

## **Effect of Educational Program on Knowledge of critically ill patients having Diabetic Retinopathy**

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**Abstract: Background:** Diabetic retinopathy DR is a complication of DM that affects the blood vessels of the retina and leads to blindness. To control or prevent vision loss, appropriate health education is necessary to encourage those at risk to seek timely and appropriate care. **Purpose:** To evaluate the effectiveness of an educational program in improving the knowledge of patients having diabetic retinopathy. **Design:** Quasi-experimental research design was utilized in this study. Sampling; A purposive sample of 80 critically ill patients divided equally into study and control groups. **Setting:** Ophthalmology Damietta Hospital emergency. **Instruments:** Knowledge of patients about diabetic retinopathy structured interview questionnaire was used 80% of patients in the study group had good knowledge in comparison with 38% of patients in the control group. 76% of study group patients had good knowledge compared to only 38% of patients in the control group **Conclusion:** Applying the educational program was effective in improving patients' knowledge. **Recommendation:** Health care providers involving ophthalmic nurses should receive health education about diabetic retinopathy.

**Keywords:** *Critical Ill Patients, Educational Program, Knowledge, Retinopathy,*

### **Introduction**

Almost all patients with T1DM and more than two-thirds of patients with T2DM have some degree of DR after a significant number of years (Sena, Seica & Perry, 2019). Diabetic retinopathy develops when uncontrolled blood glucose level damages the tiny blood vessels in the eye retina causing a variety of symptoms that varies from mild visual disturbance and can reach irreversible

vision loss (Lalithadevi & Krishnaveni, 2022).

Diabetic retinopathy patients themselves can actively participate in decreasing this percentage if they receive an appropriate educational intervention based on their needs as it is found that, poor knowledge and inappropriate practice of patients are some of the important variables that negatively influence on progression of the disease and lead to its

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complications (Padma, Bele, Bodhare & Valsangkars, 2012).

Therefore, educational intervention should be a supportive, ongoing, and collaborative process aimed at increasing awareness of patients, facilitating development of knowledge, changing negative attitude, altering wrong self-care practice, building confidence, and improving quality of patients' life (Tol, Alhani, Shojaeazadeh, Sharifirad & Moazam, 2015).

Educating DR patients requires involvement of all health care professionals in educational process, especially the ophthalmic nurse because of the close and intimate relationship she develops with their patients that allows her to better understand patients' demands and needs (Moradi, 2016).

Before educating patients, it is important to make a baseline assessment of patients' needs and identify gaps in their knowledge and practices. Actually, the ophthalmic nurse can perform this role in a professional way before providing her patients with fundamental knowledge about their disease. After that, she can help them to understand acquired knowledge both in theory and practice and promote only their healthy self-care practices (Needham et al., 2016).

Also, it is important to help patients to identify their abilities in changing their poor self-care practices and to realize that "change is not made without inconvenience" even from worse to better. The ophthalmic nurse should concentrate on enhancing the belief that patients themselves are the main manager of their own health and gradually engage them in the care (Kosti & Kanakari, 2012).

Additionally, she should help them to modify their way of living and adopt a new life style that helps in minimizing health risks and improving their QoL

(Rumelt, 2018). Furthermore, she should give support and counseling during educational process and provide regular follow-up after its completion to make them adherence to instructions (Kosti & Kanakari, 2012).

### **Significance of the study:**

In Egypt, chronic diabetes complications prevalence ranged from 8.1 % to 41.5 % for retinopathy. The vast majority of diabetic patients who lose vision do so, not because of an inability to treat their disease, but due to lack of awareness (Bos & Agyemang, 2016).

Raising awareness about DR is an important element for early diagnosis and treatment of this blinding disease.<sup>14</sup> To control or prevent vision loss, appropriate health education is necessary to encourage those at risk to seek timely and appropriate care. A few studies have been conducted regarding the knowledge and awareness about DR among the diabetic population (Khalaf et al., 2019).

### **Purpose:**

To evaluate the effectiveness of an educational intervention for patients with diabetic retinopathy on their knowledge.

### **Research Hypotheses:**

- 1) Patients who receive the self-care educational intervention (study group) are expected to have higher level of knowledge on posttest than pretest.
- 2) Patients who receive the self-care educational intervention (study group) are expected to have higher level of knowledge than patients who did not (control group).

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### **Methods**

#### **Study design:**

A quasi-experimental research design was utilized (study and control).

#### **Setting:**

This research was conducted in the ophthalmology emergency department

#### **Sampling:**

A purposive sample of 80 patients was selected according to the following inclusive criteria 40 patients was study group and 40 patients was control group.

#### **Sample size calculation:**

The sample size could be calculated using the following formula:

$n = [(Z\alpha/2 + Z\beta)^2 \times \{2(SD)^2\}] / (\text{significant mean difference})^2$  where SD = standard deviation

$Z\alpha/2$ : This depends on the level of significance, for 5% this is 1.96  $Z\beta$ : This depends on power, for 80% this is 0.84

Therefore,  $n = [(1.96 + 0.84)^2 \times \{2(25.55)^2\}] / (15)^2 = 46$

The required sample size (46) was based on the above formula, 10% was added to compensate for dropouts to become 50 patients per group. A simple random sample was used to assign patients into a study (received health education program) and control groups (received routine hospital care only).

#### **Inclusive/ criteria:**

- Diagnosed with diabetic retinopathy.
- Mentally oriented adult patients.
- Free from communication problems (speech & hearing problems).
- Availability of telephones for follow-ups.

#### **Exclusive criteria:**

The exclusive criteria were confirmed by a retina subspecialist:

- Any significant grade of cataract, or advanced glaucoma.
- Ocular ischemic syndrome.
- Retinal artery or retinal vein occlusion.
- Optic neuritis.
- Age-related macular degeneration.
- Vision-threatening uveitis.
- Any previous eye injury that could affect retinal function.
- Completely vision loss.

