

Current Assessment of Knowledge Attitude and Practice Patterns in Management of Diabetes and Diabetic Retinopathy: A Systematic Review

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Abstract:

The most common cause of new blindness cases among adults between the ages of 20 and 74 is diabetic retinopathy. About 60% of people with type 2 diabetes and almost all patients with type 1 diabetes develop retinopathy throughout the first 20 years of their condition. In India, varieties in DR prevalence between urban as well as rural areas are kept in mind. Risk factors like diabetes duration, early onset, and also coexisting complications underscore the need for early detection and also intervention. Nevertheless, India does not have a detailed nationwide DR screening program, counting on project-based screening process and also ingenious techniques like telemedicine as well as opportunistic screening to strengthen access. It emphasizes the vitality of assessments as well as extensive glucose management to minimize affiliated risks. In spite of differing levels of awareness around different areas, gaps continue in between knowledge and screening behaviors. Factors adding to inadequate Knowledge, Attitude, and also Practice (KAP) include limited access to healthcare, financial constraints, and also misconceptions concerning disease management. Lifestyle modifications such as routine exercise and also a balanced diet are actually crucial for efficient diabetes management. This study aims to educate strategies for boosting KAP and enhancing DR management internationally.

Keywords: Diabetic retinopathy, Diabetes Mellitus, KAP, Lifestyle management, Prediabetes.

1. Introduction

The prevalence of diabetic retinopathy, a very specific vascular consequence of both type 1 and type 2 diabetes, is closely correlated with the length of diabetes and the degree of glycemic control. In affluent nations, the most common cause of new cases of blindness in adults aged 20 to 74 is diabetic retinopathy. In individuals with diabetes, glaucoma, cataracts, and other eye conditions develop earlier and more frequently (70).

1.1 Diabetic Retinopathy: Indian Scenario

There are differences in the prevalence of diabetic retinopathy (DR) between urban and rural locations, according to a population-based study done in India. According to estimates, the prevalence of DR ranges from 13 to 18% in metropolitan areas and from 9 to 10% in rural areas. This implies that while the frequency of diabetes may vary by geography, the prevalence of DR appears to be less variable.

Table 1: Region Vs. Prevalence of DR

Region	Prevalence of DR
Urban	13-18%
Rural	9-10%

Nine percent of Indians living in cities have some kind of DR, according to Sankara Nethralaya's four-year study on DR epidemiology and molecular genetics. 11.5% of trial participants with diabetic retinopathy (DR) progressed to diabetic macular edema (DME) and 22.7% to sight-threatening DRE (STDR). Only a small percentage of patients had notable DR development (30.2% with a 2-step increase in DR severity and 12.6% with a 1-step increase), which emphasises the significance of early detection and therapy of DME and STDR.

1.2 Risk Factors in the Indian Population

In Indian populations, extensive research has identified several risk factors for diabetic retinopathy (DR). The duration of diabetes is a significant risk factor, with individuals having diabetes for over 15 years at a 6.5 times greater risk of developing DR in both rural and urban settings (58). Early onset of diabetes, particularly before age 40, doubles the risk of retinopathy and increases the likelihood of vision-threatening forms of the condition.

Coexisting diabetic complications at diagnosis are also indicative of risk, with 10% of diabetic individuals already presenting with nephropathy or neuropathy, and 5% with retinopathy. Obesity, and specifically central adiposity, doubles the risk of DR in the Indian population.

Diet plays a role, as those on low-fiber diets are more prone to DR compared to those consuming high-fiber diets (20% vs. 15%). Poor glycemic control is another critical factor; individuals with an HbA1c level above 8% are at higher risk, with even those above 7% at increased risk for DR which can lead to permanent vision loss.

Dyslipidemia, particularly high serum cholesterol and low-density lipoprotein cholesterol levels are more influential in the development of diabetic macular edema (DME), both in central and non-central forms. Inadequate control of blood sugar, blood pressure, and lipids also raises the likelihood of retinopathy, with a third of those with poorly controlled diabetes developing DR.

The presence of early nephropathy, indicated by microalbuminuria, increases the incidence of retinopathy by a ratio of 2:1, and this risk is sextupled with advanced nephropathy (albuminuria). Additionally, the high prevalence of anemia in India, particularly among women, is associated with an increased risk of retinopathy(59).

The relevance of health education in diabetes management may certainly not be overstated. Evidence advises that boosted disease awareness and also medication adherence by means of health education efforts may significantly reduce complications associated with diabetes. Nonetheless, while health education is actually identified as a foundation in diabetes management, there stays a dearth of robust national-level data on its own efficacy in India. Moreover, existing Knowledge, Attitudes, as well as Practice (KAP) surveys related to diabetic retinopathy (DR), a leading difficulty of diabetes, have

actually been critiqued for their brevity, theoretical weaknesses, as well as poor psychometric testing (Chua et al. 2020).

