



## Effect of educational program regarding eye infection care on mothers' performance and their children outcomes

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### Abstract

**Background:** Eye infections are one of the most common eye diseases in children and the most common ophthalmic complaint seen in emergency departments around the world. Aim of the study was to determine the effect of educational program regarding eye infection care on mothers' performance and their children's outcomes.

**Subjects and Method:** A quasi-experimental research design was used in the study.

**Subjects:** A convenience sampling of 80 mothers and their children with eye infection; forty mothers and their children from Out-patient clinic at ophthalmology of Tanta city which affiliated to Ministry of health and population and 40 mothers and their children from Outpatient pediatric clinic at ophthalmic units of Zifta Ophthalmic Hospital which affiliated to Ministry of Health and population. Three Tools were used for data collection: Tool (I): Mothers' knowledge and socio -demographic data. Tool (II): Self-report mothers' practices, Tool (III): observational check list for children's outcomes.

**Results:** the main results revealed that there were highly statistically significant differences between the pretest and post-test of educational program implementation.

**Conclusion:** the present study findings revealed that mothers had poor knowledge and inadequate practices related to eye infection and its management.

**Recommendations:** Classes and educational programs for mothers about the management and prevention of eye infection should be held at all Ophthalmic Hospitals in El-gharbia governorate.

**Keywords:** Educational program -eye infection-mothers performance-children's outcomes.

### Introduction

Eye infections are widespread in children, especially in schools, daycare centers, and playgrounds. Eye infections occur when harmful microorganisms (bacteria, viruses, and fungi) invade any part of the eyeball or surrounding tissues, including the clear front surface of the eye (cornea) and the thin membrane that lines the outside of the eye and the inner eyelids (conjunctiva) <sup>[1]</sup>. Eye infections can be serious and cause permanent vision loss. Effective treatment is always needed, especially when bacteria, viruses, or fungi invade the eye or the surrounding area. The most common eye infections in children are called viral and bacterial conjunctivitis, both of which are highly contagious. Up to one in eight children gets an eye infection each year <sup>[2]</sup>.

It has been found that a healthy toddler or preschooler is likely to spend a lot of time on the ground, in the dirt outdoors, or exploring the trash can or dog poop at the park. Preschoolers tend to be a bit more discriminating about what they explore, but still get a lot out of playing, running, climbing, and jumping. Itchy discharge from the eye and crusting on the edge of the eyelid are also common symptoms that can cause the eyelids and lashes to feel stuck together at wake up <sup>[3]</sup>. Eye pain and swelling of the tissues around the eye can also occur. These symptoms can also

occur with allergies and may have to see a doctor determine whether the child has an allergy or infection. As stated by the World Health Organization, eye problems can be prolonged with helpful remedies accelerated environmental conditions and timely intervention. In addition, eye problems can be managed with increased facial cleansing and fly reduction along with appropriate antibiotic treatment <sup>[4]</sup>.

Visual problems affect between 10 and 20% of all formative years in the first 12 months of life and almost 50% between 0 and 2 years. In addition, 20–48% have an increased risk of recurring eye infections. About 55 million are at risk in Egypt along with 15 million children worldwide, most of them between 0 and 6 years old <sup>[5]</sup>. These infections usually occur in pediatrics and affect infants and preschool children of both sexes. Bacteria are the main cause of eye infections, although viruses, fungi, and parasites can also be involved earlier in this infection. These microorganisms contribute to 32-74% of eye infections worldwide. The bacteria are associated with bright types of ocular surface infections, including keratitis, dacryocystitis, blepharokeratoconjunctivitis, and conjunctivitis <sup>[6]</sup>.

Eye infections can be caused by many different organisms, including bacteria, viruses, amoebas, and fungi. Yeast

infections in the eye are extremely rare but can be very serious. Infections can affect the eyelids, the cornea, and even the optic nerve. Conjunctivitis is the most common eye infection in children. It's an infection or inflammation of the conjunctiva, the thin, transparent tissue that covers the outer surface of the eye. **Stye:** Bacterial infections that lead to clogging of the oil-producing glands around the eyelashes or eyelids, causing small bumps on the eyelids<sup>[7, 8]</sup>.

Trachoma is an infectious eye disease caused by Chlamydia trachomatis, which is the leading infectious cause of blindness worldwide. In areas where trachoma is endemic, active trachoma is common in preschool children to varying degrees. Treating an eye infection begins with seeking medical attention from a healthcare provider. The treatment approaches used to depend on the type and severity of the eye infection. Viral eye infections usually heal on their own. Bacterial eye infections often require antibiotics. In many cases, self-care measures and home treatments can make an eye infection more comfortable<sup>[9]</sup>.