#### **Instruments:**

One instrument was used to collect data:

#### **Instrument one: A structured interview questionnaire sheet:**

It was developed by the researcher after extensive reviewing of the related literatures (Denniston & Murray, (2014); Nordquist, (2017); Pouncey & Frith, (2013); Sayin, Kari & Pekel, (2015) It consisted of three parts:

- **Part 1:** characteristics of patients. This part contained questions related to the personal characteristics of patients such as sex, age, educational level, occupation, and marital status.
- **Part 2:** Health-relevant data. This part included questions related to patients':
  - **Ocular history;** It contained the onset of DR, current symptoms, the prescribed treatment of DR, the occurrence of DR complications, and use of eyeglasses.
  - **Medical history;** It included the onset of diabetes, currently prescribed treatment of diabetes, complaints of other chronic diseases, previous hospitalization, and its causes.
- **Part 3:** Diabetic retinopathy Patients' knowledge questionnaire;

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this part assessed knowledge of patients regarding DR at pre- & post intervention phase, and at follow-up. It included questions covering the following items; (meaning of DR, sign & symptoms, risk factors, types, diagnosis, treatments, complications, prevention). Additionally, it included a question about the source of their knowledge about DR.

### **Scoring system for knowledge:**

The Knowledge part contained 8-questions.

- Complete answers which were given score (2).
- Incomplete answers which were given score (1).
- Don't know answers which were considered "incorrect answers" and were given score (0).

The total score (sum of responses), ranged from 0 to 16, It was categorized as:

- Poor: if the score was < 50 % from the maximum score.
- Fair: if the score was 50 % to 75 % from the maximum score.
- Good: if the score was > 75 % from the maximum score.

### **Pilot Study:**

Before starting data collection, a pilot study was performed on 10 patients constituting about 10 % of the sample It was conducted to test the clarity, feasibility, and objectivity of the tools, and then they were excluded later from the main study sample.

### **Validity:**

After the instruments were designed by the researcher, their content validation was evaluated by a panel of 5 experts. Two experts were professors in the field of Ophthalmology and the other 3 experts were assistant professors from the Faculty of Nursing at Mansoura University. Some modifications were

done accordingly to fulfill the suggestions and comments of the experts.

### **Reliability**

The reliability of the knowledge assessment questionnaire was estimated using the Cronbach's Alpha test ( $\alpha = 0.913$ )

### **Procedure:**

A letter was submitted from the Dean of the Faculty of Nursing to the director of Damietta hospital explaining the purpose and methods of data collection. The collection of data was conducted over a period of 18 months. It started on July 2019 and lasted until December 2020.

In the assessment phase, the researcher introduced himself to patients and explained the objectives of the research. Participants were asked to sign a consent form. Then, the pre-test assessment was conducted. Data was collected from patients about their characteristics two days/week (Saturday for the study group and Tuesday for the control group).

The second phase was the planning phase. Based on pre-test results and in the light of relevant literature, an educational program was developed by identified needs, requirements, and deficiencies were translated into the objectives of the program and set in the form of an educational booklet

In the implementation phase, four health education sessions were planned, Each session lasted from 30 – 60 minutes. First session was about overview about essential knowledge about DR, the meaning of DR, common symptoms. Second session was related to Risk factors, Type of DR. Third session included diagnosis and treatments of DR, whereas, fourth session contained complications and prevention of DR.

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Teaching days; were arranged depending on the availability and coordination of the participants. Various approaches of teaching methods were used by the researcher to carry out the program as; interactive lectures, group discussions, questionnaires, demonstration, and brain storming. Different teaching media were used (e.g.power-point presentation, video tapes, colored pictures and illustrated booklets) were used

Regarding evaluation phase, Post-test was done one month post the implementation phase for the study group and immediately after receiving routine hospital care for the control group Follow-up was done three months following posttest. The same data collection instrument was used.

### **Ethical Considerations:**

Before collecting data, the researcher obtained official permission from the Ethical and Research Committee of the Faculty of Nursing, Damietta University. An official written approval to conduct the study was obtained from the studied patients after explaining the purpose and methods of data collection. They were assured of the anonymity and privacy of collected data. Also, the privacy of their information was protected

### **Statistical Analysis:**

Data were expressed in the form of number and percentage. Chi-square test was used for comparison between variables. The Student's test was used. Correlation co-efficient test was used to test for correlations between two variables with continuous data. A statistical significant was considered if  $P < 0.05$ .

### **Results:**

**Figure (1):-** revealed that 72% versus 58% of patients in the study and control groups respectively ranged between 50 to 60 years with a mean age  $\pm$ SD (50.9  $\pm$ 7.9 vs. 49.4 $\pm$ 8.6 years). Females represented more than two-thirds (68%) of patients in the study group compared to 58% of them in the control group. Regarding education level, 36% of patients in the study group compared to near to half (46%) of them in the control group were illiterate.

In relation to occupation, half (50%) of patients in the study group compared to 40% of them in the control group were housewives. Regarding residence, most of the patients in the both study and control groups (70% & 64% respectively) came from rural areas. Furthermore, 70% of patients in the study group compared to 74% of them in the control group had sufficient monthly income.

**Figure 2:-** showed that more than half (56%) of patients in the study group versus 66% of them in the control group had DR for less than 5 years. In relation to current symptoms, 72% & 78% of patients in the study and control groups respectively suffered from blurred vision. While, less than one-quarter (20% & 24%) of them in both groups respectively had a drop-in vision. Also, it was noticed that most of patients (70% & 64%) in the study and control groups respectively didn't have any complications from DR.

Regarding family history, nearly two-thirds (64%) vs. slightly more than half (54%) of patients in the study and control groups respectively had a positive family history of diabetes. Furthermore, 21.9% Vs. 14.8% of diabetic patients in both groups respectively had positive family history of DR. Additionally, 28.6% vs. 25% of DR patients in both groups respectively had a positive family

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history of DR's complications. Finally, there was no statistically significant difference between the two groups regarding their health relevant data ( $P > 0.05$ ). Therefore, the two groups were homogenous in their health relevant data.

**Table 1:-** illustrated that on pre-intervention phase; there were no statistically significant differences between the study and control groups in all knowledge items related to meaning of DR, common symptoms, risk factors, types, diagnosis, treatments, complications and prevention as ( $P = 0.574, 0.656, 0.315, 0.079, 0.296, 0.744, 0.573$  and  $0.307$  respectively).

