Effect of an educational program for parents of children with recurrent otitis media during early childhood on prevention of its recurrence

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Abstract: Otitis media is one of the most common illnesses in children today. It is estimated to account for as many as one-third of all pediatrician visits. Recurrent otitis media can lead to problems with hearing or hearing loss. If this occurs at early stages of a child's life, it may interfere with language, speech and cognitive development. The **aim** of the present study is to assess the effect of an educational program for parents of children with recurrent otitis media during early childhood on prevention of its recurrence. Quasi- experimental **design** was selected for this study. **A sample** of 100 child suffering from recurrent otitis media and their parents were selected randomly from the Audiology Unit – Assiut University Hospital. Two **tools** were designed, to collect data1)- an interview questionnaire sheet, 2)- Family socio-economic Scale. **Results** of this study showed that the episodes frequency of otitis media per year were reduced among study group children than those in the control group with percentage 8% after application of the educational program and the effect of the educational program on the parents' level of knowledge was highly significant**. It is concluded that:** the episodes of recurrent otitis media per year were reduced in the frequency in the study group than those in the control group with percentage 8% after application of the educational program. According to the results the following **recommendations** were suggested: the Ministry of health and Population should focus on screening programs for all children in the community for early detection of otitis media and prevention of its complications. The pediatric and community nurse at home or in MCH centers gives all new parents an audio-visual material like an Arabic booklet that describes the baby care, the risk factors of otitis media and measures for prevention.

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1. Introduction

Otitis media is a highly prevalent and costly disease; it is considered the most common infection of early childhood. The incidence of otitis media peaks between ages 6 months and 6 years, with most episodes occurring in children younger than 3 years. Most initial episodes occurring at the age 6 months, when the maternal antibody level decline. By the end of the third years of life, 50 % to 70 % of all children have had at least one episode of acute otitis media. Most children younger than 5 years have two or three episodes of otitis media per year (Jams, et al., 2002, Kathi, 2002 and Blocks et al., 2003).

Otitis media is the generic term for all types of inflammation of the middle ear. Recurrent acute otitis media is defined as three new acute otitis media episodes within 6 months or four episodes during 1 year. Acute otitis media is usually a short-term inflammation of the middle ear and is principally characterized by earache that may be severe. It is often preceded by upper respiratory symptoms, including a cough and rhinorrhea. Otitis media with effusion (glue ear) can be defined as chronic inflammation of the middle ear accompanied by accumulation of fluid; it is often asymptomatic (Hay, et al., and Schechter et al., 2003).

A variety of different bacteria and viruses can cause middle ear infections. Otitis media occurs frequently along with cold or other upper respiratory tract infections during the winter month's. During a cold, sinus or throat infection, or an allergy attack, the Eustachian tubes can become blocked, preventing ventilation and drainage of fluids from the middle ear. Recurrent episodes of otitis media are often caused by new bacteria, rather than bacteria already present in the child nasopharynx that has become resistant (Sheda and Shank, 2006).

Risk factors for acute otitis media include: a child who has recently taken antibiotics has an increased risk for acquiring resistant pathogens, children in large day care setting because of increased exposure to viral illness and allergens, those exposed to passive smoke, non–breast-fed infants and those with parents with a significant history of otitis media

(Klein, 2002).children who live in developing areas or in crowded conditions have statistically more middle–ear disease than other children. In addition to children with cleft palate and other craniofacial anomalies are at increased risk for otitis media, Eustachian tube abnormalities, nasopharyngeal tumors, Down syndrome, altered immune system-HIV, immune suppression secondary to drug, IgA, allergic rhinitis and bottle propping (Behrman, et al., 2000 and Schwab, 2006).

Symptoms and signs of acute otitis media are highly variable, especially in infants and young children. There may include rupture of the tympanic membrane with purulent otorrhea, evidence of ear pain, often manifested by holding, tugging at the ear, fever, irritability, vomiting, diarrhea, pain on swallowing. The disease has been discovered at a routine health examination. Chronic otitis media, describes a variety of signs and, symptoms. These includes, perforation of the eardrum, scarring or erosion of the small sound conducting bones of the middle ear, chronic or recurring infected drainage from the ear damage to surrounding structures such as the balance or hearing organs of the inner ear, the facial nerve, or the brain and its coverings, known as the meanings (Behrman, et al., 2004). Otitis media with effusion is usually not accompanied by apparent symptoms, and the associated conductive hearing loss usually goes undetected, especially in younger children. Older children may complain of mild discomfort or a sense of fullness in the ear, eye drainage-infections secondary to H influenza non-typable are often associated with conjunctivitis (Behrman et al., 2004).

Diagnosis of otitis media is usually made simply by looking at the eardrum through a special instrument called otoscopy, and also tympanometry. Hearing screening and a routine audiometric screening every visit may be recommended (Bonin, et al., 2003).Recurrent ear infection should not cause any permanent problems with prompt care and good follow-up, while neglected otitis media can lead to serious complications which include intratemporal complication as hearing loss (conductive and sensori-neural), tympanic membrane perforation, acute and chronic mastoiditits, petrostitis, labyrinthitis and intracranial complications as meningitis, subdural empyema, brain abscess and extradural abscess (Jones and Wilson, 2004).