Nursing management of the various types of eye infections focuses on relieving symptoms and preventing the spread of infectious causes. To relieve symptoms, parents should be taught to apply eye drops or ointment, and warm compresses can be used to loosen the crust that forms on the eyelids overnight. Educate families to encourage the child not to rub or touch their eyes. Parents should wash their hands carefully after caring for the child<sup>[10]</sup>. Children can go back to daycare when the infection has completely cleared up. Educating families about good hygiene is vital to prevent the recurrence of an eye infection. Parents should be instructed to do the following: keep hands away from their eyes, wash hands frequently, change pillowcases frequently, and do not share towels or clothing. A productive and energetic population cannot grow from sick children who are chronically affected by repeated eye infections<sup>[11]</sup>. Ophthalmic nurses play an important role as teachers and advisors in educating service users and caregivers in health society education about eye infections and in promoting the development of knowledge and understanding among other members of the multidisciplinary eye health team

### Significance of the study

Eye infections are the most common eye disease in children. It can affect a child's ability to participate in outdoor activities, play games, read, and do social work. Therefore, this study was conducted to identify the treatment and prevention of eye infections in children and review new evidence, key therapies, and specific guidelines for more effective treatment strategies, and educate mothers on how to prevent and treat eye infections in children<sup>[13]</sup>. Sufficient support for mothers can prevent or improve these problems and indirectly lead to better results for mothers and their children. Therefore, carrying out the maternal education program was be of great help in acquiring knowledge and capacity regarding the disease, and can alleviate the burden on mothers and the symptoms of their children<sup>[14]</sup>.

### Aim of the study

**The study was aimed to** determine the effect of educational program regarding eye infection care on mothers' performance and their children outcomes.

### Subjects and Method

A quasi-experimental research design was used. The study was conducted at out-patient clinic at ophthalmology of Tanta city, and outpatient pediatric clinic at ophthalmic units of Zifta Ophthalmic Hospital which affiliated to Ministry of Health and population.

**Subjects: A convenience** sampling of 80 mothers having children with eye infection who were assigned as follow 40 mothers and their children from Out-patient clinic at ophthalmology of Tanta city which affiliated to Ministry of health and population and 40 mothers and their children from outpatient pediatric clinic at ophthalmic units of Zifta Ophthalmic Hospital which affiliated to Ministry of Health and population. The sample size was based on the following parameters confidence level type 1 error 0.05 and power of test 90%.

**Inclusion criteria of children:** Both sexes, aged from one to 6 years old , recurrent eye infection.

### Three tools were used to collect the necessary data:

**Tool (I): Structured interview Schedule:** It consisted of three parts:

**Part one:** Sociodemographic characteristic of mothers as: age, level of education and occupation.

**Part two:** Bio-socio-demographic characteristic of children as age, sex birth order, residence and past and present medical history.

**Part three:** Mothers' knowledge: it was developed by the researcher to assess mothers' knowledge about eye infections such as types, definition, causes, clinical picture, and mode of transmission, complications, prevention and nursing management.

### Scoring system for mothers' knowledge was scored as the following:

Correct& complete answer was scored (2) Correct& incomplete answer was scored (1). Incorrect answer or didn't know was scored (0). High level of knowledge more than 65%. Moderate level of knowledge from 65% to 50%. Low level of knowledge less than 50%.

**Tool (II): Self report mothers' practices:** it was developed by the researcher to assess mothers practices related to eye infection care such as use of protective measurements to prevent spread of infection and alleviating symptoms which includes five steps that represent technique such as:

- Protective measurement to prevent spread of infection such as washing hands, cutting nails, don't share towels.
- Rinse the eye several times a day with water
- Clean the eyelid margin and eye lashes gently and repeatedly with a warm moist cloth or cotton ball.
- Use cold or warm compress to cases of viral eye infection
- Administration of eye drop or eye ointment.

### Scoring system of mothers' practices

Not done or incorrectly done was scored (0). Done

completely and incorrectly was scored (1). Done correctly and complete was scored (2). Less than 65% of total practices score were considered unsatisfactory level of practice. From 65% and more of total practices score were considered satisfactory level of practice.

**Tool III: Outcomes of children:** by using observational chick list (improved or not improved): it included eye infection signs and symptoms as redness, sore, itching, discharge, recurrent infection and administration of eye drop or eye ointment.

### Method

1. Official permission was obtained from the responsible authorities.
2. Ethical and legal considerations was considered all over the study phases as the follow:
  - Nature of the study was not causing any harm or pain to the entire subject.
  - Privacy and confidentiality was maintained regarding data collection.
  - Mothers' consent was taken to participate in the study.
  - Ethical committee approval was obtained from the head of Tanta ophthalmic hospital and head of zifta ophthalmic hospital. The researcher was informing the mother's that they can withdraw at any time. Anonymity and use codes instead of names.
3. The participated mothers and their children were interviewed in order to explain the aim of the study and obtained their consent and cooperation.
4. Tool (I, II) was developed by the researcher based on thorough review of literature and then the tool was presented to five expertises in the field of the study to check content validity. Validity percentage was (99.4%).
5. Interview schedule was used (Tool I, II) Reliability of the developed tools used was tested through the internal consistency. The value of alpha cronbach, s was 0.921.
6. The suitable statistical test was used for testing questionnaire reliability.
7. A pilot study was carried out on 10% of mothers with their children (8) who fulfilled the criteria of the study to test the tool for its clarity, applicability, feasibility and necessary modification was done. Mothers and children of the pilot study were excluded from this study sample.

Mothers at the previous setting were asked to answer the questionnaire; the questions were directed in simple Arabic language.

### The presented study was conduct at four phases of educational program as follows:

1. **Assessment phase:** the researcher to collect the base line data of the studied mothers and their children individually using tool I and II will carry it out.
2. **Planning phase:** selection of the teaching methods and audiovisual materials based on literature review that was includes the following: Setting objectives, preparation of the contents that were covers the reason behind the application of the sessions according to mothers' needs. The learning package was translated

into Arabic. Different methods and materials for educational intervention will be used including lectures and group discussion.