Table 4 illustrated that on post-intervention phase; there were highly statistically significant differences between the study and control groups in all knowledge items as ( $P < 0.001$ ).

**Table 5:-** illustrated that on follow up phase; there were highly statistically significant differences between the study and control groups in knowledge items related to meaning of DR, risk

factors, types, diagnosis, treatments, and prevention as ( $P < 0.001$ ). Additionally, there were statistically significant differences between both groups in knowledge items related to symptoms and complications of DR as ( $P = 0.003$  &  $0.002$  respectively).

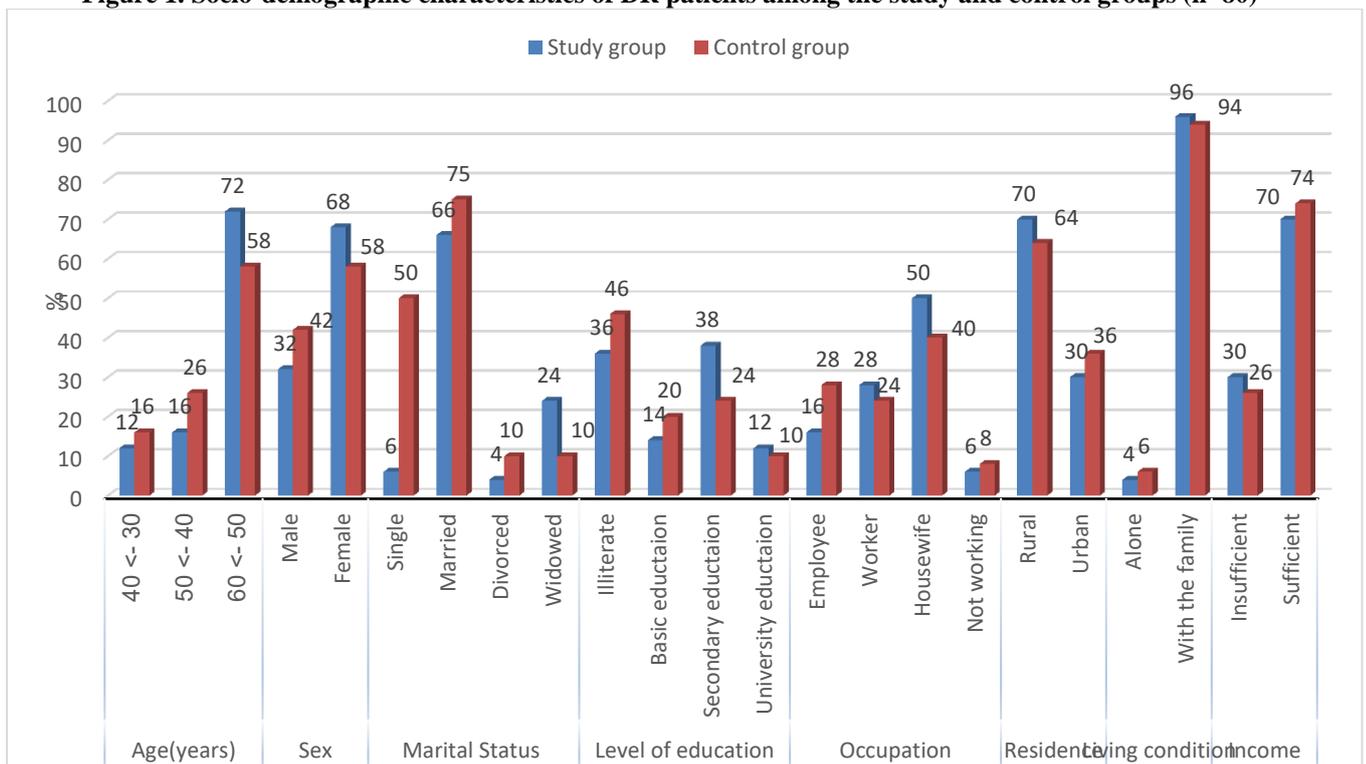
**Figure 6:-** illustrated that on pre-intervention phase; just 36% of patients in both study and control groups had good knowledge

**Figure (7)** illustrated that, at the post-intervention phase; 80% of patients in the study group vs. 38% of them in the control group had a good total knowledge level with highly statistically significant difference between the two groups as  $P < 0.001$ .

As for the follow-up phase; **figure (8)** illustrated that, 76% vs. 38% in the study and control groups respectively had good knowledge