Thus, this systematic review looks to resolve these gaps through reviewing the status of Knowledge, Attitude, and also Practice (KAP) pertaining to diabetes and also diabetic retinopathy in India and also overseas. By manufacturing existing literature, this review aims to clarify the performance of health education interventions in diabetes management and also the task of KAP surveys in recognizing client behavior (Wang et al. 2020). Furthermore, the review will definitely look into the implications of disease awareness on risk element management as well as the usefulness of early screening and management in stopping vision loss linked with diabetic retinopathy. With this effort, I intend to offer insights that may notify policy-making and healthcare strategies to deal with the diabetes prevalent efficiently.

2.Objective

The objective of this review article is to find out the status of Knowledge Attitude and Practice of diabetes and diabetic retinopathy in India and overseas.

3.Methodology

A detailed literature review on the topic of Knowledge, Attitude, and Practice (KAP) regarding Diabetes and Diabetic Retinopathy was conducted by the research team. Electronic data base such as MEDLINE (via PubMed) and ResearchGate were used to find relevant articles, employing various keyword combinations to ensure a comprehensive search strategy. The screening process involved reviewing the titles and abstracts of the identified citations to determine their relevance. Key articles that discussed KAP about Diabetes and Diabetic Retinopathy were selected to provide an overview of the Indian situation and screening practices for these conditions. Some articles were referenced for additional context, though they were not central to the article screening process. The methodology and search strategy details are documented in Figure 1.

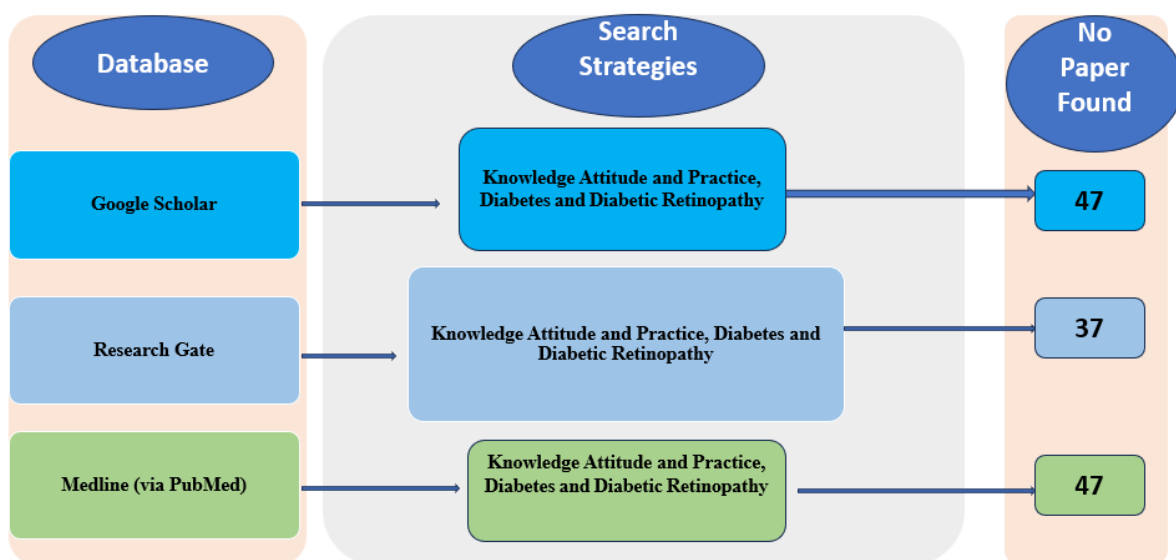


Figure 1: Strategies use for search the paper

From the search of the different database, a total of 84 articles that contain data on Knowledge Attitude, and Practice of Diabetes and Diabetic Retinopathy were selected. The screening strategy and the selection strategy is given in Table 2. Knowledge Attitude and Practice for medical student doctors and health workers were excluded after the search mechanism. A total of 58 articles were selected for writing the status of KAP in Diabetes and Diabetic Retinopathy.