3. **Implementation phase:** health education was implemented by the researcher using interactive lectures, video presentation, and poster. Study subjects were divided into 10 subgroups, each subgroup was attended five sessions that was scheduled in the morning. The time for each session was about 20–30 minutes. A number of brochures which prepared by the researcher related to the literature have been distributed to each mother, which containing of the necessary information about eye infection supported by illustrations. Each mother involved in the study was interviewed individually, and the researchers explained the purpose of the study, the component of the tool, and how to answer the questions, including data collection regarding pretest, implementation of the guidelines, and post-test. The researchers were available 2 days per week from 8 a.m. to 2 p.m.

### They attended the Fifth sessions as the following:

**First session:** It was focused on definition of eye infection, types, causes, signs and symptoms, mode of transmission of each type of eye infection as acute conjunctivitis, stye and trachoma.

**Second session:** Focused on complications, prevention, and nursing management

**Third session:** it focused on hand washing and nail cutting technique

**Fourth session:** it was focused on mothers practices as use of protective measurement to prevent spread of infection, alleviate symptoms of eye infection, rinse the eye several times a day with water, clean the eye lid margin and eye lashes gently and repeatedly with a warm , moist cloth or cotton ball , use cold compress to cases of allergic conjunctivitis , warm compress to case of infectious eye.

**Fifth Session:** Administration of eye drop or eye ointment. Probably by good hand washing before and after administration, the right holding of eye drop or ointment container, the right position of child head during administration and the right preservation of eye medication.

**Evaluation phase:** evaluated three times pre, immediately and one week post implementation of the educational program using the tools of the study (tool I, II and III).

**Outcomes of children:** Children outcomes are expected lower eye infection as eye red, sore and decrease itching and improve right administration of eye drops or eye ointment. Collecting data took about five weeks and duration of this study took nearly two years.

### Statically analysis

Data entry and statistical analysis were organized, tabulated and statically analyzed using SPSS statistical software package (statistical package for social sciences), version 20 (Lee A. Kirkpatrick, University of Denver, US). Data were

presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and mean and SDs for quantitative variables. Difference of two means test (t-test) was used. Statistical significance was considered at P-value less than 0.05.

## Results

Table (1): shows mothers socio-demographic characteristics percentage distribution. It was observed that nearly half of the mothers (45%) were between 25 and 30 years old, with an average age of (20-39) and half of the mothers were secondary education. In terms of their occupation, more than a third (43.7%) of the mothers were housewives. It has been observed that less than two-thirds of mothers (68.7%) came from rural areas. As illustrated in figure (1)

Table (2) shows socio-demographic characteristics of children. It was observed that half of them (50%) were aged 4-<6 years with a mean  $\pm$  SD (3.69 $\pm$ 1.42). Female was presented in 56.3% of the studied sample. Concerning to child birth order, 37.6% of them were the Five & more in the family. Whenever it was found that about two-thirds of them (62.5%) had a crowding index > 2 people per room.

Table (3) shows medical history of the studied children with an eye infection. It was observed that more than half of them had bacterial conjunctivitis (55%). and 2.5% of them had a fungal eye infection. Regarding the source of infection, it was found that cross infection by family & nursery school 47.5% & environmental 35% were the main sources of infection, and recurrent conjunctivitis was 47.5%. It observed that about two third of the studied children (60%) suffered from redness of the eye and more than half of them (55%) had adhesion of eyelids in the morning. It found that three-quarters of studied children (75%) have an infection in two eyes and more than three-quarters of them (78.7%) had recurrent eye infections.

As well as about, two-thirds of them (56.25%) have the

previous infection of one member of a family, and more than two-thirds of them (66.6%) were first-degree relatives. Moreover, it was observed that 68.75% of children not had respiratory infections accompanied by eye infections.

Table (4) Percentage Distribution of Studied Mothers Knowledge regarding Eye Infection. It was shown that three quarters of mothers (75%) had poor level of knowledge at the pretest, while immediate post program test were (73.75%) had good knowledge, statistically significant improvements were noticed in mothers' knowledge in all tested areas ( $P < 0.001$ ). As illustrated in figure (2)

Table (5) Total score of studied mothers reported practice regarding eye infection care. demonstrates percentage distribution of studied mothers' total score practices regarding eye infection before, immediately, and after one-week program implementation. It was revealed from the table that a high statically significant difference improvement in mothers' practice immediately and after one-week program implementation than before  $P = 0.001$ . As illustrated in figure (3)

Table (6) Demonstrates the correlation between mothers' total scores of knowledge and total practices regarding eye infection through the program phases. It was revealed that there was a statistically significant positive correlation coefficient between the total knowledge of studied mothers and their total practice regarding eye infection before the program, immediately post-program, and after one week of program implementation  $P > 0.05$ . As illustrated in figure (4)

Table (7) Shows percentage distribution of studied children regarding clinical outcomes. Table highlighted that follow-up program implementation revealed a highly statistically significant difference ( $P = .000$ ) improvement in the child's signs and symptoms of eye infection immediately post-program and after one week of program implementation than before the program.