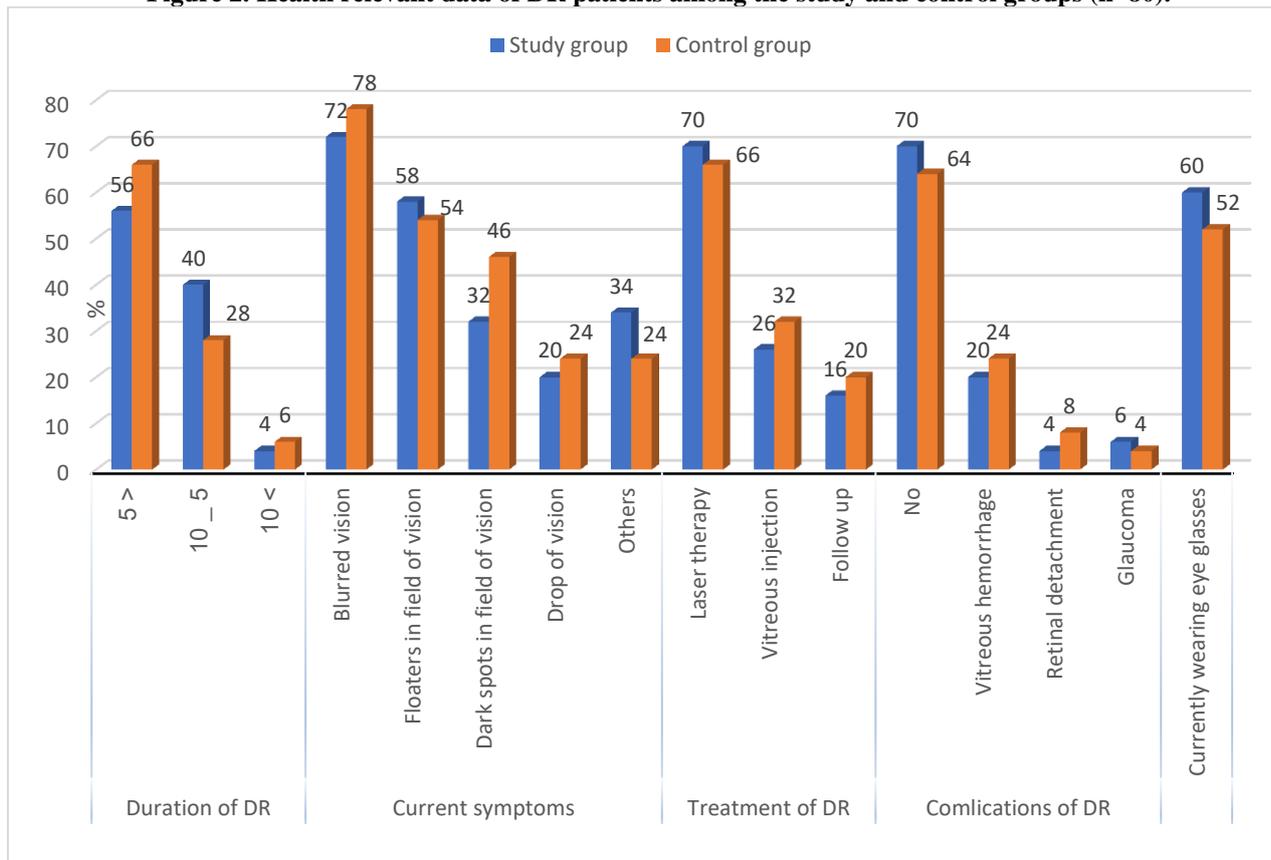
**Figure 9:-** showed that patients' Sources of knowledge were physicians (76% vs. 70%) followed by family members (24% vs. 30%) for the study and control groups respectively

**Figure 1. Socio-demographic characteristics of DR patients among the study and control groups (n=80)**

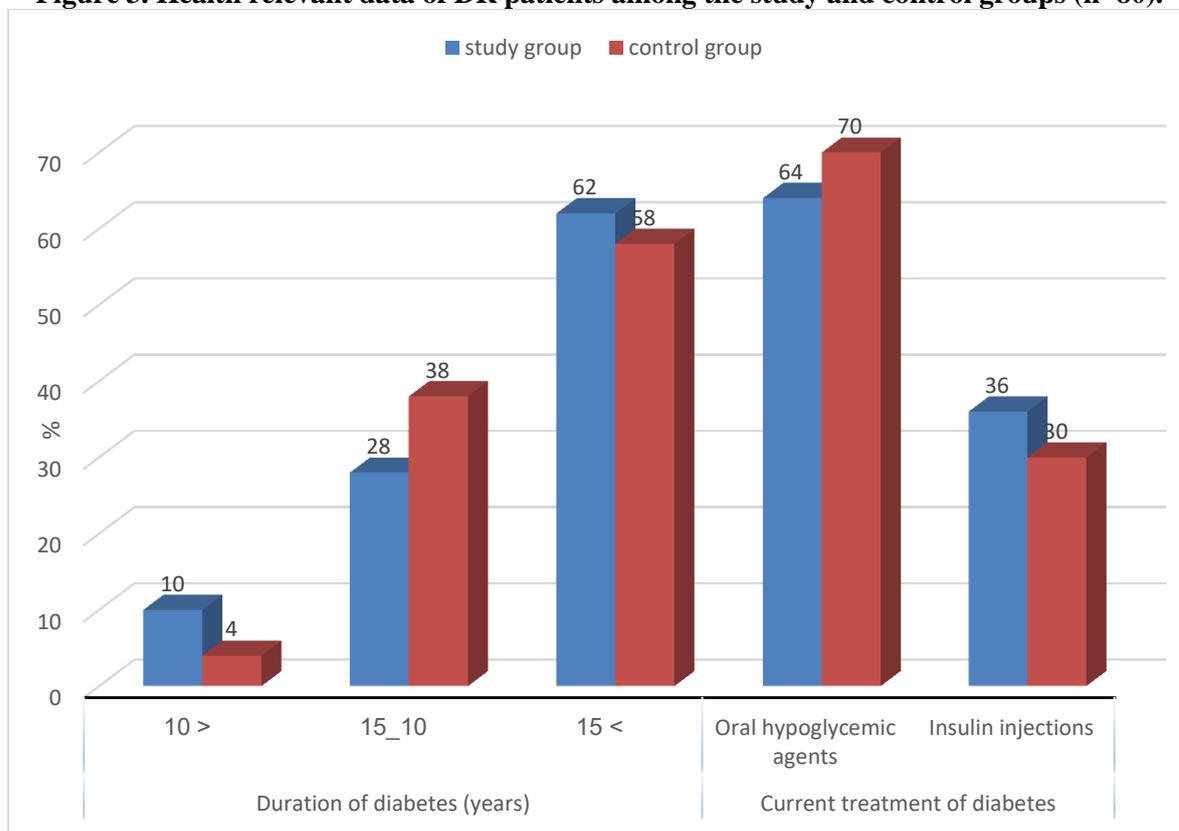


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**Figure 2. Health relevant data of DR patients among the study and control groups (n=80).**