Prevention of the diseases and their complications is one of the nurses' roles at the primary level of prevention. The emerging trends toward health care have been prevention of disease and maintenance of health rather than treatment of disease or disability. The best approach to prevention is education and anticipatory guidance (Hockenberry and Wilson, 2007).

Education is a process, the chief goal of which is to bring about change in human behavior, and help in fostering high level of wellness. Health education, like general education, is concerned with change in the knowledge, feelings and behavior of people related to health (WHO, 2000).

The nurse plays an important role in assessing the parents' current understanding of otitis media, and she should be competent enough to teach the parents that, reducing the chances of otitis media is possible with simple measures, such as sitting or holding an infant upright for feeding and avoid supine or side lying position. Eliminating tobacco smoke and known allergens is also recommended. Forceful nose blowing during upper respiratory tract infection is discouraged to avoid forcing organisms to ascend through the Eustachian tube. Provide praise for decisions that will promote wellness for the child and family (Luxner, 2005).

2. Subjects and Method

The aim of the present study was to assess the effect of an educational program for parents of children with recurrent otitis media during early childhood on prevention of its recurrence.

Research hypothesis:

The frequency of episodes of otitis media per year will be reduced among children in the study group than those in the control group after application of the educational program.

Research design:

Quasi-experimental design was selected for this study.

A - Subjects:

Setting:

The study was conducted at Audiology Unit (out patient unit) - Assiut University Hospital.

Sampling:

A sample of 100 child suffering from recurrent otitis media and their parents were selected randomly, the first five was categorized for the study group and the next five were under the control group and so on. The study group included 50 children and their parents (or the caregivers) received the medical treatment and the educational program, while the control group includes 50 children and their parents (or the caregivers) and received the medical treatment only.

= Inclusion criteria:

1- Early childhood age children (from 1 year – up to 6 years).

2- Children who diagnosed with recurrent otitis media at Audiology Unit after clinical examinations and tympanometry procedure (Three new episodes within six months or four episodes during one year).

= Exclusion criteria:

1 - Children who were complaining from systemic medical problems which compromise the immune system such as (leukemia, severe, diabetes) were excluded.

2 - Children under cytotoxic and immunosuppressive drugs.

Tools for data collection:

Two tools were designed to collect the necessary data as follow:

I- The first tool:

An interview questionnaire sheet was developed by the researcher and revised by 5 experts to test its validity and it included the following items:

a)-Personal data about the studied children as age, gender, birth order, number of siblings, nursery school attendance

b)-History of the studied children as history of infant feeding, food allergy, passive exposure to cigarette smoking (at home or school) exposure to upper respiratory tract infection and number of episodes per year, hearing difficulties, last ear infections.

c)- Questions to assess the parents' (or the caregivers) knowledge about otitis media such as definition, causes, signs and symptoms, risk factors, complications and prevention of recurrent otitis media.

II- The second tool:

Family socio-economic Scale by Abdel-Twab, 1998 which used to assess Socio-economic status of the family and it included questions about: The educational, occupational, financial status of the family, and the family life style which was estimated as the following: Score of fathers and mothers education were summed and multiply by 7.33. Score of fathers and mothers occupation were summed and multiply by 6.91. Score of income was summed and multiply by 4.86. Score of life style (residence, cultural, and owns) were summed and multiply by 5.11. The total score was summed (education, occupation, income, and the family life style) for every parent. Mean and standard deviation were calculated for the sample (mean ± SD (121 ±51). Socio-economic score was recorded as: low Socio-economic level < 121±51 (70), middle Socio-economic level between 70-172 and high Socio-economic level > 121± 51 (172).

B - Method:

An official permission was taken from the chairman of the Audiology Unit - Assiut University Hospital to conduct the present study on the children suffering from recurrent otitis media.

Pilot study:

A pilot study was carried out on (10%) of participants at Audiology Unit - Assiut University Hospital and they were excluded from the main sample. The aim of the pilot study was to determine the clarity, evaluate the content of the sheet and to estimate the approximate time required to fill and complete the sheet and the necessary modifications were done and the final form was developed.

Ethical consideration:

The researcher took an oral consent from each participant before conducting the study after introducing herself and explains the aim of the study to them.

Field of the work:

The study was conducted in the period from April 2007 to August 2008 at the study setting (Audiology Unit - Assiut University Hospital). Data was collected through interviewing each child and his parent or caregiver individually. An average 30-45 minutes were spent with each participant to fulfill questionnaire sheet. The number of participants that could be assigned were about 2 -4 per day. The pre-test was conducted to all participants included in the study (for the study and control group). On the basis of the results of the pilot study, the program was designed by the researcher.

- The program was revised by a panel of experts (medical audiologist and pediatric nursing specialists) and the final form was modified according to the given comments. The contents of the program were covered through three separated sessions for each participant.

- A copy of the program in form of Arabic booklet was given to each participant during the first session. The booklet included pictures to demonstrate the content of the program for the illiterate participants.

