q}{d^2}$$

Where,
n is the required minimum sample size.
Z = 1.96 at 0.05 level of significance
P = Proportion of people having diabetic retinopathy is 49.9%[6]
Q = 1-P = 50.1%
d = 10% (Absolute precision or error)
Then, n = 385
Therefore, the minimum required sample size will be 385 as study samples.

Inclusion criteria:

- Students between the age group of 18 - 25 years enrolled for medical courses, MBBS (Preferably 1st & 2nd professional) & non-medical courses like B. Tech, Journalism, LLB, nursing, Agriculture, etc. at United University, Prayagraj.

- Student's willingness to participate and provide informed consent.

Exclusion criteria:

- Students not willing to participate.
- 3rd professional part 1 & 2 MBBS students have diabetic retinopathy in their academic syllabus so they will be excluded from this study.

Methods used: A questionnaire was distributed to the students through google form & they were asked to give their responses within 10 minutes. The completion of the whole process took 7 days. The questionnaire was validated from previous published research[7] with few modifications and additional questions.

Statistical analysis: Data collected from the study participants were entered in an MS Excel sheet and further taken up for analysis using appropriate statistical methods. The study results were statistically analyzed using Pearson's Chi-square test. Discontinuous or categorical data were expressed as a percentage. *P* values were reported and interpreted at a 0.5% level of significance

RESULTS:

A total of 972 students were enrolled for the study, of which 887 gave consent and were willing to participate. Of the recruited group 270 (30.44%) were medical students and remaining 617 (69.56%) were from non-medical background. The knowledge about diabetes, multisystem involvement, retinopathy and diabetic foot disease was 100% (270), 95.5% (257) and 74.4% (200) among medical and 87% (536), 76.3% (470) and 45.8% (282) among non-medical students respectively (Figure 1). The main source of information was books (52.6%) among medical students and knowledge through friends and family (40%) among those with non-medical background (Figure 2). Other sources of information were internet, interaction with healthcare professionals, teachers and articles.

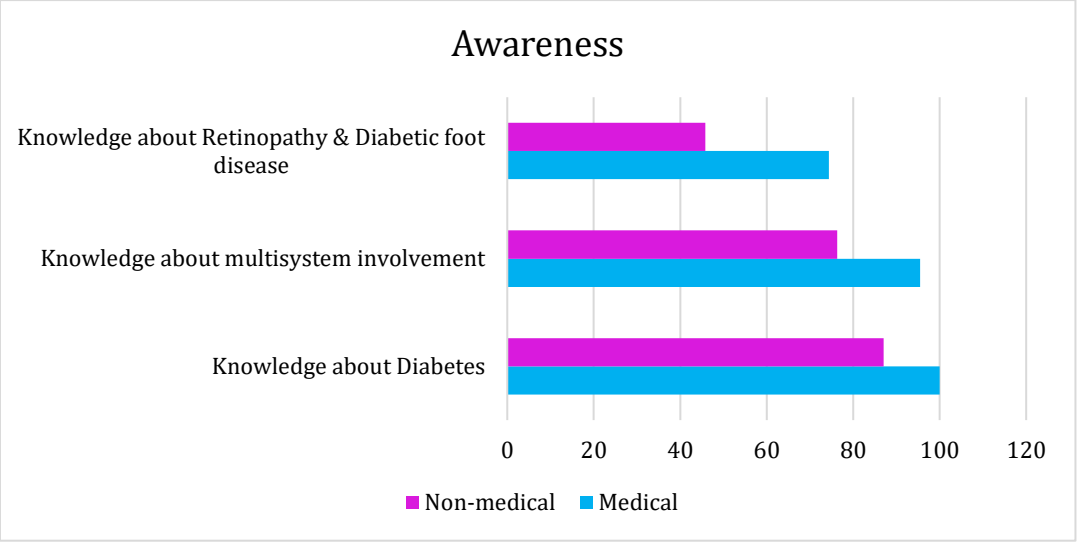

Fig.1: Awareness related to Diabetes, Diabetic foot disease & Diabetic retinopathy