**Table 1:** Percentage Distribution of Studied Mothers regarding their sociodemographic characteristics

Sociodemographic characteristics of mothers	(no=80)	
	No	%
<b>Age (in years)</b>		
20- <25	15	18.8
25- <30	36	45
30- <35	19	23.7
35- <40	10	12.5
Range	20 – 39	
Mean $\pm$ SD	28.48 $\pm$ 4.45	
<b>Educational levels</b>		
Illiterate or Read & write	15	18.75
Primary education.	8	10
Preparatory education.	7	8.75
Secondary education.	40	50
University education.	10	12.5
<b>Mothers' occupation</b>		
Worker	30	37.5
Housewives	35	43.7
Employee	15	18.8
<b>Residence</b>		
Rural	55	68.7
Urban	25	31.3

\* Statistically Significant difference at ( $P < 0.05$ ).

**Table 2:** Socio-demographic characteristics of children

Socio-demographic Characteristics	The studied children (n=80)	
	No	%
<b>Age (in years)</b>		
1>2	15	18.7
2->4	25	31.3
4-<6	40	50
Range	1.0-5.9	
Mean $\pm$ SD	3.69 $\pm$ 1.42	
<b>Sex:</b>		
Male	35	43.7
female	45	56.3
<b>Family numbers</b>		
Two	1	1.3
Three	6	7.5
Four	33	41.2
Five or more	40	50
<b>Birth order</b>		
First	12	15
Second	15	18.7
Third	23	28.7
Fourth &more	30	37.6
<b>Crowding index level</b>		
1-2 persons per room	30	37.5
>2 persons per room	50	62.5

\* Statistically Significant difference at (P<0.05).

**Table 3:** Percentage Distribution of Children with Eye infection regarding medical history.

Medical History of eye infection	No (80)	%
<b>Type of diagnosed eye infection</b>		
Bacterial conjunctivitis	44	55
Viral conjunctivitis	25	31.25
Fungal conjunctivitis	2	2.5
Trachoma	0	0.0
Stye	9	11.25
<b>Source of infection</b>		
Cross infection (family – nursery school)	38	47.5
Environmental	28	35
Don't know	14	17.5
<b>Present complain</b>		
Redness of the eye	48	60
Swelling of eyelids	30	37.5
Purulent and watery discharge	44	55
	25	31.25
Tears	32	40
The feeling of foreign body in the eye	9	11.25
Sty on the eyelids itching	44	55
Adhesion of eyelids at morning	35	43.75
Photophobia	20	25
<b>The infected eye:</b>		
One eye	20	25
Two eyes	60	75
<b>Recurrence eye infection</b>		
Yes	63	78.7
No	17	21.3
<b>Previous eye infection in the family</b>		
Yes	45	56.25
No	35	43.75
<b>If yes:</b>		
First degree	30	66.6
Second degree	15	33.4
<b>Accompanied respiratory infection</b>		
Yes	25	31.25
No	55	68.75

\* Statistically Significant difference at (P<0.05).



**Table 4:** Percentage Distribution of Studied Mothers Knowledge regarding Eye Infection.

Mothers knowledge about eye infection and related infection	Before program (n=80)						Immediate post program (n=80)						After one week (n=80)						$\chi^2$ 1/p-Value	$\chi^2$ 2/p-Value	$\chi^2$ 3/p-Value
	Don't know		Incomplete and correct		Correct &complete		Don't know		Incomplete and correct		Correct &complete		Don't know		Incomplete and correct		Correct &complete				
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%			
Meaning of eye infection	40	50	30	37.5	10	12.5	12	15	20	25	48	60	4	5	26	32.5	50	62.5	41.965 0.001*	56.408 0.001*	4.815 0.090
Types of eye infection	42	52.5	31	38.7	7	8.8	3	3.7	27	33.8	50	63.5	4	5	28	35	48	60	66.508 0.001*	62.113 0.001*	0.201 0.904
Causes of eye infection	47	58.7	23	28.8	10	12.5	4	5	23	28.7	53	66.3	3	3.7	17	21.3	60	75	65.602 0.001*	75.328 0.001*	1.479 0.478
Signs and symptoms of eye infection	8	10	42	52.5	30	37.5	0	0.0	18	22.5	62	77.5	0	0.0	5	6.2	75	93.75	79.128 0.001*	110.068 0.001*	9.142 0.010*
The difference between eye sty and chalazion	68	85	10	12.5	2	2.5	25	31.25	30	37.5	25	31.25	25	31.25	28	35	27	33.75	49.468 0.001*	49.959 0.001*	0.147 0.930
Eye infection complications	30	37.5	50	62.5	0	0.0	10	12.5	40	50	30	37.5	10	12.5	45	56.25	25	31.25	5.857 0.001*	16.163 0.001*	0.751 0.688