- Each child in the study and control groups was followed up monthly through the telephone calling and through the medical record at Audiology Unit after the program carried out to record the recurrence of otitis media and to evaluate the effect of the educational program on its recurrence

- The post-test was conducted 4 times (every 3 months) for both the study and control groups and it took 9 months to assess the changes of knowledge for the participants about otitis media, and application of the instructions in the educational program. The 1st post-test was done immediately after conduction of the program, and the 2nd, 3rd, and 4th post-test was done every 3 months.

Scoring system:

Data of the parents' knowledge about the recurrence of otitis media were scored as the following: the wrong answers and didn't know were coded as zero, and the right answers were coded as one mark. Then we calculated the total score of all questions for all parents in 1st, 2nd, 3rd, and 4th post-test. The score of the parents' knowledge included 73

questions in each post-test. So, the total score were 292 marks. We considered < 50% of total score as poor knowledge, 50 - < 65% as satisfactory, and more than or equal 65% as good knowledge. Total scores were calculated to determine the levels of parents' knowledge.

Statistical analysis:

Data entry was done using Excel XP computer software package, while statistical analysis was done using SPSS version 11 statistical software packages. Data were presented using descriptive statistics in the form of frequencies and percentage for qualitative variables, means and standard deviation for quantitative variables. Qualitative variables were compared using Chi-Square test. Quantitative variables were compared using t-test to compare two means. ANOVA test was used to compare more than two means. Statistical significance was considered at P=-value < 0.05.

3. Results

Table (1) illustrates that, 64% of children aged from 3 years to ≤ 6 years in study group and 66 % at the same age in the control group. The mean age was 3.8 and 3.9 years in the study and control groups respectively. More than half (58%) of the children were males, while in the control group the males constituted 64%. Regarding to the birth order. it was found that 82% of children were in the first and the second birth order in the study group and 58% in the control group. As regard to the number of siblings, more than three fourth (78%) of the children in study group and 62% of the control group were had less than 3 siblings. About three fourth (76%) of the study group children living in the rural areas, while in the control group the rural areas constituted 72 % and the urban 28 %.Statistical significant difference was found between the study and control groups regarding to the child's birth order.

Table (2) shows that 18%, 30% of the fathers in the study and control groups and 20%, 48% of mothers respectively were illiterate while half (50%) of the fathers in the study group and 46% of the mothers and 36% in the control group were had secondary level of education.

More than half (58%) of the fathers in the study group and 48% in control group were employers while 80% and 84% of mothers in the study and control groups were housewives respectively. Regarding to the socio-economic status of the family, more than three fourth (76%) of them were in the study group included in the middle socio-economic level, and only (10%) were included in high level. while In the control group more than half (58%) of the families were included in the middle socio-economic level, and 14% were included in the low level.

A statistical significant difference was found only between the study and the control group regarding to the fathers' occupation.

Table (3) indicates, more than one third (38%) and (34%) of the children in study and control groups respectively attending nursery schools. Regarding the class room capacity, the majority (89.5%), (88.9%) of the children in the study and control groups respectively was more than 18 child/room and 52.6% of them stay 5 hours per day and (42.1%) attending at age 36 month or more while in the control group the majority (88.9%) of them were 15-18 child and 55.6% stay 5 hours per day. No statistical significant differences were found between the study and control groups regarding to the staying hours at the nursery school and the age of the child when attending the nursery school. Statistical significant differences were found between the study and control group regarding to the capacity of the children / class room in nursery school.

Table (4) presents that, (62%) of the children in the study group were breast fed, 18% of them were bottle fed, while in the control group 80 % of the children were breast fed, and only (2%) of them were bottle fed. Regarding to the position of the children during breast feeding 80.4 % and 83.7% of the children in the study and control groups respectively was in the supine and side lying position during feeding, while 19.6 % and 16.3% in the study and control groups respectively were fed in semi sitting position. Less than half of the study group (46.3%) and 69.3% in the control group the duration of breast feeding was between 18 - 24 months.

As regard to the position of children during bottle feeding, the majority (94.7%) of mothers of the study group and half (50 %) of the control group were using supine and side lying positions. Thirty six percent of the children in the study group and 24% in the control group were using pacifier. Regarding to the food allergy, only (16%) and (10%) of the study and control groups respectively had food allergy. Statistical significant differences were found between the study and control groups regarding to the position during bottle feeding.

Table (5) indicates, about two thirds (66%) and (68%) of the children in the study and control groups respectively exposed to air pollution. More than half (56 %) of them in study group exposed to passive cigarette smoking and 42.9 % exposed 7-10 hours/day and (35.7%) their duration of exposure to passive cigarette smoking was 12 - < 24 and 60 - ≤ 72 months. While in the control group half of children (50%) exposed to passive cigarette smoking, (44%) of them exposed 3 - 6 hours / day, about one third (32%) of them were exposed to passive cigarette smoking during age 24 - < 36 month. Statistical significant

differences were found between the study and control groups regarding duration of exposure to passive cigarette smoking.