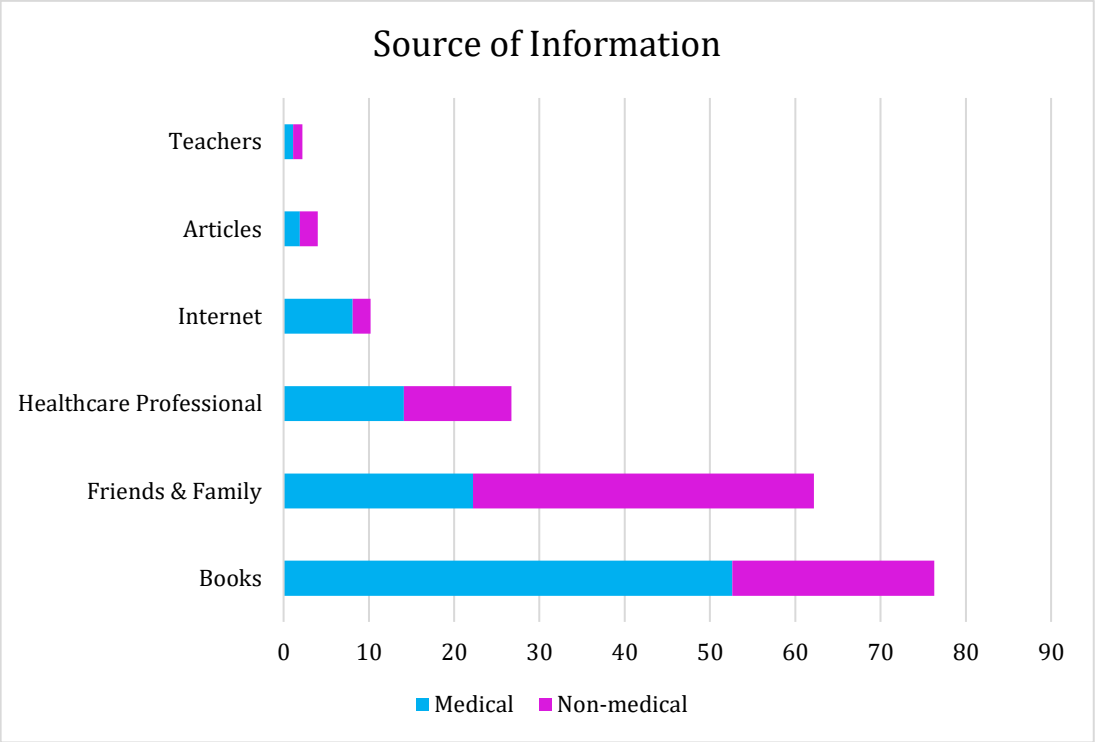

Fig. 2: Source of information about diabetic retinopathy and diabetic foot disease among medical and non-medical students

Among the study group, 4 medical (1.5%) and 17 non-medical (2.8%) students were diabetic themselves. 187 (69.3%) students among medical and 270 (43.9%) students among non-medical group had positive family history of diabetes (parents, sibling or relatives). When asked about effects of DM on body 267 (98.9%) of medical and 604 (97.9%) of non-medical students had a knowledge of harmful effects of uncontrolled diabetes on body. However only 241 (89.6%) of medical and 496 (80.4%) of non-medical students knew about effect of DM on vision and /or limbs. These numbers further lowered when asked about effect of DM specifically on retina with only 217 (80.4%) of medical and 480 (77.8%) of non-medical students having some knowledge.

In response to awareness about eye checkups, regular foot examination and diabetic retinopathy screening, 236 (87.5%) medical students and 469 (76%) of non-medical students were aware. When asked about frequency of these checkups only 167 (62.1%) medical students and 244 (39.5%) non-

medical students were aware of 6 monthly schedules. 163 (60.4%) medical students and 185 (30%) non-medical students knew about need for eye screening in a patient of diabetic foot disease. Regarding HbA1c test, 83 (30.7%) of medical and 178 (28.9%) non-medical students neither heard about the test nor had knowledge about the normal values. Remaining 187 (69.3%) medical and 441 (71.1%) non-medical students had some knowledge about the test and its normal values.
Of the total 887 subjects, 341 (38.4%) had awareness about different diabetic eye and foot screening programs. Of these, 111 were medical and 230 had non-medical background (Figure 3).

