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ORIGINAL RESEARCH

Evaluating Eye Screening Protocols for Preschoolers in India's PHCs

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ABSTRACT

Purpose: This study aims to evaluate the knowledge, attitude, and practices (KAP) regarding vision and eye screening of preschool children among staff at primary health centers (PHCs) in India. **Methods:** In 2024, a survey was conducted among PHC staff using a questionnaire with sections on knowledge (10 questions), attitude (5 questions), and practices (5 questions) related to preschool vision and eye screening. Responses were measured on a five-point Likert scale. The questionnaire's reliability was confirmed with a Cronbach's alpha of 0.798. KAP scores were analyzed in relation to participants' demographic variables. Additionally, current and preferred sources of information were identified. **Results:** The survey included 101 health staff members (66 doctors and 35 nurses). The median (interquartile range) scores for knowledge, attitude, and practice were 4.1 (3.8; 4.3), 4.2 (4.0; 4.6), and 3.6 (3.0; 4.0), respectively. Doctors demonstrated significantly better knowledge (Mann-Whitney U test, $P = 0.016$) and attitude (Mann-Whitney U test, $P = 0.019$) compared to nurses. Staff over 40 years of age showed higher knowledge (Kruskal-Wallis H test, $P = 0.035$), attitude (Kruskal-Wallis H test, $P = 0.017$), and practice (Kruskal-Wallis H test, $P < 0.001$) scores. The primary source of information was medical education (51%), followed by eye care professionals (11.9%), online resources (12.9%), and social media (14.9%). Preferred information sources were medical journals (25.7%), eyecare training (22.8%), and eye professionals (33.7%). **Conclusion:** PHC staff in India generally have high knowledge and positive attitudes towards preschool vision and eye screening, though their practices are less consistent. Enhancing information dissemination through preferred channels could improve eye care practices for preschool children.

Keywords: Attitude, Childhood blindness, Eye screening, Knowledge,Practice, Primary health center

INTRODUCTION

Integrating primary eye care within primary health care allows for a comprehensive and systematic approach to prevent and treat childhood blindness [1]. Primary health center (PHC) staff can play a crucial role by detecting eye problems at early stages, referring children to eye care professionals, counseling parents to enhance compliance with eye health advice, and conducting opportunistic vision and eye screenings during children's visits for immunization or treatment of general health issues [2,3]. Such integrated and coordinated eye care at the primary level is facilitated by training primary health care workers and allied personnel to undertake these tasks [4].

The World Health Organization prioritized childhood blindness in the VISION 2020 initiative, aiming to address avoidable blindness by advising member countries to implement strategies for early detection and referral systems within primary eye care, integrated with child health care programs [5,6].

In India school-based health care programs, including vision screening for first- and fourth-grade primary school children through health centers [7]. However, to the best of our knowledge, vision and eye screening for children aged three to five, as recommended by the American Pediatric Association, has not yet been implemented in India [8]. A study evaluating vision screening programs across multiple countries revealed significant variation in the age groups and methods used for testing children's vision [9].

A successful strategy for preschool vision and eye screening requires the support of trained primary health doctors and nurses. Therefore, assessing the current knowledge, attitude, and practices (KAP) regarding vision and eye screening among PHC staff is essential. The literature indicates variable levels of KAP among primary eye care staff, particularly pediatricians, PHC doctors, and nurses [10-13]. Studies in different provinces of India have reported low awareness levels of strabismus and amblyopia among pediatricians and family physicians [14,15].

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In the Ahmedabad, there are 155 PHCs under the Ministry of Health, with approximately 466 doctors and 990 nurses providing child health care [16]. These healthcare workers have not been formally trained in providing primary eye care or conducting vision and eye screenings for children. To generate evidence for the need for preschool vision screening (PVS) and to build the capacity of stakeholders, including primary health care providers, it is crucial to identify the current level of awareness, attitudes, and practices regarding eye care for children.

This study examines the perceived levels and determinants of KAP regarding preschool vision and eye screening among primary health care staff in Ahmedabad

METHOD

Study Overview

Doctors and nurses at all PHCs in Ahmedabad were informed about the survey. Study investigators visited selected health centers and recruited participants randomly from those present at the PHCs during the visits.

Ethical Considerations

The ethical and research committee approved this study. Written informed consent was obtained from all participants. Those who declined to participate were excluded.

