

## ***The importance of ophthalmoscopy training for general practitioners***

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## **ABSTRACT**

**Background:** The objective of the present research study was to evaluate the knowledge of general practitioners in terms of direct ophthalmoscopy and the frequency of its implementation, with the aim of developing future programs for the improvement of educational methods and elimination of probable educational shortcomings.

**Methods:** In the present descriptive cross-sectional research, general physicians completed questionnaires in their workplace. In total, 244 practitioners were randomly selected from the physicians active in Rasht, Iran, who were registered in the medical system.

**Results:** The findings demonstrated that 61.7% of the general physicians studied had never implemented the ophthalmoscopy method, and 56.6% of cases mentioned that they had little knowledge about ophthalmoscopy. According to the general physicians studied, the reasons for not utilizing an ophthalmoscope included unavailability with a frequency of 51.67%, low mastery with a frequency of 28.18%, not feeling the need with a frequency of 26.17%, and lack of sufficient opportunities with a frequency of 9.39%. 84% of the cases studied mentioned that further training was needed for medical students in this field. The comparison of the initial characteristics between the groups of cases with and without experience in utilizing ophthalmoscopy showed that the rate of using this method was generally higher in men than in women, in physicians over the age of 30 years, in the graduates of

Tehran University of Medical Sciences, in cases with more time out of university, and in physicians who were active in private offices compared to those active in government centers. The physicians with further knowledge about the instrument were also more likely to utilize it. Almost 84% of physicians expressed the need for further education regarding the use of ophthalmoscopy.

**Conclusion:** The use of ophthalmoscopy by general physicians who are active in Rasht city is not highly frequent, and more than 50% of the cases studied did not have adequate skills to utilize this method. Practical training during the externships and internships of medical students can be helpful for the elimination of this problem. Also, improvement of the medical curricula and supplying ophthalmoscopes for physicians, especially in public services, can be effective in improving the knowledge and skills of physicians regarding the use of ophthalmoscopes.

**Keywords:** ophthalmoscopy, general physician, knowledge, skills

## **INTRODUCTION**

Each year, 4% of all cases with ocular difficulties refer to general physicians. Ocular difficulties are an important cause of consultations at the primary care level, and about 20% of the consultations after incidents and emergency conditions are associated with ocular problems (1). Direct ophthalmoscopy is one of the major components of physical examination and has a high value in the diagnosis of primary ocular disorders and ocular manifestations of systemic disorders. Therefore, this method can be helpful in making an informed decision to refer the patients to an ophthalmologist (2,3). General physicians usually refer a patient to an ophthalmologist for emergency causes or for a complete systemic clinical examination (4). In emergencies, the most frequent question is the presence or absence of optic disc edema (5). In addition, the alternations in the fundus of the eye, which are caused by diseases such as diabetes and hypertension, can be seen in the pre-clinical stage of the disease, and for this reason, they are highly important in the timely diagnosis of these diseases (6). Thus, the general physician must be able to recognize unusual findings during the examination of patients and refer them to an ophthalmologist (7,8).

In general, considering the high frequency of the mentioned diseases, the proficiency of physicians in using ophthalmoscopes and recognizing the normal retina and retinal manifestations in common diseases can be crucial. Based on the standards expressed by the Association of University Professors of Ophthalmology (AUPO) and supported by the American Academy of Ophthalmology and the International Council of Ophthalmology, medical students must be able to identify the red reflexes, retina, and optic discs, and to assess the optic disc edema, abnormal vascular bed, contours, and discolorations, which are mainly associated with glaucoma and macular degradation (9-11). Regardless of these recommendations, students and practitioners who are active in fields other than ophthalmology, infrequently carry out the ocular examination or use it poorly (12,13). Students and physicians who do not perform adequate ophthalmoscopic examinations may disrupt the proper management and diagnosis of ocular disorders, and cause different systemic diseases and unneeded referrals to physicians of higher levels in the medical system (14). Physicians also contemplate that ophthalmoscopy examination is highly challenging regardless of its importance, which can be caused by the limited field of view of the direct ophthalmoscope, inaccurate positioning, and lack of cooperation of cases during these examinations (15).

Up to this point, limited studies have been performed to evaluate the knowledge of physicians regarding the use of direct ophthalmoscopy, which has a crucial role in the primary diagnosis of various systemic diseases. This study was conducted to assess the level of knowledge of general practitioners regarding the application of ophthalmoscopy.

## **METHODS**

### ***Study population***

The present cross-sectional study was conducted on all active general physicians in Rasht city, Iran, between 2020 and 2021. The list of the physicians and their workplaces (office, clinic, or hospital) was obtained after referring to the city's medical council, and the samples of the study were selected through a simple random sampling method using a table of random numbers from the list of active physicians in this city. Exclusion criteria were unwillingness to participate in the research and incompleteness of the questionnaire. Lastly, 246 physicians were randomly selected, and 2 of them were not inclined to participate in the study.