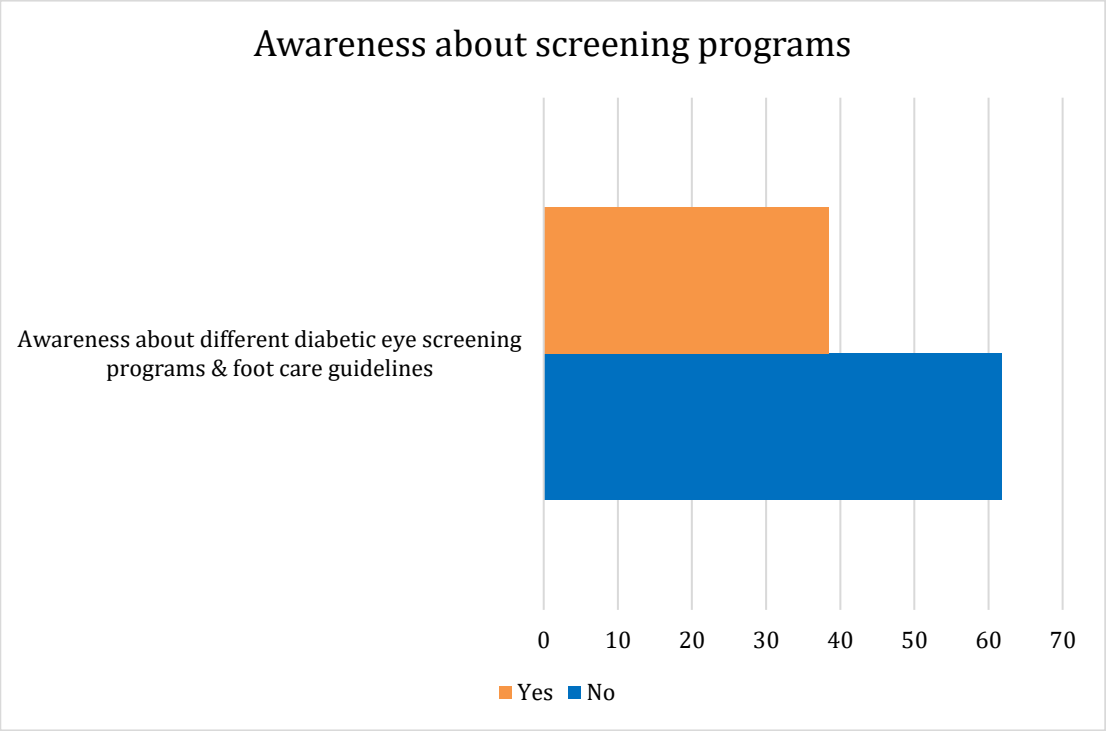

Figure 3: Awareness about different diabetic eye and foot screening programs

Analysis showed that awareness of diabetic retinopathy and diabetic foot disease, knowledge about multisystem involvement, harmful effects of uncontrolled diabetes on body, and various eye and foot screening programs was significantly associated with educational background of students and pre-existing knowledge about diabetes (p value < 0.001).

DISCUSSION:

Diabetes is reaching an epidemic stage in many countries like India. Diabetic people are more prone to foot complications and ocular manifestations like retinopathy, cataracts, glaucoma & blindness. The ever-growing prevalence of diabetes poses a pressing need to underscore the importance of raising awareness about diabetic foot disease and retinopathy, specifically among students representing diverse academic disciplines. In this study, we aimed to measure the awareness of diabetic foot complications and diabetic retinopathy among various students across different educational backgrounds.
In this study, 100 % of MBBS students & 87.0% of students of other courses knew about diabetes. However, only 95.5% of medical & 45.8% of non-medical students knew that it has multisystem involvement. Furthermore, only 74.4% of medical and 45.8% of non-medical students had a knowledge about retinopathy and diabetic foot disease and complications. This finding is a point of interest & matter of concern, as almost 13% of the youth from non-medical background have not heard of diabetes despite it being projected that India will be a home for 79 million diabetic patients by 2030[8]. Furthermore, students of other courses are less aware of diabetes & its complications even

after the university campus has its medical college & a tertiary care hospital. Studies done in South India show similar data [9].

Books are the most common source of information for MBBS students followed by family & friends & doctors whereas, in the case of the remaining students, family & friends are the most common source to gather information followed by books & doctors. This variation is obvious & acceptable as the textbooks of medical courses have sufficient details on diabetes & various other diseases.