Study Criteria

The study population consisted of approximately 170 doctors and nurses working in PHCs providing child health care in the Ahmedabad. Field investigators visited four randomly selected PHCs out of the 40 available. Participants on duty who consented to participate were included in the survey. PHCs were visited during two different shifts on different days to increase coverage.

Study Procedures

A Google Form, developed in consultation with pediatric ophthalmologists, PHC doctors, and epidemiologists, was used for data collection and was loaded on tablets for participants to provide their responses.Demographic information collected included gender, age group, PHC, and category of health staff (doctor or nurse).

Assessments

The survey contained 10 questions on knowledge, five on attitudes, and five on practices related to preschool vision and eye screening. Responses were recorded on a five-point Likert scale: “I fully disagree,” “I disagree,” “not sure,” “I agree,” and “I fully agree.” The questions were in English, with anGujarati translation available for clarification if needed.

The questionnaire was translated into Gujarati and then back-translated by independent scholars. The questions were kept simple for easy understanding by PHC staff. A pilot study with 10 health staff members was conducted to test the reliability of the questions, resulting in a Cronbach’s alpha of 0.798. Data from the pilot study were analysed using IBM SPSS Statistics, version 25.0 (IBM Corp., Armonk, NY), grouping responses to KAP questions and estimating Cronbach’s alpha, with a value over 0.75 considered very good. Likert scale analysis was performed following internationally recommended methods for health studies [17], scoring responses from 1 to 5.

Sample Size Calculation

To calculate the sample size for representing 170 doctors and nurses at 40 PHCs in Ahmedabad [16], we assumed 68% of participants had good knowledge about refractive errors in children, as noted in a Jordan study [11]. To achieve a 95% confidence interval with a 10% acceptable error margin and a clustering effect of 1.2, we needed to randomly select 96 PHC staff. To compensate for incomplete responses, the sample size was increased to 100. Sample size calculation was done using Open-Epi software [18].

Statistical Analysis

Data from the Google Form were transferred into a spreadsheet in IBM SPSS Statistics, version 25.0 (IBM Corp., Armonk, NY). The median response score for the knowledge questions was calculated to determine the overall knowledge score, with a similar approach for attitude and practice questions. Graphs were plotted to visualize the 5-point Likert scale responses on KAP. Nonparametric methods were used to compare overall knowledge response scores within subgroups. The Mann-Whitney U test was used for comparisons between two subgroups, with Z- and P-values noted. For more than two subgroups, the Kruskal-Wallis H test was used. Chi-square and two-sided P-values were estimated, with a P-value of <0.05 considered statistically significant.

RESULTS

We surveyed 101 PHC staff in the study area, which included 66 doctors (65.3%) and 35 nurses (34.7%). The gender distribution comprised 55 males (54.5%) and 46 females (45.5%). Participants' age groups were 20-29 years (46; 45.6%), 30-39 years (30; 29.7%), and above 40 years (25; 24.8%).

Knowledge

Responses to the 10 knowledge-related questions and overall knowledge about preschool vision and eye screening among PHC staff are shown in Figure 1. Over 60% of participants agreed with the correct knowledge statements. The statement “<5-year-old children’s eye problems can be found only with vision screening” had the lowest rate of agreement, whereas the statement “<5-year-old children with refractive error should wear spectacles” had the highest

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agreement. For all questions, about one in five participants was "not sure."

Attitudes

Responses to the five attitude-related questions and overall attitudes about preschool vision and eye screening among PHC staff are depicted in Figure 2. Nearly 40% of participants had an overall positive attitude toward preschool vision and eye screening. However, responses to the statements "I believe spectacles should not be used by young children as it increases the need for spectacles" and "I believe children are negatively psychologically affected and therefore should not be given spectacles" suggested a high proportion of negative attitudes.

Practices

Responses to the five practice-related questions and overall practices related to preschool vision and eye screening among PHC staff are illustrated in Figure 3. One-third of participants had responses suggesting good practices for vision and eye screening for preschoolers. More than half of the participants were not sure about the practice-related questions.

KAP Scores

The KAP scores of the participants and subgroups are shown in Table 1. The median (interquartile range) knowledge, attitude, and practice scores of the participants were 4.1 (3.8; 4.3), 4.2 (4.0; 4.6), and 3.6 (3.0; 4.0), respectively. Staff aged 40 years and older had significantly higher scores for KAP than other age groups. Doctors had significantly higher knowledge and attitude scores than nurses. There was no significant difference in scores between male and female PHC staff. The PHC staff across the four cities had similar levels of KAP.