Table (6) represents, about one third (34 %) of the children in study group and 40% in control group had family history of otitis media. Sixty six percent of the children in the study group and 58% in the control group had the first episode of otitis media at the age from 1 < 24 month. About two thirds (70%) of children in the study group and (62%) in the control group had recurrence of otitis media more than 4 times per year. Eighty two percent in the study group and 86 % in control group had recurrent upper respiratory tract infections. More than half (52 %) of children in study group and (56 %) in the control group contact to other children with upper respiratory tract infection. Regarding to the season at which the otitis media episodes increased, more than three fourth of the children (76%) in study group and (78%) in control group suffered from recurrent otitis media during winter season. Eighty two percent of children in the study group and (80%) in the control group were complete the intake of the antibiotic course. Majority of the children (98%) and (94%) in the study and control groups respectively were continuing follow up care.

Table (7) illustrate that, no statistical significant differences were found between the study and control groups in the pre-test regarding to the mean score of knowledge. Highly statistical significant differences were found between the study and control groups regarding to the mean score of knowledge in the 1st, 2nd, 3rd, and 4th post-test with higher prevalence among the study group in the 1st post-test (P = 0.000).

Table (8) presents that 16% of children had recurrent otitis media 3 episodes per six months before implementation of the educational program,14% their recurrence were 4 episodes per year, and 70% their recurrence were 5 episodes or more per year before program, While after implementation of the educational program the children improved as, 82% of them had once or twice per year, 4 % their recurrence were 3 episodes, 4 % their recurrence were 4 episodes and 10 % their recurrence were 5 episodes or more. A highly statistical significant difference was found of the study group before and after implementation of the educational program regarding to the frequency of recurrent otitis media.

Table (1): Personal data of the studied children in study and control groups.

Items	Study group (n =50)		Control group (n=50)		P value
	No	%	No	%	
- Age in year					
• 1 - < 3 years	18	36	17	34	1.000
• 3 - ≤ 6 years	32	64	33	66	
- The mean ± SD	3.8 ± 1.81		3.9 ± 1.53		
- Gender					
• Male	29	58	32	64	0.682
• Female	21	42	18	36	
- Birth order					0.018*
• First and second	41	82	29	58	
• Third to fifth	6	12	18	36	
• More than fifth	3	6	3	6	
- Number of siblings					
• < 3 children	39	78	31	62	0.126
• ≥ 3 children	11	22	19	38	
- Residence					
• Rural	38	76	36	72	0.820
• Urban	12	24	14	28	

* Statistical significant

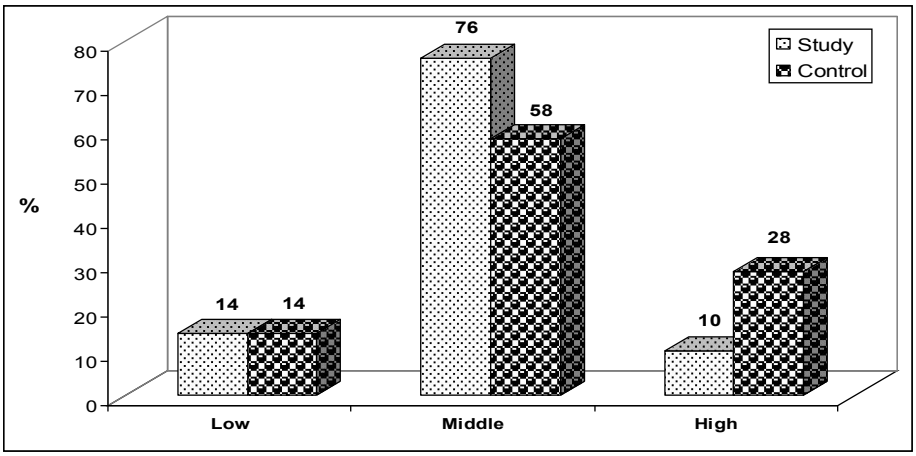

Figure (1): Percentage distribution of socio-economic status among the study and the control groups

Table (2): Studied children parents' personal data in the study and control groups

Items	Study group (n = 50)		Control group (n = 50)		P -value
	No	%	No	%	
- Fathers' education					
*** Informal**					
• Illiterate	9	18	15	30	1.000
• Primary	2	4	4	8	
*** Formal**					
• Preparatory	2	4	4	8	0.298
• Secondary	25	50	19	38	
• University	9	18	8	16	
• Master degree	3	6	0	0	
- Fathers' occupation					
• Farmer	1	2	9	18	0.029*
• Employer	29	58	24	48	
• Manual workers and others	20	40	17	34	
- Mothers' education					
*** Informal**	15	30	24	48	0.400
• Illiterate	1	2	0	0	
• Primary					
*** Formal**					
• Preparatory	4	8	2	4	0.151
• Secondary	23	46	18	36	
• University	3	6	6	12	
• Master degree	4	8	0	0	
-Mothers' working condition					
• Housewife	40	80	42	84	0.795
• Working	10	20	8	16	
- Family socio-economic status					
• High (> 172)	5	10	14	28	0.065
• Middle (70-172)	38	76	29	58	
• Low (< 70)	7	14	7	14	

* Statistical significant

Table (3): Nursery school attendance of studied children in the study and control groups.