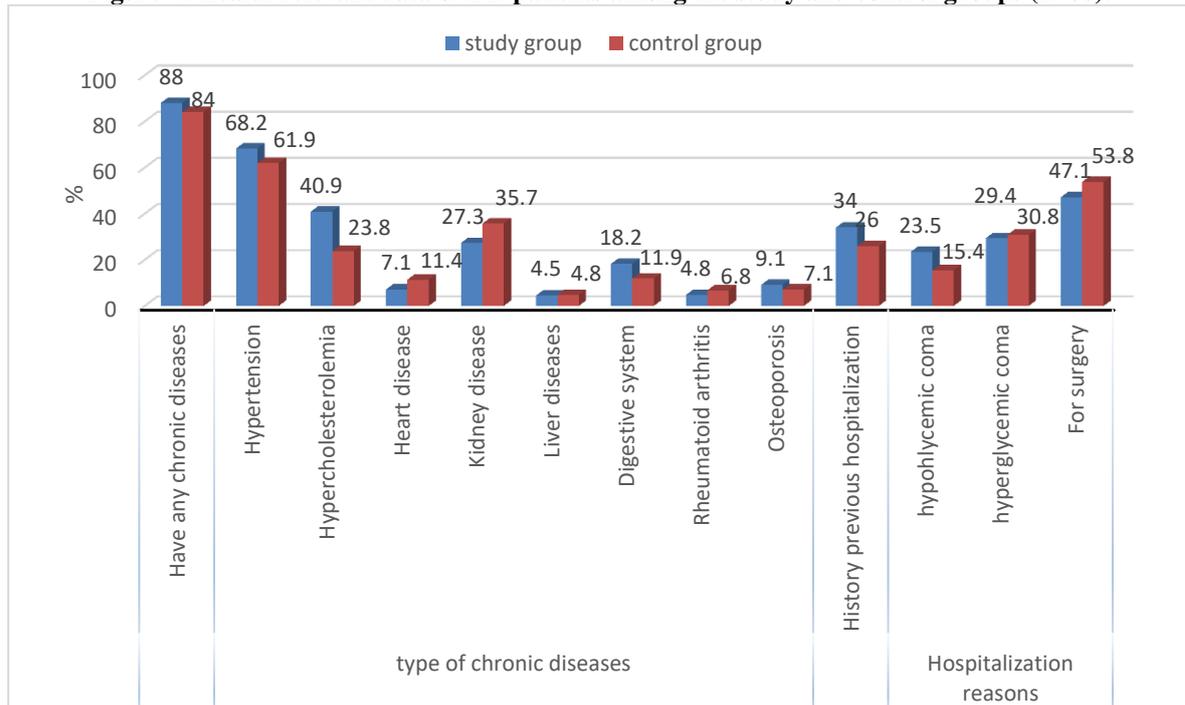


**Figure 3. Health relevant data of DR patients among the study and control groups (n=80).**

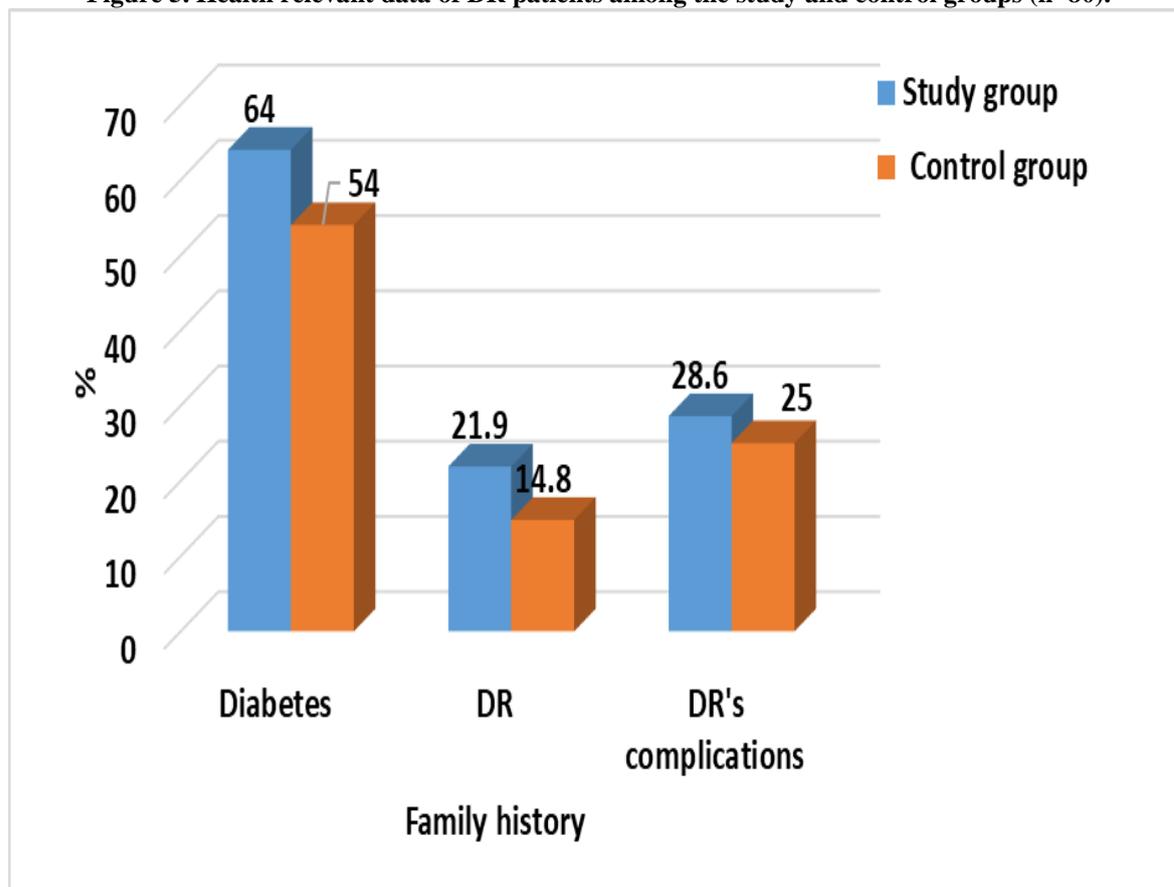


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**Figure 4. Health relevant data of DR patients among the study and control groups (n=80).**



**Figure 5. Health relevant data of DR patients among the study and control groups (n=80).**



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**Table 1. Comparison of DR patients' knowledge in the study and control groups regarding DR at the pre-intervention phase (n=80)**