Sources of Knowledge

The participants' responses about the current leading source of knowledge and preferred source of knowledge about vision and eye screening in preschool children are detailed in Table 2. The primary source of information about PVS was medical education (51%). Other sources included eye care professionals (11.9%), Google and computers (12.9%), and social media (14.9%). The participants' preferred sources of information were eye professionals (33.7%), medical journals (25.7%), and eye care training (22.8%).

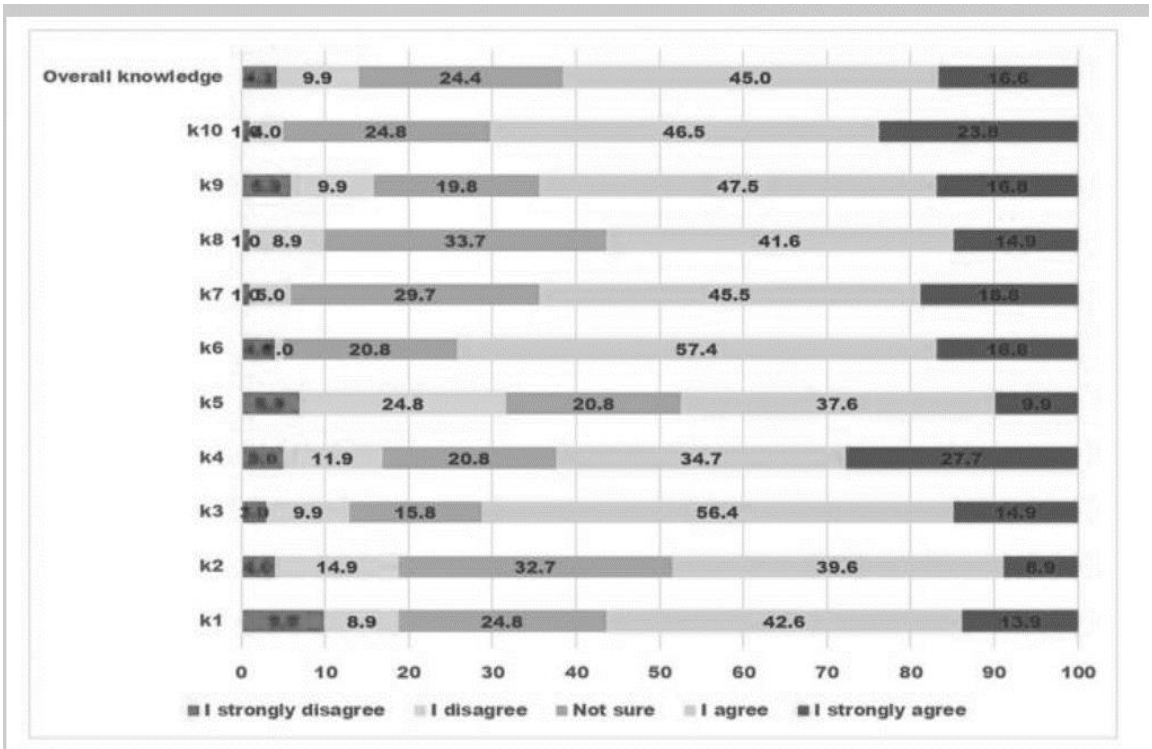

FIGURE 1: Visualizing the five-graded Likert scale responses to questions about vision and eye screening of preschool children related to "knowledge" by primary health staff

The X-axis displays the percentage proportion of participants giving a grade of response.
The Y-axis displays 10 knowledge-related questions and one overall knowledge.