Items	Study group (n = 50)		Control group (n = 50)		P-value
	No	%	No	%	
- Attending nursery school					
• Yes	19	38	9	34	0.044*
• No	31	62	41	66	
- Age of start attending (in months)					
• 3 - < 12	5	26.3	3	33.3	0.928
• 12 - < 24	3	15.8	2	22.3	
• 24 - < 36	3	15.8	1	11.1	
• 36 or more	8	42.1	3	33.3	
-Capacity of children/room					
• 11-14 children	1	5.3	1	11.1	0.000**
• 15-18	1	5.3	8	88.9	
• more than 18	17	89.5	0	0	
- Staying hours per day					
• 4	6	31.6	3	33.3	0.921
• 5	10	52.6	5	55.6	
• 6	1	5.3	0	0	
• 7	2	10.5	1	11.1	

* Statistical significant ** Highly statistical significant

Table (4): Feeding history of children with recurrent otitis media in the study and control groups.

Items	Study group (n = 50)		Control group (n = 50)		P value
	No	%	No	%	
- Type of feeding					
• Breast feeding	31	62	40	80	0.022*
• Bottle feeding	9	18	1	2	
• Both	10	20	9	18	
- Position during breast feeding					
• Semi sitting	8	19.6	8	16.3	0.785
• Supine or side -lying position	33	80.4	41	83.7	
- Duration of breast feeding					
• < 3 months	0	0	0	0	0.075
• 3 - < 6 month	8	19.6	9	18.4	
• 6 - < 12	3	7.3	1	2.1	
• 12 - < 18	11	26.8	5	10.2	
• 18 - ≤ 24	19	46.3	34	69.3	
- Position during bottle feeding					
• Semi-sitting position	1	5.3	5	50	0.011*
• Supine or side -lying position	18	94.7	5	50	
- Using pacifier					
• Yes	18	36	12	24	0.275
• No	32	64	38	76	
- Food allergy					
• Yes	8	16	5	10	0.554
• No	42	84	45	90	

* Statistical significant

Table (5): History of studied children regarding exposure to air pollution and passive cigarette smoking in the study and control groups.

Items	Study group (n = 50)		Control group (n = 50)		P value
	No	%	No	%	
- Exposure to air pollution (as pother and moulds).					
• Yes	33	66	34	68	1.000
• No	17	34	16	32	
- Exposure to Passive cigarette smoking					
• Yes	28	56	25	50	0.689
• No	22	44	25	50	
- Duration of exposure to cigarette smoking (hours/day)					
• 1 – 2	2	7.1	3	12	0.684
• 3 – 6	11	39.3	11	44	
• 7 – 10	12	42.9	7	28	
• 11 – 15	3	10.7	4	16	
• more than 15	0	0	0	0	
- Duration of exposure to cigarette smoke during life (in month).					
• 12- <24	10	35.7	3	12	0.046*
• 24 - < 36	2	7.1	8	32	
• 36 - < 48	4	14.7	2	8	
• 48 - < 60	2	7.1	5	2	
• 60 ≤ 72	10	35.7	7	28	

* Statistical significant

Table (6): History of recurrent otitis media and upper respiratory tract infections (URTI) of the studied children in the study and control groups.

Items	Study group (n = 50)		Control group (n = 50)		P value
	No	%	No	%	
- Family history of otitis media					
• Yes	17	34	20	40	0.679
• No	33	66	30	60	
- Age at the first episode					
• 1 - < 24 months	33	66	29	58	0.705
• 24 - < 48	10	20	14	28	
• 48 - ≤ 72	7	14	7	14	
-Frequency of recurrent otitis media episodes / year (before program)					
• 3 times / 6 months	8	16	4	8	0.106
• 4 times / year	7	14	15	30	
• > 4 times / year	35	70	31	62	
- Season at which the otitis media episodes increased					
• Summer	4	8	3	6	0.925
• Winter	38	76	39	78	
• All the year	8	16	8	16	
- Recurrence of URTI					
• Yes	41	82	43	86	0.786
• No	9	18	7	14	

- Contact to other children having URTI					
• Yes	26	52	28	56	0.841
• No	24	48	22	44	
- Complete intake of the antibiotic course					
• Yes	41	82	40	80	1.000
• No	9	18	10	20	
- Follow up care • Yes	49	98	47	94	0.617
• No	1	2	3	6	

