Research Article

Do General Practitioners have Sufficient Knowledge and Skills in Using Direct Ophthalmoscope? A Survey on General Practitioners of Northern Iran

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ABSTRACT

Background: The goal of this study was to determine the knowledge of general practitioners regarding direct ophthalmoscopy and its frequency of use in the hopes of designing future programs for improving educational methods and fixing possible educational shortcomings.

Methods: In this descriptive cross-sectional study, general practitioners were asked to fill out a questionnaire in their working place. Overall, 244 physicians were chosen randomly from a list of working physicians in Rasht, Iran, which were documented in the medical system.

Results: In total, 61.7% of the general practitioners in our study never used the ophthalmoscope, and 56.6% stated that they have little mastery of ophthalmoscope work. The reasons for not using an ophthalmoscope based on the statements of the general practitioners under study were unavailability in 51.67%, low mastery in 28.18%, lack of feeling needed for the general practitioner in 26.17%, and insufficient opportunity in 9.39%. Up to 84% of the physicians surveyed stated that more education was needed for medical students in this field. Comparing the baseline characteristics between the two groups with and without using ophthalmoscope indicated that the use of this tool was overall higher in men than in women, in age range higher than 30 years, in the graduates of the University of Tehran compared to other graduates, in those with more time out of university, and in those who were working in private offices relative to government centers. The physicians who reported greater mastery of working with the tool were also more likely to use it. About 84% of physicians emphasized needing more education to use this tool properly.

Conclusion: General practitioners in Rasht use ophthalmoscope infrequently, and over half of them do not have enough skills to use it. Practical training during medical students' externship and internship seems to be helpful in solving this problem. Improving educational curricula and providing ophthalmoscopes for doctors' working places, especially in public service, can improve the knowledge, proficiency, and use of ophthalmoscopes among physicians.

Keywords: ophthalmoscope, general practitioner, knowledge

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Introduction

Annually, 4% of all patients with ocular complaints refer to general practitioners. Ocular problems are the cause of a significant percentage of consultations in the primary care level, and one-fifth of the consultations performed following accidents and emergency conditions are related to ocular problems (1). Direct ophthalmoscopy is an important component of physical examination and is valuable in diagnosing primary eye diseases as well as ocular complications of systemic disorders and thus can ultimately help to make an informed decision to refer the patient to an ophthalmologist (2,3). General practitioners typically refer patients to an ophthalmologist for emergency cases or for a thorough systemic clinical examination (4). In emergency cases, the most common question is the presence or absence of optic disc edema (5). Additionally, the changes related to diseases such as diabetes and hypertension in the fundus of the eye can be observed in the pre-clinical stage of the disease and are therefore very valuable in the rapid diagnosis of these diseases (6)(23), and therefore the general practitioner should be able to identify suspicious findings from patients' ocular examinations and refer them to an ophthalmologist (7,8).

Overall, given the high prevalence of the above diseases, it is essential that general practitioners are proficient in using ophthalmoscopes, recognizing the normal retina and retinal manifestations in common diseases. According to standards adopted by the Association of University Professors of Ophthalmology (AUPO) and supported by the American Academy of Ophthalmology and the International Council of Ophthalmology, students should be able to detect the red reflex, retina and optic disc, and also evaluate the optic disc edema, abnormal vascular bed, contours, and discoloration that are especially associated with glaucoma and macular degeneration (9-11). Despite these recommendations, students and physicians in non-ophthalmology specialties rarely perform the ocular examination and perform poorly (12,13). Students and general practitioners do not perform enough ophthalmoscopic examinations during their studies that pave the way for the mismanagement and misdiagnosis of ocular diseases and some systemic diseases, unnecessary referrals of patients to higher levels of the medical system, and a decrease in confidence in dealing with ocular problems in general practitioners (14). Students and general practitioners find ophthalmoscopy examination very difficult despite knowing its importance, which can be due to the limited field of view of the direct ophthalmoscope, incorrect positioning, and patients' lack of cooperation in this examination (15).