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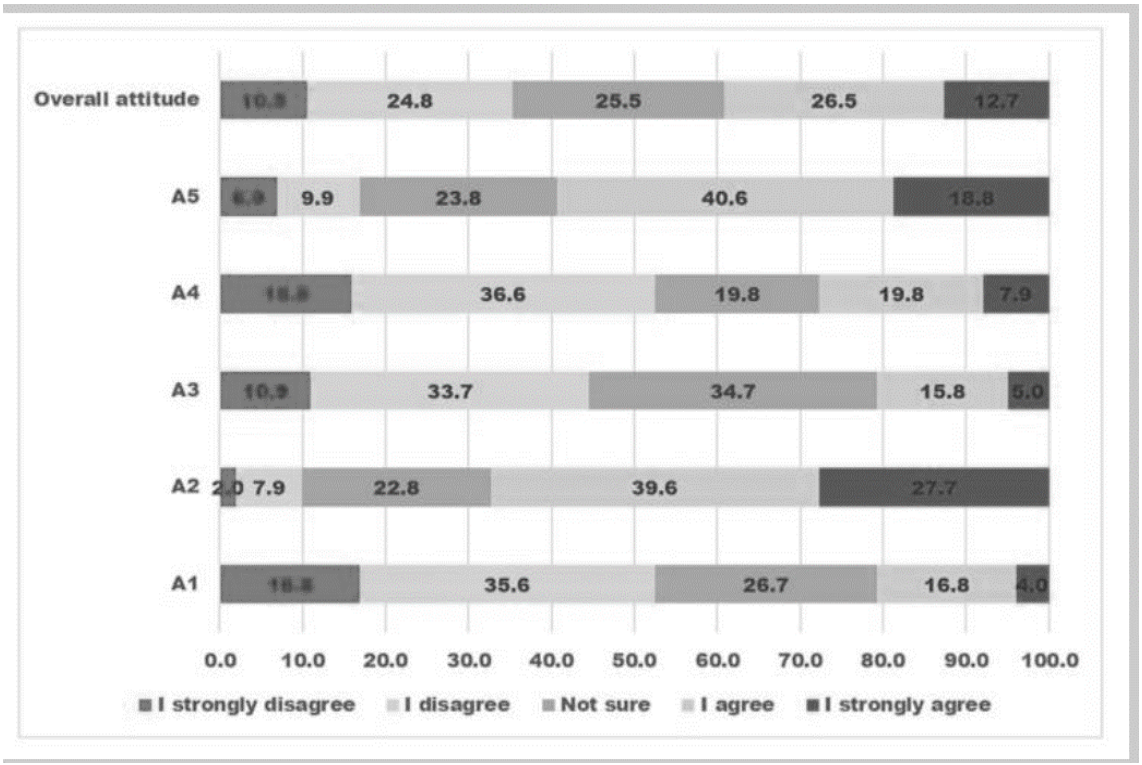

FIGURE 2: Visualizing the five-graded Likert scale responses to questions about vision and eye screening of preschool children related to "attitude" by primary health staff

The X-axis displays the percentage proportion of participants giving a grade of response.
The Y-axis displays five attitude-related questions and one overall attitude