	Study group						Control group						Chi square	
	Incorrect		Incomplete		Complete		Incorrect		Incomplete		Complete		Test	
	N	%	N	%	N	%	N	%	N	%	N	%	$\chi^2$	P
Meaning of DR	1	2.0	35	90.0	4	8.0	0	0.0	35	90.0	5	10.0	1.111	0.574
Common symptoms	0	0.0	27	74.0	13	26.0	0	0.0	25	70.0	15	30.0	0.198	0.656
Risk factors	1	2.0	39	98.0	0	0.0	0	0.0	40	100.0	0	0.0	1.010	0.315
Types	37	94.0	0	0.0	3	6.0	40	100.0	0	0.0	0	0.0	3.093	0.079
Diagnosis	1	2.0	35	90.0	4	8.0	0	0.0	32	84.0	8	16.0	2.437	0.296
Treatments	3	6.0	24	68.0	13	26.0	4	8.0	26	72.0	10	20.0	0.591	0.744
Complications	5	10.0	29	78.0	6	12.0	3	6.0	28	76.0	9	18.0	1.113	0.573
Prevention	0	0.0	37	94.0	3	6.0	0	0.0	39	98.0	1	2.0	1.042	0.307

$\chi^2$ : Chi- square test

DR: Diabetic Retinopathy

**Table 2. Comparison of DR patients' knowledge in the study and control groups regarding DR at the post-intervention phase (n=80).**

	Study group						Control group						Chi square	
	Incorrect		Incomplete		Complete		Incorrect		Incomplete		Complete		Test	
	N	%	N	%	N	%	N	%	N	%	N	%	$\chi^2$	P
Meaning of DR	0	0.0	13	36.0	27	64.0	0	0.0	33	86.0	7	14.0	26.272	<0.001**
Common symptoms	0	0.0	9	28.0	31	72.0	0	0.0	29	68.0	11	32.0	16.026	<0.001**
Risk factors	0	0.0	18	46.0	22	54.0	0	0.0	40	100.0	0	0.0	36.986	<0.001**
Types	13	36.0	0	0.0	27	64.0	40	100.0	0	0.0	0	0.0	47.059	<0.001**
Diagnosis	0	0.0	18	46.0	22	54.0	0	0.0	31	82.0	9	18.0	17.825	<0.001**
Treatments	0	0.0	13	36.0	27	64.0	1	2.0	26	72.0	13	26.0	15.022	<0.001**
Complications	0	0.0	14	38.0	26	62.0	2	4.0	27	74.0	11	22.0	17.310	<0.001**
Prevention	0	0.0	17	44.0	23	56.0	0	0.0	37	94.0	3	6.0	29.219	<0.001**

$\chi^2$ : Chi- square test

DR: Diabetic Retinopathy

(\*\*) P value is highly significant if < 0.001

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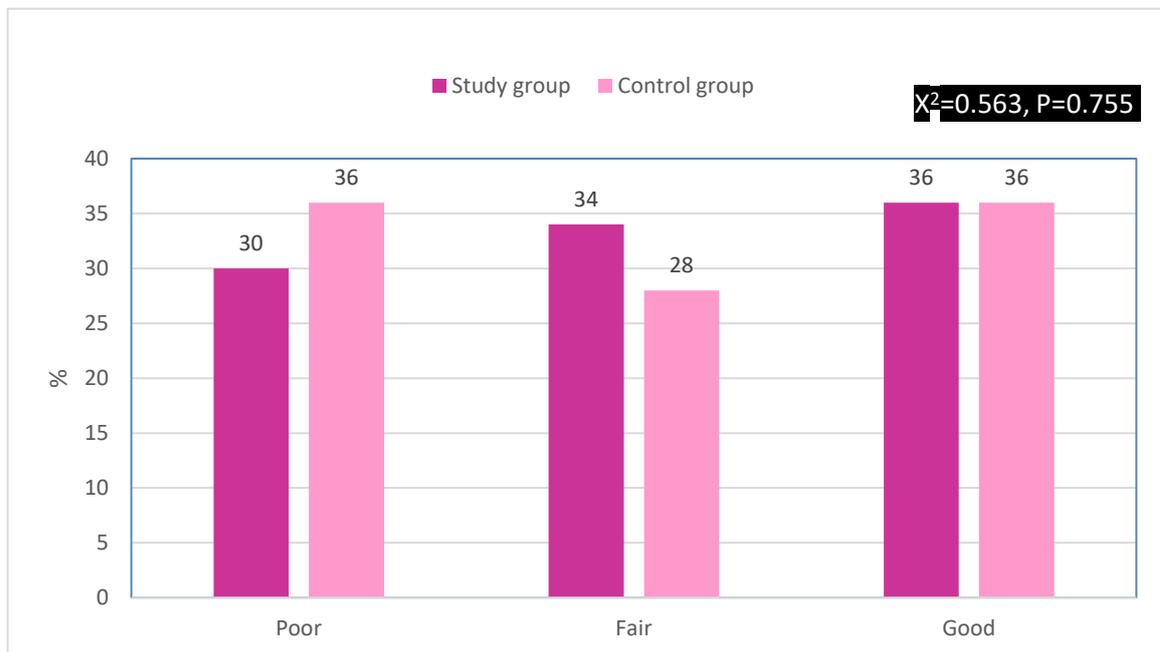
**Table 3. Comparison of DR patients' knowledge in the study and control groups regarding DR at the followup phase (n=80).**

	Study group						Control group						Chi square	
	Incorrect		Incomplete		Complete		Incorrect		Incomplete		Complete		Test	
	N	%	N	%	N	%	N	%	N	%	N	%	$\chi^2$	P
<b>Meaning of DR</b>	0	0.0	19	48.0	21	52.0	0	0.0	33	86.0	7	14.0	16.327	<0.001**
<b>Common symptoms</b>	0	0.0	14	38.0	26	62.0	0	0.0	27	64.0	13	36.0	9.033	0.003*
<b>Risk factors</b>	0	0.0	21	52.0	19	48.0	0	0.0	38	96.0	2	4.0	25.156	<0.001**
<b>Types</b>	22	54.0	0	0.0	18	46.0	40	100.0	0	0.0	0	0.0	29.870	<0.001**
<b>Diagnosis</b>	0	0.0	0	44.0	38	56.0	0	0.0	31	82.0	9	18.0	19.385	<0.001**
<b>Treatments</b>	0	0.0	9	28.0	31	72.0	0	0.0	27	74.0	13	26.0	21.168	<0.001**
<b>Complications</b>	0	0.0	17	44.0	23	56.0	1	2.0	28	76.0	11	22.0	12.677	0.002*
<b>Prevention</b>	0	0.0	21	52.0	19	48.0	0	0.0	36	92.0	4	8.0	19.841	<0.001**