**Table 5:** Total score of studied mothers reported practice regarding eye infection care.

Studied Mothers Reported Practice Regarding Eye Infection Care	Before program (n=80)						Immediate post program (n=80)						After one week (n=80)						$\chi^2$ 1/p-Value	$\chi^2$ 2/p-Value	$\chi^2$ 3/p-Value
	Not done		Correct and incomplete		Correct and complete done		Not done		Correct and incomplete		Correct and complete done		Not done		Correct and incomplete		Correct and complete done				
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%			
Protective measures to prevent spread of infection:	48	60	31	38.75	1	1.25	0	0.0	20	25	60	75	0	0	30	37.5	50	62.5	113.158 0.001*	108.082 0.001*	4.378 0.112
Washing hands and cutting nails	49	61.3	20	25	11	13.7	2	2.5	30	37.5	48	60	1	1.25	17	21.25	62	77.5	45.648 0.001*	68.447 0.001*	5.918 0.052
Eye compresses	50	62.5	28	35	2	2.5	4	5	18	22.5	58	72.5	7	8.7	13	16.3	60	75	93.628 0.001*	92.179 0.001*	1.659 0.436
Rinse the eye with water	50	62.5	28	35	2	2.5	1	1.25	5	6.25	74	92.5	1	1.25	13	16.25	66	82.5	132.859 0.001*	116.917 0.001*	3.924 0.141
Right administration of eye medication (eye drops and eye ointment)	20	25	55	68.75	5	6.25	3	3.75	33	41.25	44	55	2	2.5	25	31.25	53	66.25	60.861 0.001*	69.492 0.001*	2.913 0.233

\*\* Statistically significant P&lt;0.05

P1 Between pre and immediate post program implementation.

P2 Between immediate post program and after one week.

P3 Between pre and after one week.

**Table 6:** Correlation between mothers' totals score of knowledge and practices regarding eye infection.

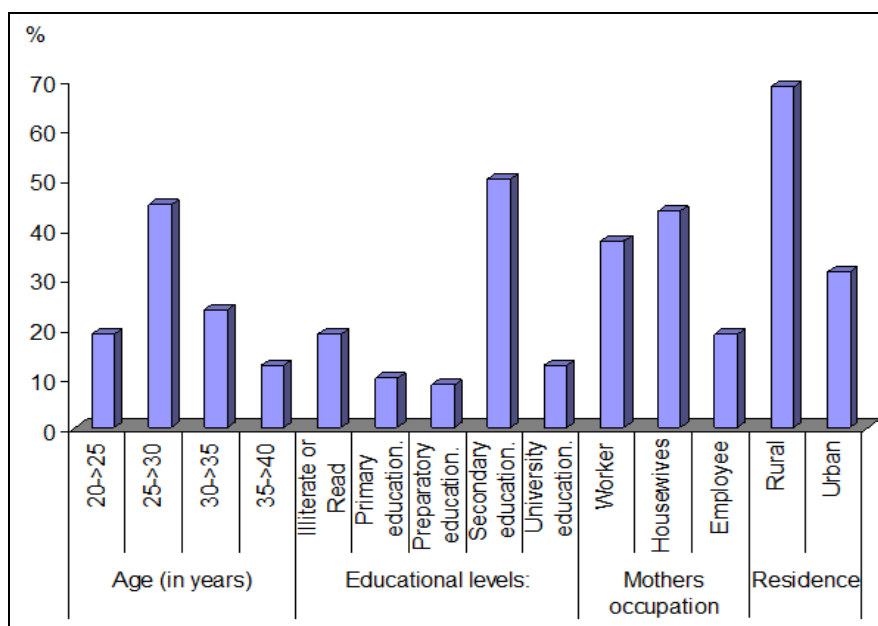
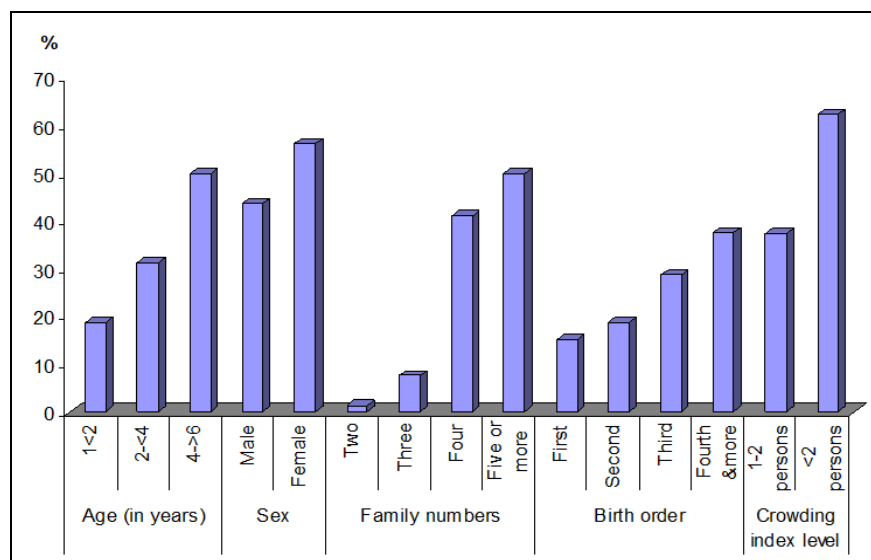
Total practices scores	Total knowledge among studied mothers					
	Before program		Immediate post program		After one week	
	r	p-value	r	p-value	r	p-value
	0.561	0.001*	0.734	0.001*	0.753	0.001*