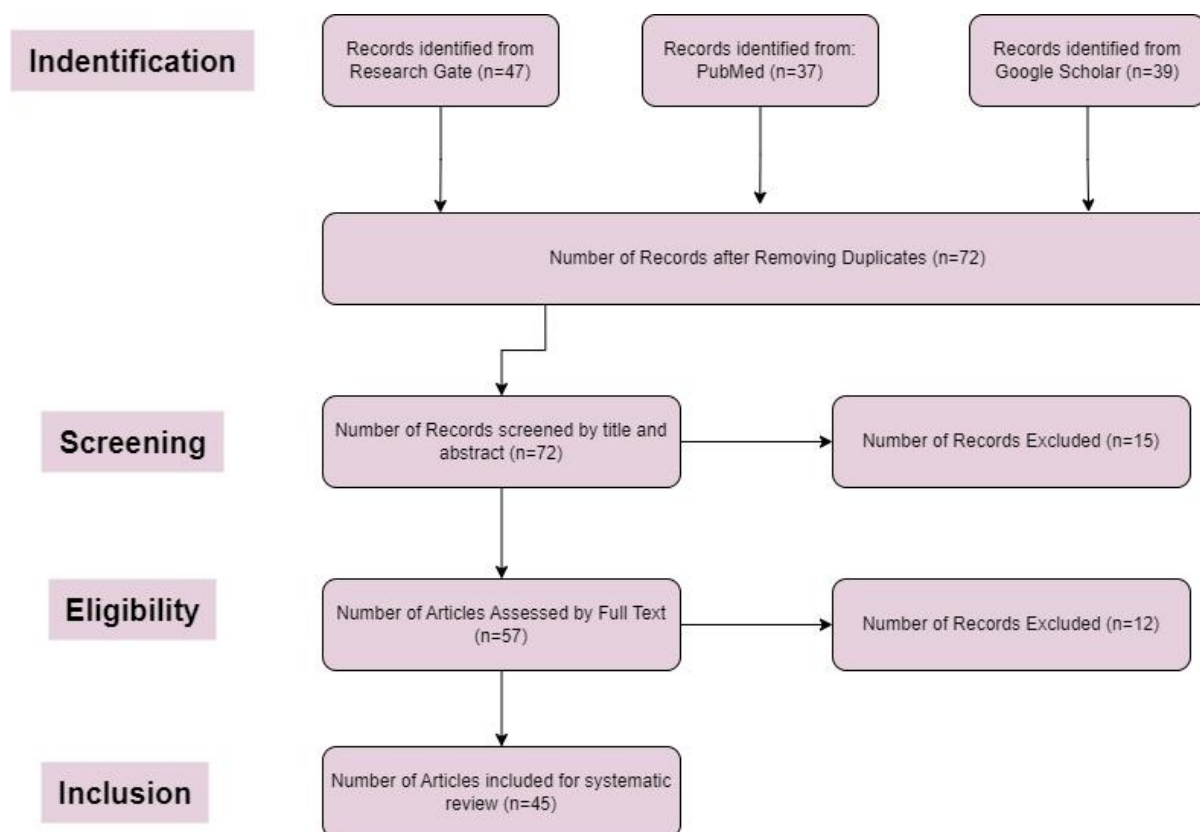


Figure 2: Overview of data collection method

3.1 Inclusion Criteria

- Researches concentrating on the prevalence, knowledge, attitudes, and practices (KAP) pertaining to diabetes mellitus and diabetic retinopathy (DR), each around the globe as well as primarily in India.
- Research studies assessing the impact of socioeconomic factors, education amount, and access to healthcare on KAP pertaining to diabetes as well as DR.
- Studies delivering data on diabetes awareness, medication adherence, lifestyle modifications, as well as screening behaviors amongst diabetic populations.
- Research published in English language peer-reviewed journals.
- Studies along with robust methodologies, consisting of huge sample sizes, crystal clear definitions of variables, as well as proper statistical evaluations.

3.2 Exclusion Criteria

- Animal research studies, laboratory practices, or studies unconnected to human populations.
- Researches concentrating entirely on other ocular ailments unconnected to diabetic retinopathy.
- Studies lacking main data or original analysis results.
- Research studies with insufficient information or inadequate detail on methodology, results, or interpretation.
- Research studies not relevant to the range of the review, like case files, content, or viewpoint parts.
- Research published in foreign languages aside from English.
- Research studies with overlapping or reproducing data coming from the very same study population.