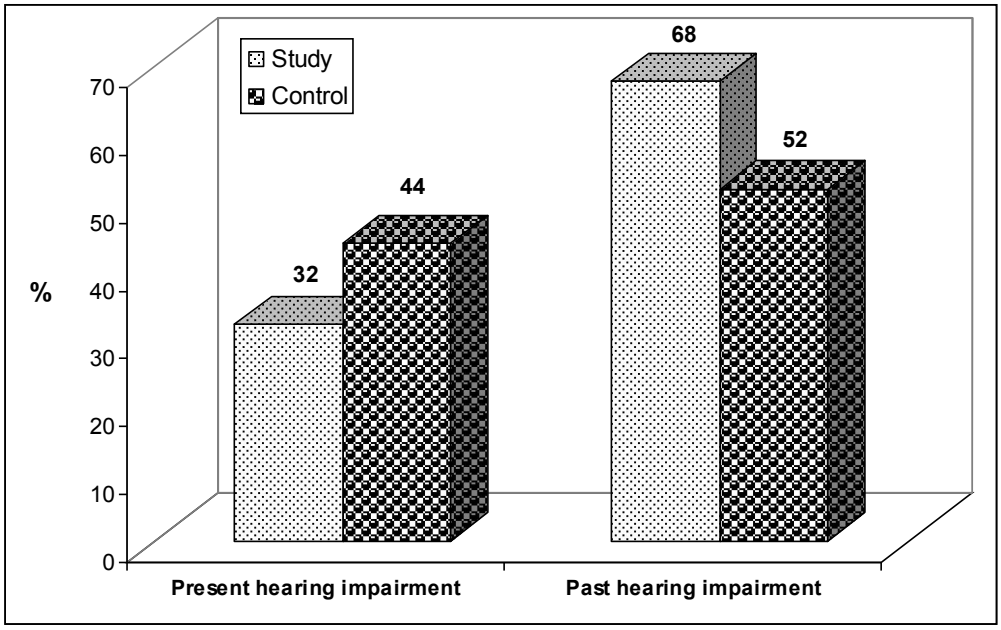

Figure (2): Percentage distribution of hearing impairment among the study and control groups

Table (7): Comparison between the study and control groups according to the mean score of knowledge in pre-test, and 1st, 2nd, 3rd, and 4th post-test.

Items	Study group (n=50) Mean ± SD	Control group (n=50) Mean ± SD	P - value
- Pre-test	25.04± 11.3	24.05 ± 12.5	.815
- 1st Post-test	68.9± 4.1	31.2 ± 4.05	.000**
- 2nd Post- test	65.8 ± 6.2	32.1 ± 11.05	.000**
- 3rd Post-test	60.8 ± 4.07	33 ± 11.01	.000**
- 4th Post-test	59.8 ± 6.2	32.8 ± 9.8	.000**

** Highly statistical significant

Table (8): The frequency of episodes of recurrent otitis media in the study group before and after implementation of the educational program, in percentage distribution.

The frequency of episodes of recurrent otitis media/year	Study group (before program)		(after program)		P value
	No	%	No	%	
- Once or Twice/ year	0	0	41	82	
- 3 episodes / 6 months	8	16	2	4	0.000**

- 4 episodes / year	7	14	2	4	
- 5 episodes or more / year	35	70	5	10	
- Total	50	100	50	100	

** Highly statistical significant differences

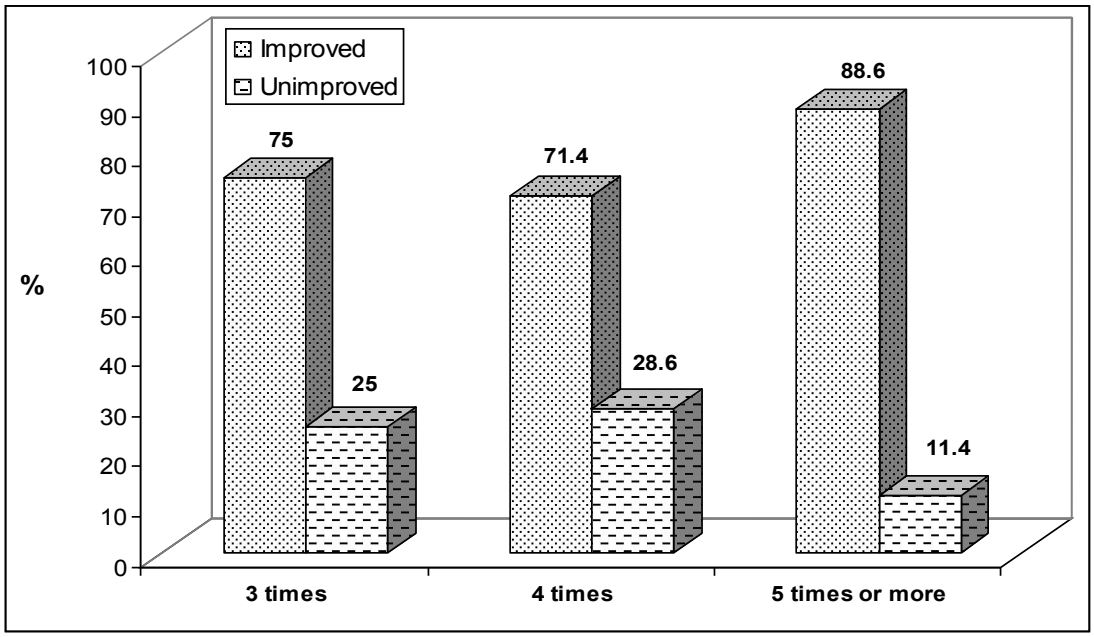

Figure (3): The improvement percent among children in the study group related to recurrent otitis media per year after implementation of the educational program