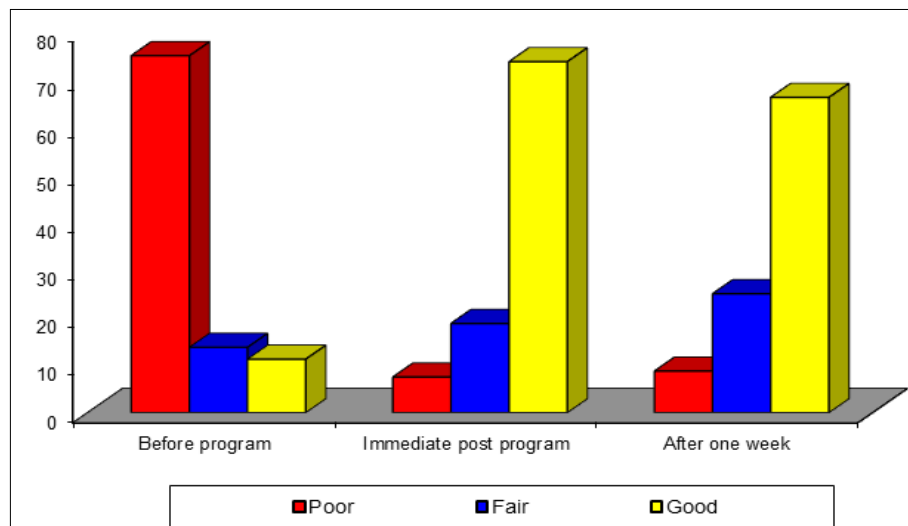
\*Statistically significance (P&lt;0.05)

**Table 7:** Percentage distribution of studied children regarding clinical outcomes

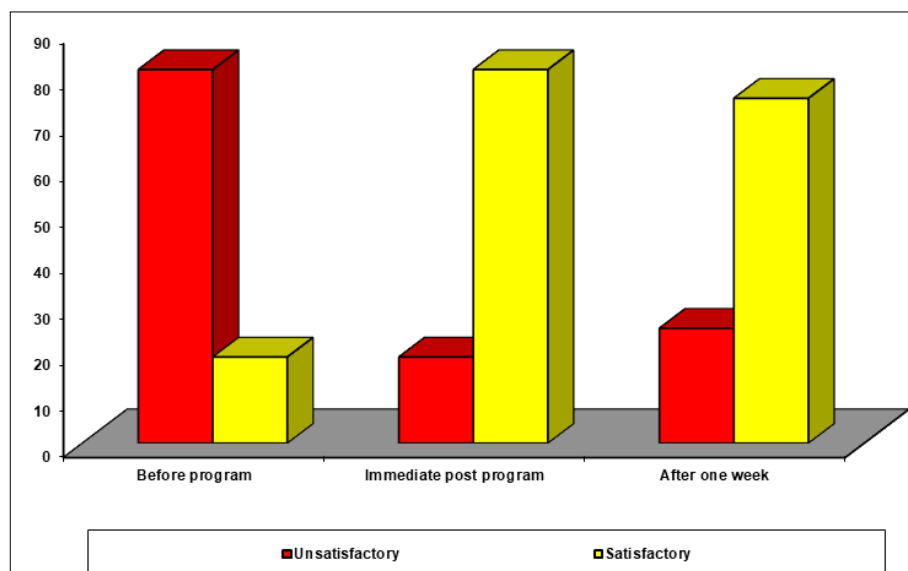
Studied children regarding clinical out comes	Before program		Immediate program		After one week		$\chi^2$ 1/p-value	$\chi^2$ 2/p-value	$\chi^2$ 3/p-value
	No	%	No	%	No	%			
Eye redness									
worse	80	100.0	4	5.0	0	0.0	144.762 0.001*	160.001 0.001*	51.538 0.001*
Not improved	0	0.0	9	11.25	0	0.0			
improved	0	0.0	18	22.5	62	77.5			
Eye pain or discomfort									
worse	80	100.0	3	3.75	0	0.0	148.428 0.001*	148.428 0.001*	10.158 0.017*
Not improved	0	0.0	5	6.25	0	0.0			
improved	0	0.0	52	65	65	81.25			
Eye secretion									
worse	80	100.0	0	0.0	0	0.0	160.001 0.001*	160.001 0.001*	22.321 0.001*
Not improved	0	0.0	1	1.25	0	0.0			
improved	0	0.0	54	67.5	77	96.25			
Eye swelling									
Worse	80	100.0	0	0.0	0	0.0	160.001 0.001*	160.001 0.001*	76.702 0.001*
Not improved	0	100.0	20	25	0	0.0			
Improved	0	100.0	25	31.25	78	75			

\* Statistically Significant difference at (P&lt;0.05).

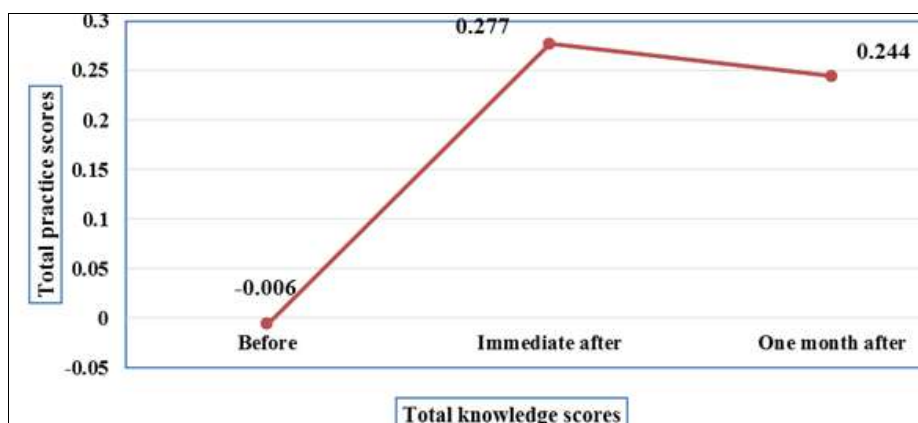
**Fig 1:** Sociodemographic characteristics of mothers.**Fig 2:** Socio-demographic characteristics of children