3.4 PICO Statement

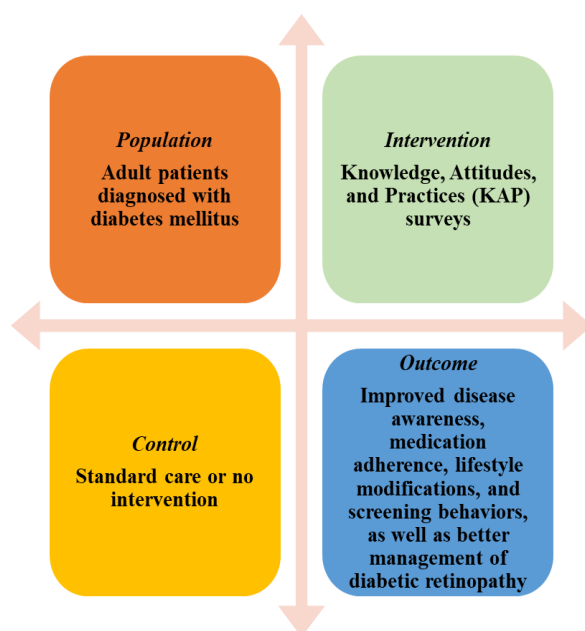


Fig 3 : PICO Statement

4. Result:

The systematic literature search on knowledge, attitudes, and practices (KAP) relating to diabetes and also diabetic retinopathy (DR) has unearthed vital ideas into the worldwide burden of diabetes and also the challenges linked with its management, specifically in low-resource environments. Analyzing individual research studies elucidates the nuanced factors influencing KAP amounts one of diabetic patient and highlights the necessity for targeted interventions to resolve knowledge gaps, enhance attitudes, and market far healthier practices (Ntentakis et al. 2023).According to a study by

Kulkarni et al. (2023), those from lower socioeconomic classes are more likely to develop diabetic retinopathy.

Most participants showed poor knowledge regarding diabetes, signifying a pushing need for instructional campaigns modified to the local area circumstance. This research emphasizes the relevance of targeted health education initiatives intended for improving disease awareness as well as empowering patients to create educated choices about their health. In places where access to healthcare is really restricted, consisting of wilds or even neighborhoods along with reduced socioeconomic status, outstanding procedures may be actually vital to spread info properly as well as connect the knowledge space.

In a comparable way, research executed in the Saurashtra site of Gujarat, India, explained the challenges that come across with poor individuals in accessing diabetes mellitus therapy and also likewise concentrated procedures (Obasanmi et al. 2023). Financial restraints, participated in minimal health care infrastructure, offered considerable barricades to perfect ailment administration. This underscores the standards for thorough medical care plans that handle socioeconomic differences and also ensure wise access to necessary services for all folks, in spite of their financial condition.

Treatments like diabetes therapy plans along with prediabetes education and learning jobs have divulged guarantees in enriching KAP quantities amongst diabetic persons. As an example, a counseling system applied in South India triggered distinctive redesigns in postprandial blood sugar level amounts and likewise body fat profile pages among individuals. This highlights the ability of targeted interferences to effect great alterations in attitudes and strategies related to diabetes mellitus control (Cutruzzolà et al. 2023). With offering people along with the know-how and also skill sets called for to self-manage their ailment successfully, such plans might simply make it possible for people to take management of their health in addition to decreased the risk of difficulties associated with diabetic issues.

In addition, the effect of socioeconomic elements on KAP amounts might definitely not be actually minimized. Individuals originating from unsuitable socioeconomic histories typically experience incorporated problems in handling their diabetes mellitus, including restricted accessibility to doctors besides economic barricades to drug as well as therapy. Taking care of these building obstacles requires a varied approach that consists of program interference concentrated on enriching health care structure, along with community-based efforts that deliver help along with information to prone occupants.

Besides enhancing know-how and additionally mindsets, early screening process as well as furthermore monitoring of DR are actually vital for keeping away from eyesight loss among diabetic individuals (Tan and Wong, 2023). In spite of awareness of the importance of frequent eye examinations, many individuals quit working to join efficient testing actions. This highlights the necessity for targeted interventions that make certain constant eye screening processes as well as inform patients about the significance of early detection as well as likewise treatment of DR. Innovative techniques such as telemedicine as well as opportunistic screening have guaranteed access to DR screening companies, particularly in underserved areas where access to specialized eye

care may be actually confined. The systematic literature search has actually revealed the sophisticated interplay between knowledge, attitudes, and practices in diabetes management and also DR prevention (Kowluru, 2023). Targeted interventions that attend to knowledge gaps, market more healthy attitudes, and also improve access to look after are essential for obtaining purposeful improvements in individual results. Through resolving the multifaceted challenges associated with diabetes care, healthcare systems can better assist individuals coping with diabetes and also lessen the worry of complications such as DR on both patients and also healthcare systems.

Quality Assessment

In evaluating the quality and potential predispositions of the included studies in our systematic literature review, many essential factors to consider need to have to be dealt with. Each study's design, sampling methods, as well as data selection treatments play a crucial job in finding out the dependability and validity of the results. In Kulkarni et al.'s (2023) study on KAP in relation to diabetes retinopathy, for example, it was truly important to comprehend the selection process used to choose study participants (69).