So far, few studies have been conducted on the knowledge and application of direct ophthalmoscopy, which is a very important diagnostic tool in the field of general practitioners and plays a major role in the initial diagnosis of many systemic diseases. The present study was designed to determine the level of knowledge of general practitioners and their use of this diagnostic tool.

Methods

Study population

This cross-sectional study was performed on all active and employed general practitioners in Rasht city, Iran, in 2020 and 2021. The random list of the physicians and their place of employment (including offices, clinics, or hospitals) was compiled by referring to the city's medical council. The sampling of general practitioners was done on a simple random basis based on a table of random numbers from the list of active general practitioners in Rasht registered in the council. The exclusion criteria included not agreeing to participate in the study and incompletion of the questionnaires. From this list, 246 cases were randomly selected; 2 of those were not willing to answer the questions.

Collection of data

At the general practitioners' workplace, they were asked to complete a pre-designed questionnaire. The questionnaires were

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completed under the direct supervision of the questioner and were collected at the same time. From this list, 246 people were randomly selected, 2 of whom were not willing to answer the questions. The validity of this tool was examined as a formal content by the ophthalmologists. Ophthalmologists expressed their views and opinions on all items and suggested items to strengthen the questionnaire. Also, in terms of content validity, shortly after face content validity, a 5-person panel was used to determine the two content validity ratio (CVR) and content validity index (CVI). The CVR and CVI index of the questionnaire were obtained to assess the necessity, relevance, simplicity, and clarity of the questions. In order to check the reliability, the opinions of 10 general practitioners were examined simultaneously through equivalent forms, in which the sequence of questions was different. The kappa coefficient obtained from the two forms is significant and is more than 0.75. The Ethics Committee of Guilan University of Medical Sciences approved the protocol of the study.

Statistical analysis

For statistical analysis, the results were presented as mean±standard deviation (SD) for the quantitative variables and were summarized by frequency (percentage) for the categorical variables. The continuous variables were compared using *t* test or Mann-Whitney test whenever the data did not appear to have normal distribution or when the assumption of equal variances was violated across the study groups. The categorical variables were, on the other hand, compared using the Chi-square test. The association between quantitative indices, the Pearson's or Spearman's correlation tests were employed. For the statistical analysis, the statistical software SPSS version 23.0 for windows (IBM, Armonk, New York) was used. P values of 0.05 or less were considered statistically significant.

Results

In this study, the opinions of 244 general practitioners in Rasht city, Iran, regarding the application of direct ophthalmoscopy were studied. The baseline characteristics of the participants are shown in table 1. In total, 51% of physicians were women, and 49% were men, with the mean age of 41.7±13.4 years. Most of the physicians studied (54.5%) had more than 10 years of work experience. Overall, 41.8% were working in government centers, and most (92.6%) stated that they had received ophthalmoscopy training during college. Only 7.4% stated that they had not been trained to work with ophthalmoscopes, and 80.1% had been trained in both theoretical and practical methods. In the study of participating in the workshop after graduation, only 4.5% of physicians stated that after graduation, they had seen training courses to work with ophthalmoscopes and in the study of the presence of ophthalmoscopes in the medical field. 50% stated that they did not have an ophthalmoscope at the medical center. Also, 61.7% of the studied samples never used ophthalmoscopes, 29.10% of physicians rarely used ophthalmoscopes, while 4.92% performed ophthalmoscopy daily, 1.23% weekly, and 3.69% monthly. In total, approximately 39% of general practitioners used ophthalmoscopes. Regarding ophthalmoscope mastery, 56.6% stated that they have little mastery of ophthalmoscope work. Most of the physicians stated that they use ophthalmoscopes in diabetes cases (49.47%) and then in those patients with headache (38.94%), decreased vision (38.94%), and blood pressure (26.31%), respectively, and 5.26% also mentioned other diseases. 96.84% stated that they never use mydriatic drops and 3.16% rarely use them. Of the three people who used mydriatic drops, one was named Midrax drops and two named atropine drops. Moreover, 41.05% expressed that they did not use it due to the lack of drops in the workplace, 33.68% were worried about the side effects of the drops, 12.63% admitted that they could use the ophthalmoscope well without the drops, and 9.47% did not have enough time to find the drop.