**Fig 3:** Relation between total mothers knowledge before, immediate post and after one-week program implementation.



**Fig 4:** Relation between total mothers practice before, immediate post and after one-week program implementation



**Fig 5:** Correlation between mothers' totals score of knowledge and practices regarding eye infection

## Discussion

Eye infection is the most common eye disorder in young children and the most frequent ophthalmic complaint seen in the pediatric emergency department all over the world. It has been reported that more than half of all eye infection cases in children occur before the age of 5 years<sup>[15]</sup>.

Mothers of children with eye infections play a central and essential role in home care. Therefore, the educational program must be for mothers to provide them with the necessary knowledge and real achievement to help them reduce family stressors and achieve better child outcomes. Therefore, this study was conducted to evaluate the



effectiveness of the educational program in mothers of children with eye infections<sup>[16]</sup>.

According to the current characteristics of the studied mothers, the present study shows that the highest percentages of mothers were in the age range of 25–30 years. They were mature mothers. This may be a result of government efforts to raise awareness against early marriage among women in Egypt. Age is important in raising and caring for a child and in understanding new experiences of care and treatment. This result is in contrast to Yussef (2016) who examined (Differential Effects of Young Maternal Age on Child Growth) and found that most mothers in African countries have a maternal age of 15-19<sup>[17]</sup>.

It was found that slightly less than half of mothers had basic education; whereas few of them were graduated from university. Low educational level mothers generally find it difficult to understand the nature of the disease and apply a new treatment strategy. Education greatly empowers women to play their vital role in caring for their children and creating a healthy environment. Half of them had basic education, while the minority had university degrees.

This finding was consistent with Abd El- Aziz (2015) who studied "mothers' knowledge and practices regarding their children with acute infective conjunctivitis" and found that; half of the examined mothers were illiterate<sup>[18]</sup>. Mensch (2019), who studied "Evidence for causal links between education and maternal and child health" agreed with this study, he mentioned that the causality of the diseases is directly related to the educational level achieved<sup>[19]</sup>.

According to working more than one third of mothers were housewives. This is because unemployed mothers do not make them interested in expanding their knowledge and living the traditional activity of the day without innovation. Working mothers interact with educated people who have knowledge and experience and this increases their knowledge and experience. This result contradicts with Wafaa (2018) "Mothers' Knowledge and Practices Regarding their Children with Acute Infective Conjunctivitis" who mentioned that; more than half of mothers was employed<sup>[20]</sup>.

Regarding the place of residence of the mothers, the present study showed that; about three-quarters of them lived in rural areas; this may be because community health services in rural areas were declining and illiteracy was common. Consistent with Liang (2016) "Study of infectious conjunctivitis among children in rural areas" who found that; three quarters of mothers in rural areas<sup>[21]</sup>.

Regarding the social characteristics of the children examined, the present study showed that half of the studied children were between 4 and 6 years old. From researcher point of view this may be related to the hyperactive activity in these children of this age made them more liable to get infected. Chawla (2013) who studied "Acute infectious conjunctivitis in childhood" showed that ocular infections, especially conjunctivitis, is a common infection, especially in children under 5 years of age, and this was consistent with the result of the present study<sup>[22]</sup>.

This was also shown by the present study; just over half of the children studied were female. From researcher opinion, females are more susceptible to infection than males, because rural society cares more about males' protection and

health than females. This finding is in contradiction to Oladigbolu (2017) who examined "pattern of eye diseases in a university hospital in northern Nigeria" and found that; Boys more than girls who had conjunctivitis<sup>[23]</sup>. On the other hand, these results contradicted Raja Kumar Pasam and UdayKumar, (2014). "A Study of Spectrum of Childhood Eye Diseases". At a Tertiary Care Hospital in South India, who stated that no gender differences were observed<sup>[24]</sup>.

Concerning the birth order of the children, the present study clarified that more than a third was fourth & more child in the family. The reason may be due to the increase in the number of family members and the exposure to the spread of infection is greater in large families and due to the large burdens that the mother bears in caring for a larger number of children, which makes them more susceptible to infection. The result agrees with Malika *et al.*, (2013) who made "A pilot study to evaluate incorporating eye care for children into reproductive and child health services in Dar – El Salaam" was mentioned that the big families with more siblings with eye diseases represent an important risk factor<sup>[25]</sup>.

The study has shown that more than three quarter of studied children were living in a crowding level of more than two persons per room. This may be due to low socioeconomic level in rural areas and presence of big families. This result goes in line with the result of Mohammed (2017) who studied "assessment of mothers' knowledge and practice about early childhood conjunctivitis at Assiut Ophthalmology Hospital" and revealed that most of the studied children having crowding level more than three persons per room<sup>[26]</sup>.