$\chi^2$ : Chi- square test  
 (\*) P value is significant if < 0.05

**DR:** Diabetic Retinopathy  
 (\*\*) P value is highly significant if < 0.001

**Figure 6. Comparison between DR patients in the study and control groups regarding their overall knowledge level at the pre- intervention phase (n= 80)**

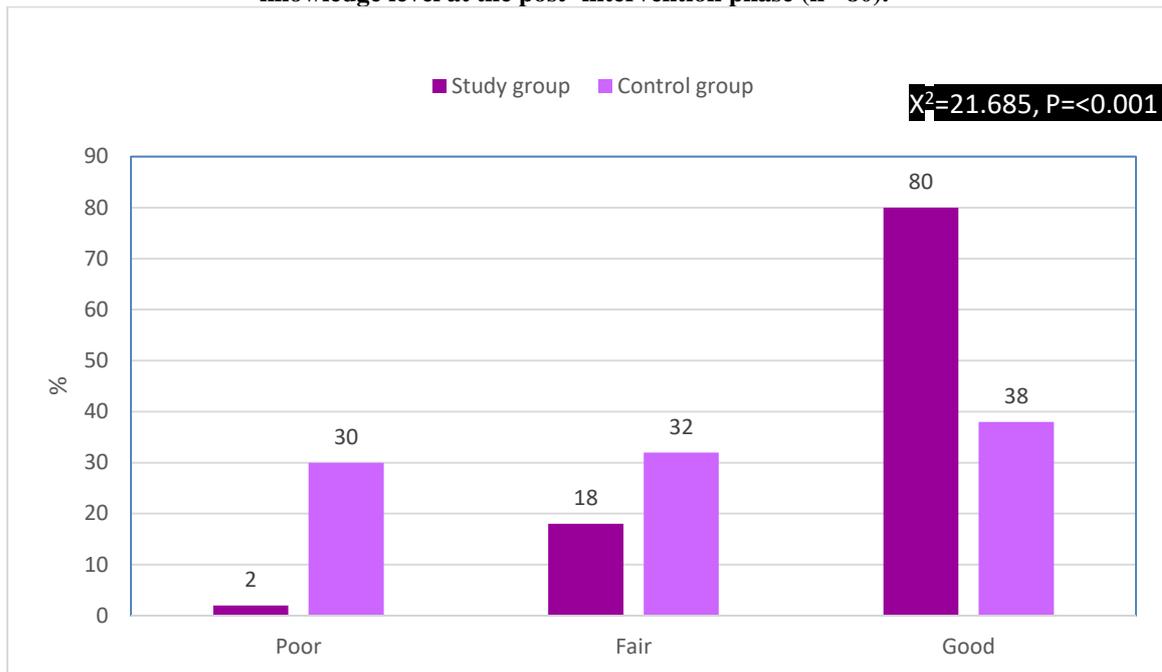


$\chi^2$ : Chi- square test  
 P value is highly significant if < 0.001  
**Good:** score > 75.0%

**Poor:** score < 50.0%  
**Fair:** score 50.0 % - 75.0%

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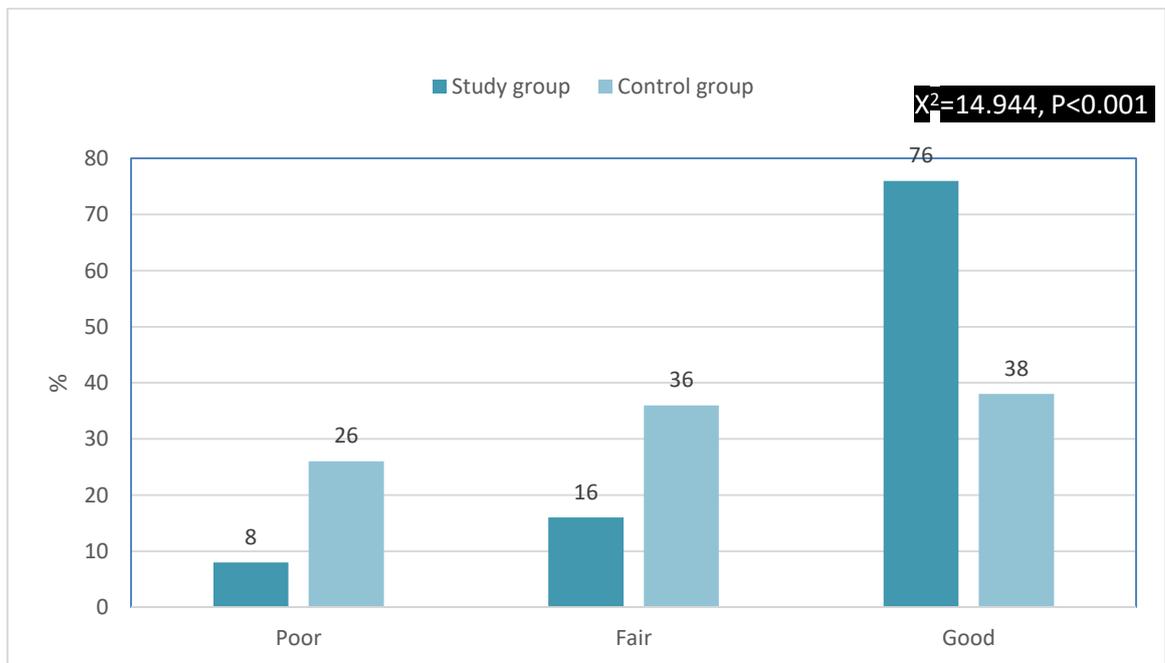
**Figure 7. Comparison DR patients in the study and control groups regarding their overall knowledge level at the post- intervention phase (n= 80).**



$\chi^2$ : Chi- square test  
**P** value is highly significant if < 0.001  
**Good**: score > 75.0%

**Poor**: score < 50.0%  
**Fair**: score 50.0 % - 75.0%

**Figure 8. Comparison between DR patients in the study and control groups according to knowledge level at follow-up phase (n= 80).**