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Table 1: Baseline characteristics of study population

Sex, %	N (%)
Male	119 (48.77)
Female	125 (51.23)
Age group, %	
Under 30 years	86 (35.25)
30 to 39 years	30 (12.30)
40 to 49 years	28 (11.48)
50 to 59 years	78 (31.97)
Over 60 years	22 (9.02)
Mean age, year	41.67±13.38
Graduation University	
Guilan University of Medical Sciences	171 (70.08)
Tehran University of Medical Sciences	45 (18.44)
Other medical universities	20 (8.20)
Islamic Azad University	7 (2.87)
Overseas universities	1 (0.41)

Table 2: Frequency of ophthalmoscope use in terms of baseline parameters

Characteristics	**No use ophthalmoscope**	**Use ophthalmoscope**	**P value**
Sex, %			<0.001
Male	53 (44.54)	66 (55.46)	
Female	96 (76.80)	29 (23.20)	
Age group, %			<0.001
Under 30 years	70 (81.40)	16 (18.60)	
30 to 50 years	26 (44.83)	32 (55.17)	
Over 50 years	53 (53.00)	47 (47.00)	
Graduation University			<0.001
Guilan University of Medical Sciences	104 (60.82)	67 (39.18)	
Tehran University of Medical Sciences	19 (42.22)	26 (57.78)	
Other medical universities	19 (95.00)	1 (5.00)	
Islamic Azad University	6 (85.71)	1 (14.29)	
Overseas universities	1 (1.00)	0 (0.00)	
Graduation years			<0.001
<5 years	79 (75.96)	25 (24.04)	
5 to 10 years	4 (57.14)	3 (42.86)	
>10 years	66 (49.62)	67 (50.38)	
Working place			<0.001
Private	45 (51.14)	43 (48.86)	
Governmental	79 (77.45)	23 (22.55)	
Both	25 (46.30)	29 (53.70)	
Use of ophthalmoscopes during study period			0.618
Yes	139 (61.50)	87 (38.50)	
No	10 (55.56)	8 (44.44)	
Type of education			0.072
Theoretical	5 (35.70)	9 (64.30)	
Practical	17 (54.80)	14 (45.20)	
Both	117 (64.60)	64 (35.40)	
Participate in a workshop			0.219
Yes	5 (45.45)	6 (54.55)	
No	144 (61.80)	89 (38.20)	
Self-assessment of mastery of working with the ophthalmoscope			0.033

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Low	93 (67.39)	45 (32.61)	
Moderate	54 (54.00)	46 (46.00)	
High	2 (33.33)	4 (66.67)	

Table 3: Frequency of ophthalmoscope use in men and women considering baseline parameters

Characteristics	**No use ophthalmoscope**	**Use ophthalmoscope**	**P value**
Self-assessment of mastery of working with the ophthalmoscope			
Low			<0.001
Men	33 (30.0)	30 (66.7)	
Women	60 (64.5)	15 (33.3)	
Moderate			<0.001
Men	20 (37.0)	35 (76.1)	
Women	34 (63.0)	11 (23.9)	
High			0.999
Men	0 (0.0)	1 (25.0)	
Women	2 (100)	3 (75.0)	
Age subgroups			
<30 years			0.108
Men	15 (21.4)	7 (43.8)	
Women	55 (78.6)	9 (56.3)	
30 to 49 years			0.346
Men	9 (34.6)	15 (46.9)	
Women	17 (65.4)	17 (53.1)	
≥50 years			<0.001
Men	29 (54.7)	44 (93.6)	
Women	24 (45.3)	3 (6.4)	
Guilan University of Medical Sciences			<0.001
Men	31 (29.8)	42 (62.7)	
Women	73 (70.2)	25 (37.3)	
Tehran University of Medical Sciences			<0.001
Men	9 (47.4)	24 (92.3)	
Women	10 (52.6)	2 (7.7)	
Other medical universities			0.999
Men	10 (52.6)	0 (0.0)	
Women	9 (47.4)	1 (100)	
Islamic Azad University			0.999
Men	2 (22.3)	0 (0.0)	
Women	4 (66.7)	1 (100)	
Graduation years			
<5 years			0.002
Men	18 (22.8)	14 (56.0)	
Women	61 (77.2)	11 (44.0)	
5 to 10 years			0.999
Men	1 (25.0)	1 (33.3)	
Women	3 (75.0)	2 (66.7)	
>10 years			0.003
Men	34 (51.5)	51 (76.1)	
Women	32 (48.5)	16 (23.9)	
Working place			
Private			0.004
Men	25 (55.6)	36 (83.7)	