Regarding the diagnosis of eye infections, the present study has shown that conjunctivitis is the most common eye infection, and more than half of them had a bacterial type. This may due to increase eye discharge in bacterial conjunctivitis which easily spread by hand – eye contact and children's lack of awareness about protective measures and increasing overcrowding in most families, and in kindergarten and high contagious level of eye infections. All of these factors make a child more susceptible to bacterial conjunctivitis.

This result is the same as that of Watson (2018) in his study "Common eye infections" found that conjunctivitis is the most common eye infection in children. In agree with this result, Mohammed (2016) "Assessment of mothers' role in care of ophthalmological problems in their children" reported that more than a third of the mothers examined indicated a bacterial infection as the cause of their children's eye diseases<sup>[27, 28]</sup>.

The study also shows that, there is no infection with trachoma in the studied children, as a result of the state's interest by maximizing access to safe water and sanitation and encouraging personal hygiene. This result agrees with the result of Amer *et al*; (2018) "Prevalence of trachoma in four marakez of Elmenia and Bani Suef Governorates, Egypt. "the prevalence of studied children aged from 1-9 years old was only 0.3%<sup>[29]</sup>.

Regarding the sources of infection, the present study showed that environmental sources and cross-infections from family members and day care centers were the main sources of infection for most children. In addition, more

than two-thirds of them had previously been infected by a family member. It may be because the most of studied children from rural areas in where poor hygienic environment, dusty environment, open terrain, and flies. In addition, large family sizes increase rate of infection spread. These factors are common in rural areas. As well as small children (>5 years) who cannot take care of the cleaning themselves.

In agreement with the current study, the study by Azmy (2016) who studied " Microbial keratitis: Management and visual outcome" found that most of children's families lived in rural area and had a large family size and bad infection control<sup>[30]</sup>.

Concerning the mother's knowledge of the definition of an eye infection. The study showed that vast majority of mothers do not know. As a result of the lack of awareness and the lack of sources of information on eye diseases. It is also related to the fact that the illiteracy of unemployed mothers does not interest in expanding their knowledge through reading books, magazines and searching on websites. This finding disagreed with Long *et al.*, (2017) who studied "Principles and Practices of children Infectious Diseases, Stanford" and founded that; the minority of mothers had poor knowledge about meaning of acute eye infection<sup>[31]</sup>.

Concerning total knowledge score of the studied mothers regarding eye infection , this study showed that; three quarter of them had poor knowledge scores before program implementation , these findings agreed with Abd El-Aziz, et al., (2018) who studied " Effect of instructional guidelines on mothers of children with conjunctivitis " and founded that; two thirds of mothers had poor knowledge because they didn't seek or express a want for more information about acute eye infection, also these findings disagreed with Isbell *et al.*, (2016)" Child care health consultation: improving the health and safety of children in child care " who mentioned that more than two thirds of the studied mothers had good knowledge scores<sup>[32, 33]</sup>.

Concerning total practices scores of the studied mothers regarding eye infection, the result showed that; less than one third of mother's had satisfactory total practices scores regarding their children with eye infection before program implementation, while the majority of them had unsatisfactory total practices, there is because of the bad knowledge of mothers which on their practice.

These findings disagreed with Hill (2016) who studied "managing infectious diseases in school and child care settings" and mentioned that; The majority of the studied mothers had satisfactory practices scores regarding child's eye care<sup>[34]</sup>. This result is consistent with Ebeigbe (2017) " Parents' awareness and perception of children's eye diseases in Nigeria "who showed that the higher the mother's educational<sup>[35]</sup>.

Regarding the effect of the educational program on the clinical outcome of children had poor practice The results of the study revealed that the most frequently reported eye symptoms were redness, swelling and purulent discharge; this result was consistent with Wong (2014). In his study "The pediatric red eye" Who mentioned that the signs of eye inflammation, particularly redness, itching and swelling, are the main symptoms that draw a physician's attention<sup>[36]</sup>.

The study found that good practices such as eye hygiene and eye compresses help improve ocular manifestations such as

redness, pain, discharge and swelling. The result is consistent with the study by Cooper (2017)" approach to pediatric eye discharge and periorbital swelling." which suggested that warm compresses might improve eye health and relieve eye infection symptoms. And it can reduce the blockages that caused the sty and relieve dry eyes and itching<sup>[37]</sup>.

## Conclusion

The main results revealed that there were highly statistically significant differences between pretest and post-test of educational program implementation; the present study findings revealed that mothers had poor knowledge and inadequate reported practices related to eye infection and its management. There was a positive effect of educational program on improving knowledge and performance of the studied mothers.

## Recommendations

### The following recommendations are suggested based on the findings of the present study

1. Continuation of educational programs for mothers about the management and prevention of eye infection should be held at all Ophthalmic Hospitals in Egypt.
2. In-service educational programs toward childhood eye infection should be established for community and pediatric health nurses at rural health units and ophthalmic hospitals.
3. A well-planned health education program about early childhood eye infection should be introduced into the curriculum at preparatory, secondary school, and university levels.
4. A written pamphlet, brochure, or booklet containing information about pediatric eye infection such as types, symptoms, causes, mode of transmission and how to prevent it, treatment, and how to care for the infected child should.

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