### ***Collection of data***

The researchers referred to the workplace of physicians and asked them to answer the pre-designed questionnaires. Each questionnaire was completed under the direct supervision of a researcher. The validity of the questionnaire was assessed as a formal content by the ophthalmologists. Ophthalmologists mentioned their opinions about questions and expressed their views for strengthening the questionnaire. Additionally, following the face content validity, a 5-

person panel was used for determining the content validity ratio (CVR) and content validity index (CVI). The CVR and CVI of this tool were obtained for assessing the exigency, relevancy, clearness, and simplicity of the items. Also, for assessing the reliability of the questionnaire, the views of 10 general physicians were investigated at the same time by using equivalent forms that consisted of distinct sequences of questions. The kappa coefficient calculated for the two forms was significant and was higher than 0.75. The Ethics Committee of Guilan University of Medical Sciences approved the protocols of this research.

### **Statistical analysis**

In order to statistically analyze the findings, the quantitative data were reported as mean  $\pm$  standard deviation (SD), and the qualitative data were reported as frequency and percentage. Comparison of the continuous variables was performed by T-test or Mann-Whitney test when the data did not have normal distribution or when the assumption of equal variances was rejected in the study groups. In contrast, the comparison of the categorical data was performed by the Chi-square test. In order to investigate the relationships among quantitative indices, Pearson's or Spearman's correlation tests were implemented. All statistical analyses, were performed using the statistical software SPSS 23.0. P values of less than 0.05 were considered significant.

## **RESULTS**

In the present research, the knowledge of 244 physicians on the use of direct ophthalmoscopy was investigated. The average age of cases was  $41.7 \pm 13.4$  years and 51% of them were women, and 49% were men. The initial characteristics of the cases are demonstrated in table 1. 54.5% of the cases had more than 10 years of work experience, and among them, 41.8% were working in government centers. A great number of physicians (92.6%) expressed that they did not receive training on ophthalmoscopy at the university. Only 7.4% mentioned that they were trained in this regard, and 80.1% of them had received both theoretical and practical training. Additionally, only 4.5% of the cases had participated in training courses about ophthalmoscopy after graduation. Half of the samples expressed that they did not have ophthalmoscopes at the medical centers. Also, 61.7% of participants had never used ophthalmoscopes, 29.10% of them rarely used ophthalmoscopes, 4.92% of the samples used ophthalmoscopes daily, 1.23% of them implemented ophthalmoscopy weekly, and 3.69% of the cases utilized ophthalmoscopy monthly. In total, about 39% of physicians implemented ophthalmoscopes. Also, 56.6% of cases mentioned that they have little mastery regarding the ophthalmoscopy method. A great number of the physicians stated that they utilize ophthalmoscopy in diabetic patients (49.47%), cases with headache (38.94%), patients with reduced vision (38.94%), and patients with high blood pressure (26.31%). Also, 5.26% used this method for other cases. 96.84% mentioned that they had never used mydriatic drops and 3.16% used them infrequently. Only three physicians implemented mydriatic drops, and one of them utilized drops named Midrax, and two of them utilized atropine drops. Additionally, 41.05% mentioned that they did not utilize them due to the unavailability of drops in the workplace, 33.68% were concerned about the side effects, 12.63% expressed that they can implement the ophthalmoscope appropriately without the drops, and 9.47% did not have adequate time to find the drop. In addition, 41.80% of practitioners utilized ophthalmoscopes for observing the red reflex, about 43.44% did not observe the red reflex, and 14.75% expressed that they had not received training for observing the red reflex. Only 7 physicians observed all areas of the optic disc, arteries, and macula. Most of the cases studied (63.15%) performed the examination of the optic disc area, 33.68% examined the vessels, and 23.15% examined the macula. According to the physicians studied, the causes for not utilizing the ophthalmoscopy method were unavailability in 51.67%, low knowledge in 28.18%, not feeling required for the physician in 26.17%, and lack of adequate opportunity in 9.39%. About 84% of the cases studied mentioned that further education on ophthalmoscopy is required for medical students.