With time there have been a lot of changes in the manifestations & complications of diabetes, one such change is in the age group affected. Diabetes is slowly expanding its footprints in the young age groups too; our study shows that 1.5% of medical students have diabetes as compared to 2.8% of students of other courses. This variation might be due to greater awareness & precautions in medical students. These might delay the onset or severity of the disease but its probability of occurrence can't be reduced if there's genetic predisposition. Parents, siblings & relatives of 69.3% of MBBS students & 43.9% of remaining students have diabetes. Although the genetic predisposition is higher among the MBBS students, the occurrence is less. This might be due to lifestyle & other differences mentioned above.

Another point of concern in our study was that only 341 (38.4%) subjects had awareness about different diabetic eye and foot screening programs. Of these, 111 were medical students and 230 had non-medical background. The correct duration of eye checkup i.e. every 6 months is known by only 62.1% of medical students & a meager 39.5% of non-medical students.

For reducing the prevalence of DR and diabetic foot disease related complications, it is important to keep the blood sugar levels in control & for measuring it, the HbA1c test is most convenient as it doesn't require fasting & avoids the problem of daily variation of glucose levels. A recent report from Australia has shown that including HbA1c for predicting the incidence of retinopathy is as good as & possibly better than fasting plasma glucose [10]. So, to know this we asked our participants about the HbA1c test & its normal levels. 83 (30.7%) of medical and 178 (28.9%) non-medical students neither heard about the test nor had knowledge about the normal values. Remaining 187 (69.3%) medical and 441 (71.1%) non-medical students had some

Going to the labs for screening is only possible if people are aware of the problem & its consequences. This can be achieved by giving the proper information about different eye screening programs & their benefits. To our surprise, of the total 887 subjects, 341 (38.4%) had awareness about different diabetic eye and foot screening programs. Of these, 111 were medical and 230 had non-medical background. It is the responsibility of physicians to counsel the patients & their attendants regarding screening and also look for their compliance in follow-up. All diabetic patients should be sent for fundus examination at the time of diagnosis & at least every 6 months. The same protocol applies for diabetic foot screening. Patient education received from the physician or other healthcare providers plays a pivotal role in a successful attempt to prevent long term ocular and foot related morbidity caused by diabetes. Practitioners should not wait for any complaint of visual impairment for the referral. Depending on resource availability, visual acuity with pinhole, mydriatic DR screening & fundus imaging can be easily performed in diabetic patients at primary care levels [11]. Similarly, foot should be examined for evidence of corn, callouses, non-healing ulcers and evidence of neuropathy and other vascular issues.

In light of the study findings, it is evident that non-medical students exhibit significant knowledge gaps pertaining to the ocular and limb related implications of diabetes and the accessibility of relevant screening programs. Consequently, there is an urgent call for educational institutions to adopt proactive measures, such as organizing comprehensive awareness programs and interactive sessions, to effectively educate students about the multifaceted nature of diabetic retinopathy.

Moreover, strict adherence to established community screening guidelines endorsed by esteemed bodies like the All India Ophthalmological Society assumes paramount importance in addressing the challenges associated with diabetic retinopathy. Similar guidelines for diabetic foot disease are laid down by IWGDF (International Working Group on Diabetic Foot). By amplifying awareness and disseminating knowledge while advocating for proactive measures, the collective objective is to

significantly diminish the prevalence of diabetic retinopathy and diabetic foot disease related complications and mitigate its deleterious impact on affected individuals and the broader community. To the best of our knowledge, there are very few studies assessing the understanding and existing awareness of diabetic retinopathy and diabetic foot disease among students. Therefore, this study was carried out to assess the extent of such awareness and identify gaps among the students of various courses like B. Tech, BSc Nursing, BSc Agriculture, Journalism, BBA-MBA, B. Pharma & MBBS students. Such studies play a major role in identifying the gaps in knowledge and in creating awareness regarding the health of the whole community, as diabetes affects everyone & its ocular and limb complications can be minimized with timely interventions.

CONCLUSION:

The study aimed to evaluate, identify gaps and improve awareness of diabetic retinopathy and diabetic foot disease and associated complications among students of varied educational background. Although many students are knowledgeable about diabetes mellitus, a significant number are unaware of its effects on the eyes, foot and other systems, particularly those in non-medical disciplines. Furthermore, there is a lack of adherence to treatment modalities and screening programs. It is imperative to raise awareness among young people to prevent avoidable blindness and address the systemic effects of diabetes.