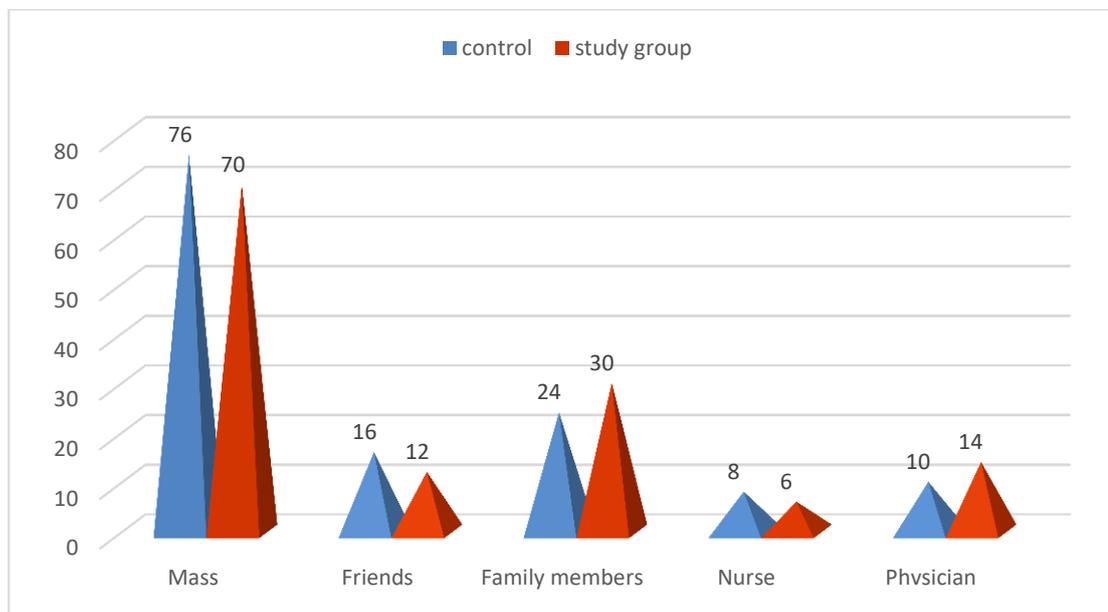


$\chi^2$ : Chi- square test  
**P** value is highly significant if < 0.001  
**Good**: score > 75.0%

**Poor**: score < 50.0%  
**Fair**: score 50.0 % - 75.0%

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**Figure 9. Distribution of DR patients in the study and control groups according to the source of their knowledge about DR.**



### **Discussion**

Patient education plays an important role in the management of retinopathy, as increased awareness and decrease complications. Making patients knowledgeable about the disease, engaging them in self-care practices, and helping them in adopting a new life style are very essential to achieve treatment goals, to keep the disease under control, and to prevent complications (Shaban, 2018). Therefore, this study was carried out to test the hypothesis that implementing the educational program for DR patients would improve their knowledge.

Pre-implementing the educational intervention; our findings revealed that, most of the patients in the study and control groups had a deficient knowledge about their disease. This was noticed in all the tested knowledge areas and in the total knowledge level with no statistically significant difference between both groups.

In agreement with this present study finding, a Chinese study by Duan et al. (2020) who studied "Knowledge and practices regarding DR among diabetic patients registered in a chronic disease management system in eastern China"

and revealed that, the awareness of DR among patients was very low. Similarly, another study by Beaser, Turell and Howson (2018) revealed low levels of knowledge about DR before the educational program. On the same line, a study in South India by Hussain et al. (2016) demonstrated that, the patients who had been diagnosed with DR had poor knowledge and awareness about their disease.

On the contrary, a study in Saudi Arabia by Alsaidan and Ghoraba (2019) who studied " Awareness of DR among patients with type 2 diabetes mellitus in primary health care in security forces hospital Riyadh, Saudi Arabia" and revealed high level of awareness about DR. Moreover, N. R. Almalki, T. M. Almalki and Alswat (2018) reported that, almost two-thirds of diabetic patients had a good level of knowledge about DR.

The deficient pre-intervention knowledge among DR patients in this current study might be due to many factors such as patients' low level of education in both groups, limited health literacy in developing countries like Egypt, gap between healthcare providers and patients

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as well as less participation of media in awareness creation about DR.

Post-implementing the educational intervention and at follow up phases; there were statistically significant differences between the study group compared with the control group in all the tested knowledge areas and in the total knowledge level. This indicated the effectiveness of the educational intervention that was given to the study group in improving their knowledge, achieving one of the objectives of the current study. A similar positive effect of an educational intervention was reported by Khalaf et al. (2019) who reported that, the educational program significantly helped DR patients in improving their awareness about their disease. Also, S. S. Mohamed, R. F. Mohamed and S. H. Mohamed (2019) reported the same results in their study. The success of our educational intervention might be attributed to the simplicity of its content, relevant of the information, as well as the instructional process that took into consideration educational level and health status of patients.

Regarding the source of patients' knowledge: The result of the current study found that, DR patients got their knowledge from different sources. The major source of knowledge for both groups was physicians and the second source were family members. This was in the same line with Abdulaal et al. (2019) who reported that; major source of knowledge about DR was physicians. This result might be due to regular contact of physicians with DR patients. But, the deficient knowledge among patients in both groups, although the major source of their knowledge was physicians indicated the incomprehensive knowledge they obtained from their physicians and the informal education about DR.

Also, our result showed that the nurses were less likely to be key informants for DR patients. This was on the same line

with Abosree (2017) who reported the same findings. This highlighted the need for nurses to be well-informed about DR and to be more involved in information dissemination since they were with the greatest contact time with the patients. Regarding mass media (such as radio and magazines), it played a less important role in disseminating information among our study sample. This might be because of the fact that, most of them were illiterate.

### **Conclusion**

Based on the findings of this study; total knowledge of the study group was improved post-implementing the educational program and at the follow-up phase compared with the control group, indicating the effectiveness of the educational program and achieving the ultimate goal of the present study.

### **Recommendations**

- Health care providers involving the ophthalmic nurses should be fully aware of their educational roles in improving knowledge of DR patients.
- This study should be replicated on a larger sample to generalize its results.

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