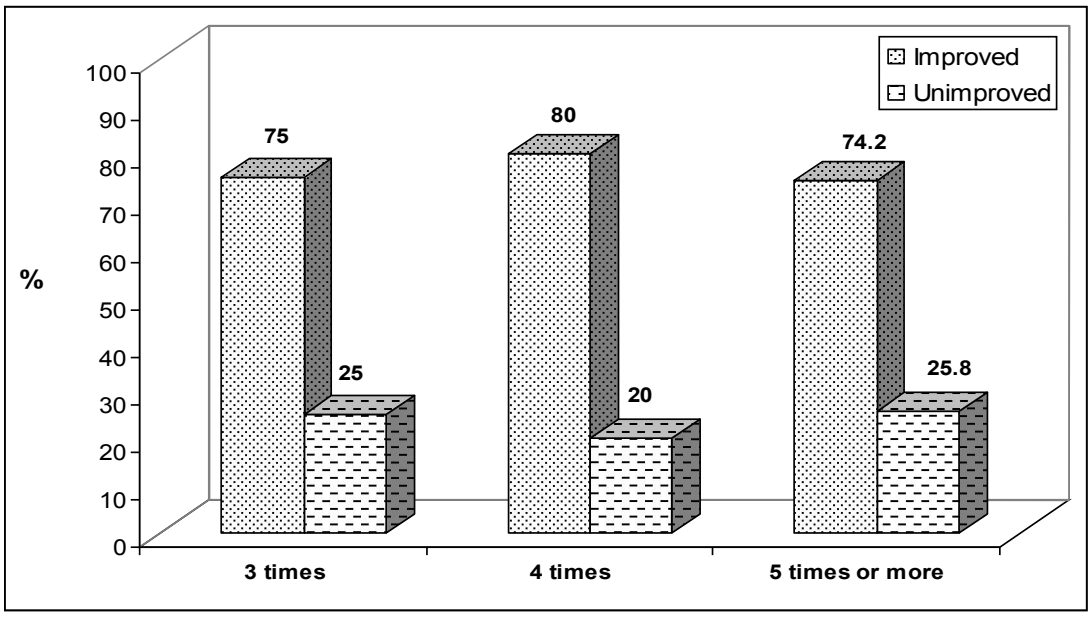

Figure (4): The improvement percent among children in the control group related to recurrent otitis media per year at the end of the study

4. Discussion

Otitis media is an extremely prevalent infectious disease among children. Although otitis media usually heals easily, failures, prolongation of the disease and multiple recurrences are common. Otitis media is a commonly encountered pediatric illness that affects approximately 70 % of children by 3 years of age, with one third experiencing more than three episodes. If not properly treated, otitis media can lead to hearing loss, middle ear disorder, and delayed speech development. (Garrelts and Melnyk 2001).

In the current study, more than two thirds (64%) and (66%) of the children in the study and control groups respectively aged from 3 to ≤ 6 years and the mean number of the recurrence of otitis media was significantly higher among the children who aged between 3 - ≤ 6 years. These findings coincide with the study of Jero, et al., (2000) who reported that, more than half (58 %) of children in their study aged more than 3 years, but disagrees with James et al., (2002) who stated that, the incidence of otitis media peaks were at ages of 6 months and 6 years, with most episodes occurring in children younger than 3 years.

It was observed that more than half of children (58 %) in the study group and (64%) in the control group were males. The same results were found in the study carried out by Jero et al., (2000) who stated that, more than half (54 %) of their studied children were males compared with females. It is also in agreement with Schwab, (2006) who stated that male sex is one of the risk factors regarding the occurrence of recurrent otitis media. This observation may be also explained differently according to our Egyptian culture by the fact that families usually offer more attention to their sons than daughters. Hence, boys constitute the major fraction of children seeking medical advice of recurrent otitis media.

The present study showed, statistical significant relationship between the mean number of recurrent otitis media and the number of siblings more than four children (p = 0.058). This finding is consistent with Neto et al., (2006) who stated that, greater incidence of acute otitis media and chronic otitis media is described in children belonging to big families (especially if their children are under 5 years of age). History of recurrent otitis media in siblings is considered to be a risk factor.

The present study depicted that, more than three fourths of the children (76%) in study group and 72% in the control group were from rural areas. This is in accordance with Pillai, (2000) who found that, survey of the literature indicated that rural population experiences a higher prevalence of chronic ear infections possibly due to staying away from facilities of health care.

The present study revealed, highly statistical significant relationship between the mean number of recurrent otitis media and low socio-economic status of family among the study group (p = 0.001). This finding is in agreement with Australian Indigenous Health Infonet, (2002) which reported that, limited economic resources are one of the risk factors regarding the occurrence of recurrent otitis media. Paradise et al., (2007) stated that, lower socio economic status was the most important risk factor for recurrent otitis media. In our opinion the recurrent otitis media increased among the low socio-economic families may be due to less finances and resources to seek care for their sick children and to follow the medical and nursing instructions, this increase the risks of recurrent otitis media.

About two thirds of the children (62%) in the study group and 80% in the control group in the current study were breast fed. Less than one quadrant (19.6%) and (16.3%) of children in the study and control groups respectively were fed in semi-sitting position, while more than three fourths (80.4%) in study group and (83.7%) in the control group were using supine or side-lying position.

Jones and Wilson, (2004) reported that, breast feeding protects infants against otitis media; this benefit is evident only in children who are breast feeding exclusively for the first 3-6 months of life and this delays the onset of the first otitis media episodes and reduces the recurrence of otitis media in those children. As illustrated in this study, no statistical significant differences between the mean number of recurrent otitis media and the type of feeding, whereas the mean number of recurrent otitis media increased among bottle fed children, who were fed in supine or side-lying positions. Hockenberry and Wilson, (2007) stated that, lying-down position favors the pooling of fluid and predispose to development of otitis media

The present study showed that, the mean number of recurrent otitis media increased in children who used pacifier among the study group and control groups with no statistical significant difference between them. This finding is consistent with Baxter et al., (2003) stated that, pacifier use is significant risk factor for acute otitis media. Also Simon (2007) as well, stated that sucking increases production of saliva, which helps bacteria travel up the Eustachian tube to the middle ear.