A comparison of the initial characteristics among the two study groups with and without the use of ophthalmoscopy (table 2) showed that the rate of implementation of this method was generally higher in men than in women, in physicians higher than 30 years old compared to the elderly, in the graduates of Tehran University than other graduates, in physicians with more time out of university, and in physicians that were active in private offices. The physicians who stated that they have further knowledge about the tool were also more likely to implement it. The other variables, such as ophthalmoscope training in academic education, being practically or theoretically trained, or participation in a workshop after graduation, had no considerable association with the use of the ophthalmoscopy. As shown in table 3, the frequency of the implementation of ophthalmoscopy in men was higher compared to women, and in cases with moderate mastery compared to those who had lower knowledge about the tool, and these differences were statistically significant; also, in the group of cases with higher knowledge about the use of ophthalmoscopy, despite the differences in term of gender, the difference remained considerable. The rate of

implementation of ophthalmoscopy in men with 50 years of age and more was higher compared to female physicians, and the difference was considerable, however, in the age range of less than 50 years, the differences were not significant. The frequency of the implementation of ophthalmoscopy in men was higher compared to women in both subgroups that were graduated within the last 5 years or more than 10 years ago. However, there was no difference between the genders in the group of physicians who graduated within 5 to 10 years of graduation. In addition, in the subgroup of physicians working in private systems, men were more likely than women to utilize an ophthalmoscope, whereas there was no difference among the physicians working in governmental workplaces.

**Table 1:** Initial characteristics of studied physicians

<b>Sex, %</b>	
Male	119 (48.77)
Female	125 (51.23)
<b>Age group, %</b>	
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
<b>Graduation University</b>	
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 the implementation of ophthalmoscopy in terms of baseline parameters

<b>Characteristics</b>	<b>Not using ophthalmoscope</b>	<b>Using ophthalmoscope</b>	<b>P value</b>
<b>Sex, %</b>			<0.001
Male	53 (44.54)	66 (55.46)	
Female	96 (76.80)	29 (23.20)	
<b>Age group, %</b>			<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)	
<b>Graduation University</b>			<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)	
<b>Graduation years</b>			<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)	
<b>Working place</b>			<0.001
Private	45 (51.14)	43 (48.86)	
Governmental	79 (77.45)	23 (22.55)	
Both	25 (46.30)	29 (53.70)	
<b>Use of ophthalmoscopes during study period</b>			0.618
Yes	139 (61.50)	87 (38.50)	
No	10 (55.56)	8 (44.44)	

<b>Type of education</b>			0.072
Theoretical	5 (35.70)	9 (64.30)	
Practical	17 (54.80)	14 (45.20)	
Both	117 (64.60)	64 (35.40)	
<b>Participate in a workshop</b>			0.219
Yes	5 (45.45)	6 (54.55)	
No	144 (61.80)	89 (38.20)	
<b>Self-assessment of mastery of working with the ophthalmoscope</b>			0.033
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 the implementation of ophthalmoscopy in men and women based on initial parameters

Characteristics	No use ophthalmoscope	Use ophthalmoscope	P value
<b>Self-assessment of mastery of working with the ophthalmoscope</b>			
Low			<0.001
Male	33 (30.0)	30 (66.7)	
Female	60 (64.5)	15 (33.3)	
Moderate			<0.001
Male	20 (37.0)	35 (76.1)	
Female	34 (63.0)	11 (23.9)	
High			0.999
Male	0 (0.0)	1 (25.0)	
Female	2 (100)	3 (75.0)	
<b>Age subgroups</b>			
<30 years			0.108
Male	15 (21.4)	7 (43.8)	
Female	55 (78.6)	9 (56.3)	
30 to 49 years			0.346
Male	9 (34.6)	15 (46.9)	
Female	17 (65.4)	17 (53.1)	
≥50 years			<0.001
Male	29 (54.7)	44 (93.6)	
Female	24 (45.3)	3 (6.4)	
<b>Guilan University of Medical Sciences</b>			<0.001
Male	31 (29.8)	42 (62.7)	
Female	73 (70.2)	25 (37.3)	
<b>Tehran University of Medical Sciences</b>			<0.001
Male	9 (47.4)	24 (92.3)	
Female	10 (52.6)	2 (7.7)	
<b>Other medical universities</b>			0.999
Male	10 (52.6)	0 (0.0)	
Female	9 (47.4)	1 (100)	
<b>Islamic Azad University</b>			0.999
Male	2 (22.3)	0 (0.0)	
Female	4 (66.7)	1 (100)	
<b>Graduation years</b>			
<5 years			0.002

Male	18 (22.8)	14 (56.0)	
Female	61 (77.2)	11 (44.0)	
5 to 10 years			0.999
Male	1 (25.0)	1 (33.3)	
Female	3 (75.0)	2 (66.7)	
>10 years			0.003
Male	34 (51.5)	51 (76.1)	
Female	32 (48.5)	16 (23.9)	
<b>Work place</b>			
Private			0.004
Male	25 (55.6)	36 (83.7)	
Female	20 (44.4)	7 (16.3)	
Governmental			0.761
Male	16 (20.3)	4 (17.4)	
Female	63 (77.7)	19 (82.6)	
Both			0.001
Male	12 (48.0)	26 (89.7)	
Female	13 (52.0)	3 (10.3)	