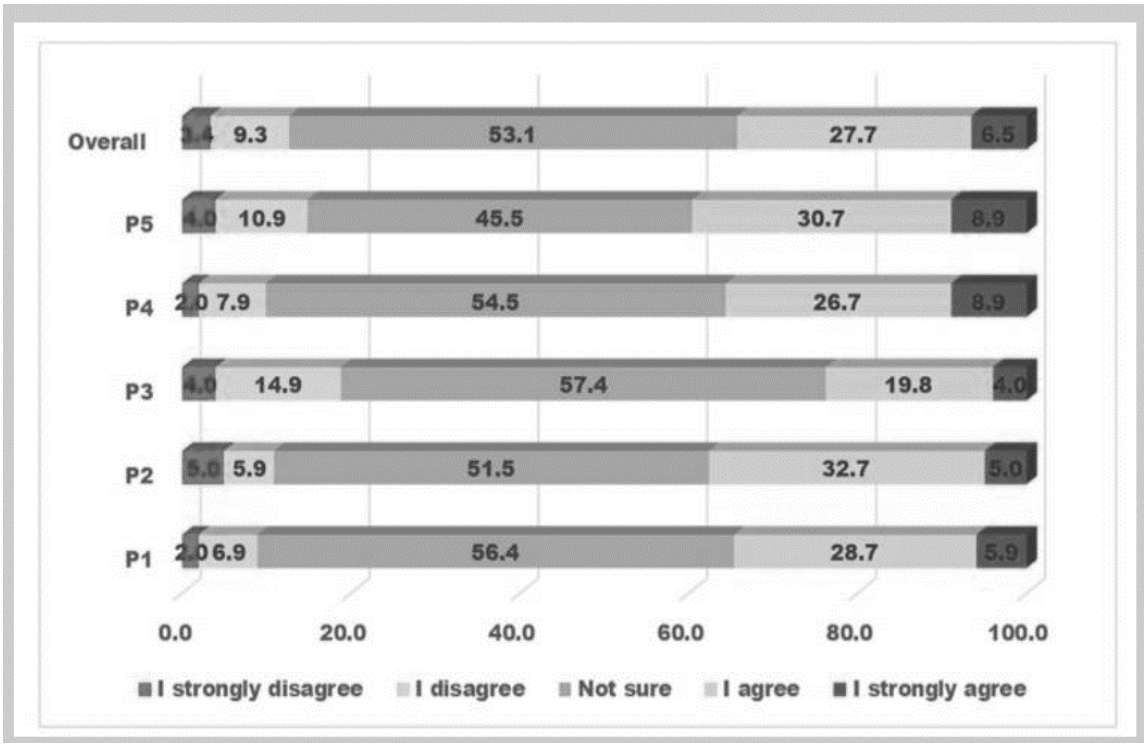

FIGURE 3: Visualizing the five-graded Likert scale responses to questions about vision and eye screening of preschool children related to "practice" by primary health staff

The X-axis displays the percentage proportion of participants giving a grade of response.
The Y-axis displays five practice-related questions and one overall practice.

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Table 1: Knowledge, attitude, and practice related to vision and eye screening of preschool children among PHC staff in Ahmedabad

*For two subgroups, the P-value is based on the Mann-Whitney U test. Meanwhile, for more than two subgroups, the P-value is based on the Kruskal-Wallis H test.

IQR, inter quartile range; PHC, primary health center

	Knowledge	*P-value	Attitude	P-value	Practice	P-value
All PHC staff	4.1 (3.8-4.3)	-	4.2 (4.0-4.6)	-	3.6 (3.0-4.0)	-
Gender						
Male	4.1 (3.8-4.3)	0.88	4.2 (4.0-4.6)	0.565	3.6 (3.0-4.0)	0.821
Female	4.1 (3.78-4.3)		4.2 (3.95-4.45)		3.6 (3.0-4.0)	
Age-group						
20-29	4.0 (3.7-4.3)	0.034	4.2 (3.75-4.4)	0.017	3.0 (3.0-3.65)	<0.001
30-39	4.0 (3.8-4.2)		4.2 (3.95-4.6)		3.8 (3.0-4.0)	
40+	4.3 (4.1-4.35)		4.4 (4.02-4.8)		4.0 (3.0-4.4)	
Staff category						
Doctor	4.15 (3.9-4.3)	0.016	4.2 (4.0-4.6)	0.019	3.8 (3.0-4.1)	0.107
Nurse	4.0 (3.5-4.2)		4.0 (3.0-4.4)		3.0 (3.0-4.0)	

Note: Median (IQR) represents the median and interquartile range of the Knowledge, Attitude, and Practice scores. The P-values indicate the statistical significance of differences between groups.

Table 2: Source of information (current vs desired) about vision and eye screening of preschool children among PHC staff in Ahmedabad

PHC, primary health center

Current Source	Number (percentage)	Desired Source
During medical education	52 (51.5%)	0 (0.0%)
Medical journals	0 (0.0%)	26 (25.7%)
Training in eye care	2 (2.0%)	23 (22.8%)
Eye care professionals	12 (11.9%)	34 (33.7%)
Google and computer	13 (12.9%)	4 (4.0%)
Social media	15 (14.9%)	4 (4.0%)
Television	2 (2.0%)	2 (2.0%)
From feedback of referred patients	2 (2.0%)	7 (6.9%)
Other	2 (2.0%)	0 (0.0%)
Pamphlets & brochures	1 (1.0%)	1 (1.0%)

Table 3: Questions about preschool vision and eye screening for primary health center staff

Knowledge	
K1	Less vision in <5 years old children can cause permanent vision impairment/blindness
K2	Less vision in <5 years old children can cause crossed eye
K3	Impaired vision in <5 years old children will need spectacles
K4	Less vision in <5 years old children can affect their development
K5	Less vision in <5 years old children can be detected only by vision testing
K6	<5 years old children with a refractive error should wear spectacles
K7	Children of parents with a refractive error have more chances of having a refractive error
K8	If there is a refractive error in a child in the family, other siblings have more chances of having a refractive error
K9	<5 years old children should be periodically examined by an optometrist/ophthalmologist
K10	Parents should strictly follow "screen time" norms in their children before school age