- Adhering to community screening guidelines established by the All India Ophthalmological Society (AIOS) is crucial[12]
- Educating, creating awareness and laying guidelines as detailed by IWGDF on prevention and management of diabetic foot disease.
- Screening for diabetic retinopathy and diabetic foot disease should be conducted at Primary Health Centers (PHC), Community Health Centers (CHC), general physician clinics, test laboratories, and through telemedicine approaches to prevent associated complications[13]
- Additionally, educational institutions should organize awareness programs and interactive sessions to educate students about diabetic retinopathy and diabetic foot disease.

KEY MESSAGE:

Awareness about diabetic retinopathy and diabetic foot disease may help to reduce visual disability and in preventing foot related complications that are preventable if treated at an early stage avoiding significant morbidity they cause.

DECLARATION OF PATIENT CONSENT:

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

FINANCIAL SUPPORT AND SPONSORSHIP:

Nil.

CONFLICTS OF INTEREST:

There are no conflicts of interest.

REFERENCES:

1. https://www.who.int/news-room/fact-sheets/detail/diabetes
2. Ramachandran A, Snehalatha C, Vijay V, Viswanathan M. Diabetic retinopathy at the time of diagnosis of NIDDM in south Indian subjects. Diabetes Res Clin Pract. 1996 Apr;32(1-2):111-4.
3. Rema M, Pradeepa R. Diabetic retinopathy: an Indian perspective. Indian J Med Res. 2007 Mar;125(3):297-310.

4. Viswanathan V, Kumpatla S. Pattern and causes of amputation in diabetic patients – A multicentric study from India. J Assoc Physicians India 2011;59:148-51.
5. Pendsey SP. Understanding diabetic foot. Int J Diabetes Dev Ctries 2010;30:75-9.
6. Rani PK, Raman R, Subramani S, Perumal G, Kumaramanickavel G, Sharma T. Knowledge of diabetes and diabetic retinopathy among rural populations in India, and the influence of knowledge of diabetic retinopathy on attitude and practice. Rural Remote Health. 2008 Jul-Sep;8(3):838. Epub 2008 Jul 24.
7. Garg P, Khan M. Awareness of diabetic retinopathy among the adult population attending Rural Health Care Center, Uttar Pardesh. Modern Medicine [Internet]. 29(1):53–7. Available from: https://doi.org/10.31689/rmm.2021.29.1.53
8. Kumar A, Goel MK, Jain RB, Khanna P, Chaudhary V. India towards diabetes control: Key issues. Australas Med J. 2013 Oct 31;6(10):524-31.
9. Namperumalsamy, Perumalsamy & Kim, Ramasamy & Kaliaperumal, Kumarasamy & Sekar, Alagarsamy & Karthika, Arumugam & Nirmalan, Praveen. (2004). A pilot study on awareness of diabetic retinopathy among non-medical persons in South India. The challenge for eye care programmes in the region. Indian journal of ophthalmology. 52. 247-51.
10. Tapp RJ, Tikellis G, Wong TY, et al. Longitudinal association of glucose metabolism with retinopathy: results from the Australian Diabetes Obesity and Lifestyle (AusDiab) study. Diabetes Care. 2008;31:1349–1354.
11. Singh A, Tripathi A, Kharya P, Agarwal R. Awareness of diabetic retinopathy among diabetes mellitus patients visiting a hospital of North India. J Family Med Prim Care. 2022 Apr;11(4):1292-1298. doi: 10.4103/jfmpc.jfmpc_977_21. Epub 2022 Mar 18.
12. Raman R, Ramasamy K, Rajalakshmi R, Sivaprasad S, Natarajan S. Diabetic retinopathy screening guidelines in India:All India Ophthalmological Society diabetic retinopathy task force and Vitreoretinal Society of India Consensus Statement. *Indian J Ophthalmol.* 2021;69:678–88.
13. Avidor D, Loewenstein A, Waisbourd M, Nutman A. Cost-effectiveness of diabetic retinopathy screening programs using telemedicine:A systematic review. *Cost Eff Resour Alloc.* 2020;18:16.