## DISCUSSION

Despite the significance of ophthalmoscopy in the care and diagnosis of a wide range of ocular and systemic illnesses, physicians use it infrequently. The use and expertise of general practitioners in ophthalmoscope use, the efficacy of pre- and post-graduate training courses on this crucial topic, and the availability of ophthalmoscopes were all investigated in this study. Initially, investigation of a number of studies in this field showed that there was no significant relationship between age and sex and the rate of ophthalmoscope use in any of the similar studies, but in our research, the rate of ophthalmoscope use in men was higher than women, and in the age group under 30 years was lower than in the older age group. As a result, the two key indicators for employing this tool in a routine checkup were discovered to be male gender and senior age. Whereas, we found no link between the rate of implementation of ophthalmoscopy and other variables such as graduation year, workplace, or the university of physicians. The majority of our cases were graduates of Guilan University of Medical Sciences, and physicians graduating from Tehran University of Medical Sciences utilized ophthalmoscopes more frequently, which demonstrated a considerable difference in the educational curricula of different universities.

The majority of the cases studied had been in practice for more than ten years. In studies by Al-Rashidi et al. (16) and Onua et al. (17), the majority of the participants had fewer than 5 years of job experience on average. In this regard, our study showed that there is a direct association between graduation time and the rate of ophthalmoscopy; however, in the studies by Dalay et al. (18), Onua et al. (17), and Al-Rashidi et al. (16), there was a direct association among work experience and abilities, self-confidence, and the implementation of ophthalmoscopy, which demonstrated that our results were in line with other articles. As a result, graduation time, which indicates an individual's work experience, is another aspect that influences the requirement to use this instrument.

In the present research, the majority of physicians worked in government centers, and about 50% of them stated that they did not use ophthalmoscopy in their practice. Thus, based on our results, the presence of ophthalmoscopes in public systems is substantially lower compared to private systems. The rising usage of ophthalmoscopy by private-sector general physicians suggests that the lack of the requisite tools for ophthalmoscopy is a major barrier for general practitioners to use this tool. According to Onua et al. (17), the most significant barrier to utilizing ophthalmoscopes was the shortage of tools. According to the physicians in our study, the most prevalent reason for not utilizing an ophthalmoscope was the lack of access to the instrument, followed by a lack of mastery. Also, in a study by Onyiaorah et al. (19), the major reason was discovered to be the lack of ophthalmoscopes, while in another study by Roberts et al. (20), the main reason was reported to be the lack of adequate opportunities.

The majority of the general physicians that were interviewed mentioned they received ophthalmoscopy training in their university studies, both theoretically and practically, but there was no correlation between such training and the rate of ophthalmoscopy use. There was no significant link between ocular examinations (including ophthalmoscopy) and physicians' education in the study by Onyiaorah et al. (19), which was attributed to the lack of appropriate tools that was identified as the most common cause of non-examination. Our findings also showed that a low percentage of the physicians we surveyed reported taking ophthalmoscopy training courses after graduation. According to the

findings of a study by Shuttleworth et al.(21), despite the fact that most physicians believe they received insufficient training in their university and that more than half of the physicians participated in additional courses of ophthalmology examinations, participation in a post-graduation workshop had no efficacy on implementation of ophthalmoscopy.

More than half of the physicians had never used an ophthalmoscope, and a third of the cases only utilized it occasionally, implying that they paid no attention to this method of examination. In the study by Onyiaorah et al., none of the physicians utilized ophthalmoscopes. Some studies have reported that physicians rarely utilize ophthalmoscopy in the management of patients (18,20,22), which is consistent with our findings. More than half of the general practitioners we surveyed had only a basic understanding of ophthalmoscope operation. Additionally, a direct association was observed between the knowledge of physicians regarding the use of ophthalmoscopy and their use of this method, which justified the disinclination of physicians for using this instrument. Furthermore, although some of the physicians placed the greatest emphasis on ophthalmoscopic examination of diabetic patients, these cases accounted for less than half of the study population, implying that practitioners do not devote adequate time to ocular examination in different disease groupings. Lastly, it appears that a lack of understanding of the indications of this instrument is another reason for the prevention of its use.

One of the limitations of this cross-sectional research was the nature of the study itself and the related recall bias.

## CONCLUSION

In general, the findings of this research indicated that the theoretical knowledge and the rate of usage of direct ophthalmoscopes are not adequate among the general practitioners of Rasht city. Furthermore, the educational programs devoted to this field are insufficient in our country and require to be upgraded. In addition, active physicians of this city experience a paucity of the instruments required for ocular examinations. Based on the results of this research, the instructions regarding the use of ophthalmoscopy that are presented to the medical students need to be reviewed and enhanced. Also, further and more precise theoretical and practical training in the use of this method should be positioned amongst the educational outlines of the field of ophthalmology. Supplementary training courses may also be provided to general physicians for reviewing and emphasizing the need to implement this method in the diagnosis of ocular and systemic diseases.

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