In a similar way, in Malathy et al. (2011) study carried out in Erode district, South India, the impact of a diabetes counseling program on KAP credit ratings and also medical outcomes needs to have thorough assessment. Analytical cross-sectional concepts, when carried out robustly, can easily offer important insights. Nonetheless, regulating for possible confounding variables as well as making sure correct data compilation and also statistical analysis are crucial to minimize bias as well as enrich the study's internal validity.

Shah et al. (2009) research in the Saurashtra place, Gujarat, exploring KAP along with kind 2 diabetes clients, needs evaluation associating with example representativeness along with achievable prejudices hooked up to socioeconomic distinctions in medical care gain access to. While cross-sectional tips allow exams throughout different personal workers, projects to get rid of prejudices like non-response predisposition in addition to additionally size bias are actually definitely essential for guaranteeing the validity of the findings. Threat of predisposition evaluation remains in truth in addition critical, keeping an eye on recognizing as well as also dealing with achievable details of predisposition that could most likely determine the research results. This consists of analyzing for option predisposition, dimension predisposition, misreckoning, along with also making known predisposition (Lundeen et al. 2023). Through systematically visiting these possibilities throughout the provided analysis, doubters may develop taught opinions worrying the solidness and also integrity of the documentation delivered.

In conclusion, carrying out a thorough high-quality evaluation and risk of prejudice review is in truth crucial for reviewing the methodological rigor as well as credibility of the highlighted research in our step-by-step literary works testimonial. By means of addressing possible resources of bias as well as making certain robust study layouts and also data variety methods, our firm might boost the reliability of the evidence as well as help make more properly updated evaluations of the seeking.

5. Analysis of different study :

Title	Author	Methodology	Population of the study	Result
Diabetes Mellitus knowledge and awareness in rural and urban India: A Study by the Indian Council of Medical Research (ICMR)		Cross sectional Study National Based Survey		This research shows that 50% of the population know about diabetes and its consequences.
India Diabetes Study (Phase I)	Deepa et al. (2014)	Pretested Questionnaire (2008-2010)	26,001 individuals from Chennai	In rural areas the awareness is significantly lower than urban areas and metropolitan cities. Self-reporting diabetic patients are too few in the population. Known diabetic subjects do not possess satisfactory knowledge on diabetes.
Diabetes Mellitus (DM) and Diabetic Retinopathy (DR): A Study on Knowledge, Attitude, Practice	Srinivasan et al. (2017)	Hospital Based Survey Cross Sectional (2013)	288 patients of Department of Ophthalmology at Christian Medical College, Vellore, Tamil	288 respondents were selected. Among these respondents 121 respondents (42%) showed adequate knowledge of DM. Among these 121

(KAP) among Diabetic Patients			Nadu	respondents with good knowledge, only 84 respondents (29.2%) had positive attitude towards DM. Again, among 288 respondents, 158 respondents (54.9%) were found to have impressive practice patterns. Again, 207 respondents (72.9%) were found to be aware of diabetic retinopathy (DR) and 49 of these patients who were aware of DR had prior eye check-up.
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Knowledge of Diabetic Mellitus (DM) and Diabetic Retinopathy (DR) among rural population in India.	Rani et al. (2008)	Survey Based Research Questionnaire (2009)	1938 individuals from a rural population	In this study, 966 respondents were selected. Among these respondents 49.9% were found to have knowledge of DM and 37.1% were found to have good knowledge on DR. Higher percentage (93.3%, with $p < 0.0001$) of respondents having impressive knowledge of DR thought that people with diabetes needed regular health check-up for diabetes and retinopathy.
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<p>Knowledge, Awareness, and Practices of Diabetes Mellitus (DM) and Diabetic Retinopathy (DR) in an urban population in a South Indian State: A population-based study</p>	<p>Hussain et al. (2016)</p>	<p>Population survey in some regions in South India. Door-to-door survey performed.</p>	<p>6211 people from suburban town of South India</p>	<p>The survey was conducted among 6211 respondents. 3457 (55.6%) respondents were found to have positive attitude and 3280 (52.8%) respondents were found to have good knowledge of DM. Among the respondents, 1538 (25.4%) had DM but 619 out of them (40.7%) were aware of that issue. Again, among respondents 828 showed positive attitude (53.8%) and 886 had been following good practices (57.6%). But, only 9.60% had undergone any screening for DM.</p>
<p>Substantiation of knowledge and attitudes towards diabetic retinopathy (DR) through survey in people with DR and Diabetic Macular Edema (DME)</p>	<p>Fenwick et al (2020)</p>	<p>Extended study over 2 years period from 2015 to 2017 through mixed-method questionnaire</p>		<p>Measurements scales were created that showed K/A scores increasing with increasing levels of education on the subject matters that is diabetes and retinopathy. Respondents with high scores reported to have better access the knowledge resources.</p>
<p>A Questionnaire Based Survey for KAP study on Diabetic</p>	<p>Kumar and Sharma (2020)</p>	<p>Cross sectional study</p>	<p>Total Respondents were 410.</p>	<p>40% possessed no knowledge of DM and 40% had no</p>