It was found in the present study that, more than half of children in study and control groups exposed to passive cigarette smoking. Bongiovanni, (2006) stated that children who exposed to smoke in their homes during first 3 years of life are at almost double the risk for frequent or persistent middle ear infections. Also Paradise et al., (2007) stated that, children who live with smokers have significant risk for ear infections..

These findings disagree with Wozinicki, (2005) who stated that, the number of infectious pathogens found in the children of smoking parents and children of non-smoking was essentially the same.

The current study represents that, more than two thirds (67%) and (78%) of children in the study and control groups respectively had recurrent otitis media in winter season more than other seasons. It also observed that, more than three fourths of the children had recurrent upper respiratory tract infection. These findings conformed with Neto et al., (2006) and Phyllis and James, (2006) they stated that, epidemiological evidences and clinical experience strongly suggest that otitis media is frequently a complication of upper respiratory infection and the incidence is greater during autumn and winter months and lesser in summer.

The findings of the current study delineated that, no statistical significant differences between the mean number of recurrent otitis media and the attending nursery school. This finding disagrees with Strafford, (2005) who reported that, the care outside the home increases the relative risk of recurrent acute otitis media. Neto et al., (2006) as well found that, nursery school attendance is the major risk factor for developing recurrent otitis media. Also Mayo Foundation of Medical Education and Research (2007) reported that, children who regularly attending large group child care setting have more ear infections than do children who are cared for at home or in smaller child care facilities.

In the present study, about one third (32%) of children in the study group and 44% in the control group suffered from hearing impairment at the time of the study while 68% of children in study group and 52% in the control group have past history of hearing impairment. This agreed with Jones and Wilson, (2004) who stated that, hearing loss (conductive and sensorineural) is one of the intratemporal complications of recurrent otitis media. Also this is in agreement with Pillai, (2000) who stated that the recurrent otitis media if not treated well, place those children at risk of permanent hearing loss.

Regarding to the mean score of the parents' knowledge (before program), the current study illustrates no significant relationship between the study and control groups. Majority (86%) of the parents in the study and control groups have gotten poor score of knowledge before implementation of the educational program, and only 2% and 4% in the study and control groups respectively got good knowledge score while a highly statistical significant difference (p =0.000) was found between the study and control groups regarding to the parents' knowledge in the 1st, 2nd, 3rd, and 4th post-test with higher prevalence among the study group in the 1st post-test.

It could be observed that the effect of the residence on the parents' level of knowledge was significant (P=0.013) with higher prevalence of poor level of knowledge among the rural areas, so it could be concluded that the rural area are not concerned by health information because the levels of education decreases in the rural area.

Furthermore, from the findings it was observed that, the effect of the socio-economic status on the parents' levels of knowledge was highly significant (P= 0.001) with higher prevalence of poor levels of knowledge among the parents with low socio-economic status. This may be related to those families with low socio-economic occupied by the activity of daily living rather than the concern with their knowledge.

The present study revealed statistical significant differences between the parents' levels of knowledge and the mothers' occupation with higher prevalence of poor knowledge among housewives. Also the prevalence of the poor level of knowledge increased among the parents with informal education..

The present study analyzed the improvement percent regarding to the recurrence of otitis media per year among children in study and control groups before and after implementation of the educational program. As regards the recurrence in the study group, 8 children their recurrent otitis media were 3 times per six months before the program 6 of them improved to less than 3 times per year after conduction of the educational program (the improvement percent 75 %), 7 children their recurrent otitis media episodes before program were 4 times per year after the program 5 of them improved to less than 4 times (the improvement percent 71.4 %), while 35 child their recurrent otitis media were 5 times before program, 31 of them improved to less than 5 times after the program (the improvement percent 88.6 %). the *total* number of improved children was 42 and their improved percent were 84 %.

5. Conclusion:

Based on results of the present study, it can be concluded that:

- The episodes of recurrent otitis media per year were reduced in the frequency in the study group than those in the control group with percentage 8% after application of the educational program.

- **Recommendations:**

The present study recommended the followings:

1- Population-based screening programs for all children in community, including the nursery schools

for early diagnosis of otitis media and prevention of the complications.

2- Annual influenza vaccination for all children 6 months to 5 years of age.

Preventing influenza (the flu) is an important protective measure against ear infections.

3- In the hospital, parents spend more time with the nurse than they do with the physician. So it might be a good time for the nurses to teach parents some preventive measures for otitis media.

4 - At the nursery, families are very receptive to education, so it is a good opportunity to educate them the importance of breast feeding, importance of allowing the right position during feeding, and avoidance of smoking for protection against otitis media.

5 - The pediatric and community nurse at home or in MCH centers gives all new parents an audio-visual or handout material like booklet that describes the infants care, the risk factor of otitis media and measures for prevention.

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