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Women	20 (44.4)	7 (16.3)	
Governmental			0.761
Men	16 (20.3)	4 (17.4)	
Women	63 (77.7)	19 (82.6)	
Both			0.001
Men	12 (48.0)	26 (89.7)	
Women	13 (52.0)	3 (10.3)	

Also, 41.80% of physicians used ophthalmoscopes to see the red reflex, about 43.44% did not see the red reflex, and 14.75% stated that they were not trained to see the red reflex. Only seven people saw all areas of the optic disc, arteries, and macula. Most of the physicians (63.15%) examined the optic disc area and then 33.68% of the vessels, and 23.15% of the macula, respectively. The reasons for not using an ophthalmoscope based on the statements of the general practitioners under study were unavailability in 51.67%, low mastery in 28.18%, lack of feeling needed for the general practitioner in 26.17%, and insufficient opportunity in 9.39%. Up to 84% of the physicians surveyed stated that more education was needed for medical students in this field.

Comparing the baseline characteristics between the two groups with and without using an ophthalmoscope (table 2) indicated that the use of this tool was overall higher in men than in women, in age range higher than 30 years than in the elderly, in the graduates of the University of Tehran compared with other graduates, in those with more time out of university, and in those who were working in private offices relative to government centers. The physicians who reported greater mastery of working with the tool were also more likely to use it. The other variables, including ophthalmoscopy training within academic education, receiving training in a practical or theoretical way, or participating in a workshop after graduation, had no statistically significant relationship with the use of the ophthalmoscope.

As shown in table 3, the percentage of ophthalmoscope use in men was higher than women in physicians who had low mastery and moderate mastery, and this difference was statistically significant, however in the group of physicians with excellent mastery, despite the difference of 50% in the use of female physicians compared with a male because of the lack of samples, the difference remained significant. The rate of ophthalmoscope use in men in the age group of 50 years and above was higher than women, and this difference was statistically significant, but at the age of less than 50 years, despite the greater use of ophthalmoscopes by women, the difference was no statistically significant. The percentage of ophthalmoscope use in men was higher than women in both subgroups who graduated within the last 5 years and more than 10 years, but in the subgroup of physicians who have graduated within 5 to 10 years after graduation, no difference was revealed across the two sexes. Also, the rate of ophthalmoscope use was higher in men than women in the subgroup working in private systems, with no difference in the subgroups working in governmental states.

Discussion

Despite the importance of ophthalmoscopic examination in the management and diagnosis of many ocular and systemic diseases, physicians rarely perform this examination and as a result. In this study, we examined the use and knowledge of general practitioners in ophthalmoscope use, the role of pre- and post-graduate training courses on this important issue, and also access to ophthalmoscope in connection with this issue. First, reviewing the literature shows that first in none of the similar studies, there was a significant relationship of age and sex with the rate of ophthalmoscope use, but in our study, the rate of ophthalmoscope use in male physicians was

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higher than female as well as in the age group under 30 years were lower than in older age group. Therefore, male gender and advanced age were revealed as the two main indicators for using this tool in a routine examination. However, we also showed no association between the use of ophthalmoscope and other parameters, including the year of graduation, working place, or Graduation University. Most of our physicians were graduates of Guilan University of Medical Sciences, and the highest percentage of ophthalmoscope use was attributed to physicians graduating from Tehran University of Medical Sciences, indicating significant differences in educational curricula between the country's universities.