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Retinopathy among Diabetic patients				knowledge of DR. No correlation was established between duration of diabetes and knowledge on the same.
A Riyadh, Saudi Arabia based Knowledge, Attitude, and Practices (KAP) study on Diabetes and related knowledge	Al-Yahya et al., (2020)	A cross sectional study	Total respondents 313.	Knowledge was poor. Diabetes related knowledge was below the average in respondents elected from poor socioeconomic background.

Effect of a diabetes counseling programme on knowledge, attitude and practice among diabetic patients in Erode district of South India	Malathy et al., (2011)	Multi-centre analytical cross-sectional study	85 males and 122 females from Erode District of South India	Patients in the test group saw a substantial improvement in their KAP score ($P < 0.0001$), while patients in the control group showed no discernible improvements. In the test group, the postprandial blood glucose (PPBG) levels dropped considerably. The test group also exhibited lower levels of low-density lipoprotein (LDL), triglycerides (TGL), and total cholesterol
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Assessing the knowledge, attitudes and practice of type 2 diabetes among patients of Saurashtra region, Gujarat	Shah et al., (2009)	Cross-sectional study	238 patients were included for the analysis from three centres of Saurashtra region	Since almost 40% of patients were impoverished, they were unable to pay for even the most basic forms of therapy and care. Endocrinologists handled a mere 3% of patients. This is due to Gujarat having an extremely low number of endocrinologists. The government-run hospital does not offer any of them, and patients cannot afford the private care. There was not a single institute in Gujarat offering super specialty courses in endocrinology or diabetology. Numerous studies have demonstrated that receiving care from a diabetes specialist yields better results than receiving care from a generalist.
Knowledge, attitudes and practices towards COVID-19 among young adults with Type 1 Diabetes Mellitus amid the nationwide lockdown in India: A cross-sectional survey	Pal et al., (2020)	Cross-sectional web-based survey	212 participants were included and Most of the participants were from the North Zone of India	Greater knowledge scores were correlated with higher educational status, living in an urban area, and being married; however, only urban residence was shown to be statistically significant on multinomial logistic regression.

Impact of prediabetes education program on	Hyder et al., (2021)	Community based assessment	315 prediabetes respondents from Kerala and Tamil Nadu	Ninety percent of prediabetics scored poorly on the baseline knowledge
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<p>Knowledge, attitude and practice among prediabetic population of south India</p>				<p>evaluation; however, following the PEP programme, forty-three percent scored averagely and forty-four percent scored well. 30% of respondents to the attitude baseline survey had a negative attitude, whereas 68% of respondents showed a positive attitude following counselling. Practice evaluation results showed that 35% had very poor practice and 52% had poor practice; however, following PEP, 71% had good practice and 15% had very good practice. The baseline KAP survey reveals that newly diagnosed prediabetics require health literacy.</p>
<p>Knowledge, attitude, and practice of urban Gujarati type 2 diabetics: Prevalence and impact on disease control</p>	<p>Solanki et al., (2017)</p>	<p>Cross-sectional observational KAP study</p>	<p>96 males and 104 female patients of Government Medical College, Gujrat</p>	<p>In type 2 diabetics with a mean age of 58 years and a typical duration of 9 years, the average KAP score was 19 out of 30. The KAP score was highly impacted by education level and present age, but it was unaffected by gender, occupation, or length of illness. Less than 40% of patients with strong</p>