Attitude	
A1	I believe spectacles should not be used by young children as it increases the number of spectacles faster
A2	I believe excessive exposure to computers and phones results in a refractive error in children
A3	I believe parents should not allow children to undergo surgery for cross-eye in young children
A4	I believe children are negatively psychologically affected and therefore should not be given spectacles
A5	I believe <5 years old children should be screened for eye and vision

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DISCUSSION

The findings of this study indicate that the doctors and nurses working at PHCs in Ahmedabad have a good level of knowledge and a positive attitude towards vision and eye screening of preschool children. However, the practices related to this issue were not as prevalent as desired, with many participants uncertain about their responses to practice-related questions. Notably, older staff and doctors exhibited better knowledge and attitudes compared to younger staff and nurses. Approximately half of the participants' knowledge was derived from their medical education, with additional contributions from sources like Google and social media. Their preferred sources for gaining knowledge included medical journals, eye care professionals, and training workshops.

Importance of Primary Health Staff

Primary health staff play a critical role in promoting eye health, detecting eye diseases in children, and providing timely referrals to specialists by counseling parents and arranging appointments with pediatric ophthalmologists. This study highlights the current KAP status among PHC staff and their expectations for improving KAP through training, feedback from eye care professionals, and access to medical journals. Based on these findings, national and provincial health programs focused on child health, primary health care, and eye health care can organize training sessions similar to those implemented [19]. Furthermore, these programs can establish referral systems from primary care to higher levels of eye care, along with feedback mechanisms to PHCs [20].

Knowledge and Awareness

The high level of knowledge regarding vision and eye screening among PHC staff is encouraging, although there is a notable gap in awareness about the importance of vision screening for detecting asymptomatic eye problems in children under five years old. This finding contrasts with the results of Marsh-Tootle et al. [10], who found a positive association between better knowledge and good PVS behavior among pediatricians and family physicians. A study in Jordan revealed that although pediatricians had good knowledge and attitudes towards eye screening, their referral rates to ophthalmologists were lower than desired [11]. Similarly, in Kenya, a study found that 70% of pediatricians had poor knowledge about eye diseases in children [12]. These insights suggest that training programs for health staff should address specific weaknesses and leverage strengths in knowledge and practice.

Attitudes Towards Vision Screening

The positive attitude of PHC staff towards vision and eye screening is promising, as health staff with positive attitudes are more likely to adopt related behaviors [10]. However, changing attitudes can be challenging. Personal experiences, referral lessons, and feedback from ophthalmologists play crucial roles in shaping attitudes towards referral practices, parent counseling, and proactive care for children with suspected eye problems. While Jordanian pediatricians demonstrated a positive attitude, their collaboration with ophthalmologists was lacking [11]. Thus, efforts to improve attitudes through workshops and practical training sessions are essential.

Practices and Training

The study indicates that older health staff have significantly better KAP scores compared to younger staff, possibly due to changes in medical and nursing training focus or personal experiences as parents. Doctors had better knowledge and attitudes towards PVS than nurses, which could be attributed to their responsibilities for referrals and feedback from ophthalmologists. In many countries, vision screening is the responsibility of nursing staff, highlighting the need to enhance their knowledge and attitudes for better quality screening [23,24]. Additionally, the absence of significant gender differences in KAP levels suggests that female health staff, who predominantly serve in health care facilities, can effectively contribute to universal vision and eye screening initiatives.

Sources of Information

The current reliance on social media and unconfirmed cyber sources for information is concerning. Officially approved sources of information on preschool vision and eye screening should be incorporated into the Ministry of Health's knowledge portal. Providing standard operating procedure manuals for eye care at PHCs can serve as valuable guides for health staff [25].

Study Limitations

This cross-sectional study has limitations, including the non-random recruitment of participants, which may affect the generalizability of the results to the entire PHC staff in Ahmedabad.

CONCLUSIONS

The study reveals a reasonably good level of knowledge and positive attitudes towards PVS among PHC staff, but highlights a need to improve practices through enhanced training, resource provision, and better communication channels between eye care professionals and primary health staff. Administrators should review the proposed methods for imparting health awareness to staff, and a follow-up survey is recommended to assess the impact of PVS programs and training initiatives on primary eye care in the study area.

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