Most of our physicians had a graduation period of more than 10 years. In the studies of Al-Rashidi and colleagues (16) and Onua and colleagues (17), the average work experience of the majority was less than 5 years. In this regard and as shown by our survey, a direct relationship was found between graduation time and ophthalmoscopy rate, but In the Dalay and colleagues (18), Onua and colleagues (17), and Al-Rashidi and colleagues (16) studies, there was a direct relationship between work experience and ability, self-confidence, and the rate of ophthalmoscope use expressing the similarity of our findings with other studies. Therefore, graduation time, which it reflects the work experience of individuals, is another factor related to the need to use this tool.

In the current study, in examining the medical employment system, the most worked in government centers, and half of the physicians stated that they did not have an ophthalmoscope in their practice. According to the findings of our study, the presence of ophthalmoscopes in public systems is much less than in private systems. The increasing use of ophthalmoscopes by general practitioners working in private systems indicates that the lack of the necessary tools for ophthalmoscopy is an important obstacle to the failure of general practitioners to perform them. In the study of Onua and colleagues (17), the most important obstacle in performing ophthalmoscopy was the lack of its instruments. The most common reason for not using an ophthalmoscope, according to the doctors' opinions in our study, is lack of access to the ophthalmoscope and then low mastery. In a study by Onyiaorah and co-workers (19), the main reason was found to be the lack of ophthalmoscope, and in another study by Roberts and co-workers (20), the main reason was reported to be an insufficient opportunity.

Most of the general practitioners we studied stated that they received ophthalmoscope training in both theoretical and practical ways during their studies, but there was no relationship between receiving training and the rate of ophthalmoscopy using. In Onyiaorah and colleagues (19) study, there was no significant relationship between ocular examinations (including ophthalmoscopy) and physician education, which the author attributed to the most common reason for non-examination, which was the absence of the necessary tools. In a review of post-graduation workshop participation, a small number of the physicians we studied reported participating in ophthalmoscope training courses after graduation. In a study by Shuttleworth and others (21), despite the belief of most physicians in inadequate training during their studies and the participation of more than half of the physicians studied in the supplementary courses of ophthalmology examinations, participation in a post-graduation workshop had no effect on ophthalmoscope use.

More than half of the physicians never use an ophthalmoscope, and about a third of them performed it rarely, indicating that they pay little attention to such examinations. In Onyiaorah and colleagues (19) study, none of the physicians under study used an ophthalmoscope. In some studies, low use of ophthalmoscope by physicians in the management of visited patients was reported (18,20,22), which was similar to the findings of our study. More than half of the general

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practitioners we studied have little mastery of ophthalmoscope work. Also, there was a direct relationship between the physician's mastery of ophthalmoscope use and his or her use of the diagnostic device. This justifies the unwillingness of general practitioners to use this tool. Moreover, in our study, physicians gave the most importance to ophthalmoscopic examination in diabetes, but these physicians constituted less than half of the population in our study, which indicates that general practitioners do not pay enough attention to ocular examination in different diseases subgroups. In fact, it seems that another reason why doctors do not use this tool is the lack of sufficient knowledge of the indications for its use. One of the limitations of this study is that a cross-sectional study is usually associated with potential limitations such as the nature of the study itself and associated with recall bias.

Conclusion

In total, the results of this study indicate that the theoretical information, application, and rate of use of direct ophthalmoscopes by general practitioners in Rasht are weak and insignificant. Moreover, the education throughout the country in this field is insufficient and needs to be upgraded. Also, general practitioners in Rasht face a shortage of tools needed for ocular examinations at work. According to the findings of this study, the training provided to medical students about ophthalmoscopy examination needs to be reviewed and improved. Further and more accurate theoretical and practical training in the use of this diagnostic tool in the field of ophthalmology should be among the educational outlines in the field of ophthalmology. Continuing training courses can also be held for general practitioners to remind and emphasize the need to use this device in the diagnosis of ocular and systemic diseases.

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