				glycemic control outperformed inadequate glycemic control in terms of KAP. The KAP score and glycemic control showed a favourable connection, which was significant only for glycosylated haemoglobin and not for postprandial or fasting blood sugar.
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Knowledge, attitude and practice of insulin use of diabetic patients in India	Venkataraman et al., (2020)	Cross sectional analysis	Male and female patients of Bangalore Medical College and Research Institute, Department of Medicine	<p>Sixty diabetes patients (either inpatients or outpatients) had their knowledge, attitudes, and practices evaluated using a validated 24-item questionnaire. Each question was given a score, which was then assessed using the relevant statistical tests. The patients' mean age was</p> <p>53.51±6.48 years, with 58.33% of them being male. The mean score for knowledge was 9.061.88 out of 22, the mean score for attitude was 4.781.37 out of 12, and the mean score for practice was 7.751.24 out of 11. In comparison to male patients, female patients had a higher mean attitude score (5.32±1.34 vs. 4.4±1.28).</p>
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				When asked about hypoglycemic symptoms, male patients answered the question with 38.57%, while female patients answered with 41.33%. When they went out, simple carbs were carried by 72% of female patients and 57.14% of male patients.
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Knowledge, attitude, and practice of diabetes in patients with and without sight-threatening diabetic retinopathy from two secondary eye care centres in India	Pardhan et al. (2024)	Cross sectional analysis	383 consecutive patients with diabetic retinopathy attending retina referral clinics in Chennai (private) and Darjeeling (public) were recruited	Analysis was done on 383 participants' (94.8%) usable data. Among them, 300 (78.3%) had NSTDR and 83 (21.7%) had STDR. Compared to the STDR group (mean rank = 233.1), the NSTDR group reported a significantly lower overall KAP score (mean rank = 183.4), $z = -3.0$, $p < 0.001$. In the NSTDR group, a considerably higher proportion of participants stated they were not aware that diabetes could have an impact on eyes, were unaware of potential treatments for DR, and checked their blood sugar less frequently than once a month.
Evaluation of the knowledge, attitudes and practices of	Tejaswi et al. 2018	Prospective observational study	100 patients Department of Pharmacology, Sri Aurobindo Medical	To create effective programs for disease control and awareness, KAP research are required. High rates of

<p>diabetic patients in a tertiary care hospital in Central India</p>			<p>College and Postgraduate Institute, Indore (M.P.)</p>	<p>morbidity and mortality are linked to diabetes. In this case, people must take responsibility for managing their illness; simply being aware of the diagnosis is insufficient. Therefore, it is imperative that appropriate health education and personalized counselling be implemented in a variety of healthcare settings to guarantee that every diabetic patient receives enough knowledge and is inspired to live a healthier life.</p>
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<p>Knowledge, Attitude, Practices (KAP) of Metabolic Disorders in South Indian Population</p>	<p>Swami et al., 2021</p>	<p>Prospective observational study</p>	<p>980 houses were screened in Vijayawada city</p>	<p>Over the course of a year, 980 homes were evaluated, and 187 of them found to have thyroid abnormalities and 735 to have diabetes mellitus. There are 456 patients with T2DM alone and 130 hypothyroid (H) individuals remaining after meeting the selection criteria. 55 of them disappeared during the follow-up.</p>
<p>An assessment of knowledge, attitude and practices (KAP) towards diabetes and diabetic retinopathy in a suburban town</p>	<p>Memon et al., 2015</p>	<p>Cross-sectional study</p>	<p>Six hundred ninety-two adults one from each household of Karachi</p>	<p>One's ability to regularly check blood sugar (87.5%), seek expert support for disease control (77.9%), and visit an ophthalmologist (56.8%) were all highlighted as strengths. Among the weaknesses were eating out</p>

of Karachi			<p>of the house at least once a month (87%) and taking high- calorie snacks in between meals (49%). Additionally, 9.2% of the respondents did not pay enough attention to other blood tests, such as cholesterol and glycated haemoglobin HbA1C (22.1%), or retinal screening.</p> <p>There was a mismatch between the way people believed exercise and how they really did it. While 58.7% of respondents acknowledged the value of exercise, 67.9% of them did not exercise.</p>
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6. DISCUSSION

6.1 Status of Knowledge Attitude and Practice of Diabetes and Diabetic Retinopathy

The literature review indicates a rapidly growing prevalence of diabetes, with a likely concurrent increase in diabetic retinopathy (DR) cases. Studies emphasize the importance of screenings and stringent glucose management to mitigate this risk (34, 35). A lack of education on diabetes and DR complicates effective treatment and adherence to monitoring regimens.

Most studies within the review aimed to evaluate the Knowledge, Attitude, and Practice (KAP) levels related to diabetes and DR in various populations. Awareness of the need for DR screening was evident, yet specific knowledge about screening frequency was lacking (36, 37). Even in regions with higher awareness, such as Jordan and Oman, there was a disconnect between knowledge and screening behavior(38). An individual's KAP can affect how they behave and handle illnesses and medical treatment. A lack of knowledge about the potential effects of diabetes and DR screening services, forgetting to take medication, and not attending screening services due to various reasons such as limited access to healthcare facilities, financial difficulties, or underlying co-morbid conditions are all considered contributing factors to poor KAP. Healthy lifestyle choices, such as regular exercise, a balanced diet, and abstaining from or consuming less alcohol and tobacco, are crucial for regulating blood pressure, cholesterol, and blood sugar.

Glycemic control and blood pressure management are key to reducing DR incidence, but awareness

of the link between hypertension and DR was low among study respondents (39-42). Attitudes towards DR were generally less positive, with many people not recognizing the importance of regular eye exams in the absence of vision issues (19). In practice, there was a shortfall in routine DR screenings despite high levels of awareness (42-44). Various factors contributed to this gap, including access issues and social factors. Recommendations from the literature suggest integrating annual fundoscopic screenings with regular diabetes care to improve compliance (42, 45). There was a noted discrepancy between awareness of DR and subsequent behaviors and attitudes. According to the present review, although many understood the necessity of annual eye exams, a significant number still believed that managing blood sugar levels alone is sufficient to avoid ocular complications (45, 46). This highlights a critical need for education campaigns to address misunderstandings about diabetes management and DR prevention.

The review further notes a higher prevalence of DR in developing countries and suggests that primary care clinics could better utilize available resources (47). Socioeconomic status and education level correlate with better knowledge and attitudes towards DR (38, 48). However, even among those with good knowledge, there remains a gap in proactive screening behaviors (5, 11, 49-52). Healthcare professionals, particularly in primary care settings, are pivotal in disseminating information about DR (50). Informed patients are more likely to engage in self-care practices that preserve vision, emphasizing the need for effective communication strategies to educate diabetic patients about potential blindness risks and necessary preventive measures (11).

6.2 Diabetic Retinopathy Screening in India

Unfortunately, India does not have a state-wide DR screening program. Due to a lack of a comprehensive national plan, screenings throughout the country are now conducted on a project-by-project basis. It is important to note that many methods for DR case discovery in India have been created, and their implementation varies in terms of success.

6.2.1 Screening camps

Diabetic individuals attending these camps are screened for STDR, and those who test positive are given referrals to get treatment. As part of their community outreach efforts, doctors often enlist the aid of residents to staff mobile screening clinics. Here, an ophthalmologist-based approach is used to screen known diabetics for DR. The diabetic retinopathy awareness camps put on by this organization are helpful.

6.2.2 Telemedicine

In India, a telemedicine-based approach is enhancing access to diabetic retinopathy screening. Patients with diabetes can have their retinas imaged using automated equipment that does not require dilation of the pupils. These images are then remotely evaluated by specialists (60). Mobile units, outfitted with fundus cameras, reach out to various communities to facilitate image collection, which is then sent to a central facility for detailed analysis. The evaluated images lead to reports that are provided back to the patients through the mobile units, along with any necessary recommendations for follow-up care or treatment. This strategy is not only improving access to care but is also cost-effective; according to the World Health Organization, it represents a saving of \$1320 per quality-

adjusted life year when compared to the absence of screening(61).

6.2.3 Opportunistic screening

This method employs screenings for diabetes during regular doctor's visits. These diabetic patients have their fundus photographs taken by a skilled technician utilizing nonmydriatic fundus cameras. The images are then sent to a central reading center or an ophthalmologist for interpretation. On the same day, the photos are read, and a report is forwarded to the diabetes center for review. Based on the information obtained, the patient is given the necessary instructions. Direct ophthalmoscopy (DO) is another screening method doctors use; however, only 1.3% of general practitioners in South India reported employing DOs in their practices. After dilation, just half of them use DO. General practitioners have challenges with DR screening due to a shortage of time, ophthalmoscopes, and education.

7. CONCLUSION

Finally, it should be noted that managing diabetes and diabetic retinopathy is a complex issue requiring an all- encompassing strategy. The literature review has emphasized the need to comprehend the complex interactions between diabetes and the retinopathy's development, stressing the critical role that blood pressure control, glycemic control, and lifestyle modifications play in reducing the risk and halting the progression of diabetic retinopathy. Additionally, the prognosis and visual results for people with diabetic retinopathy have greatly improved because to breakthroughs in diagnostic tools and therapy modalities, such as anti-VEGF medications and laser treatments. Enhancing accessibility and efficiency in the management of diabetic retinopathy is possible through the integration of artificial intelligence and telemedicine in screening and monitoring.

This article throws light on the status of Knowledge Attitude and Practice of diabetes in different strata of our society and we can find out that most of the people in the upper class of society are aware of the condition and they follow the proper guidelines to control this condition but very fewer data is available to conclude the lower strata of the society. More population-based research is required to get concrete evidence to conclude the findings.

8. List of Abbreviations

KAP- Knowledge, Attitudes, and Practice

DR- Diabetic retinopathy

BMI- Body Mass Index

STDR- Sight-threatening diabetic retinopathy

DO- Direct ophthalmoscop

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