

Nursing Intervention PROGRAM FOR MOTHERS AND THEIR MUMPS CHILD BY USING EPIDEMIOLOGICAL MODEL

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Abstract

Background: Mumps epidemics have occurred worldwide with school-aged children generally serving as the vector for horizontal spread to household family members. **The aim of this study** was to evaluate the effect of nursing intervention program for mothers' and their mumps child by using epidemiological model. **Research design:** A quasi-experimental design was used in this study. **Setting:** The study was conducted at Out-patient Clinic in Health Insurance Hospital where the children were treated and referral. **The sample:** Convenient sample of all children were admitted to previous mentioned setting which include 40 child and their mothers according to certain criteria less than 8 years and residence with mothers at home. **Tools:** An interviewing questionnaire which consists of three parts: I): a) Socio-demographic characteristics of child mothers'. b): Children characteristics II): a): Mothers knowledge regarding mumps. b): Mothers knowledge regarding an epidemiological model. III): Practices as reported by mothers regarding mumps child. **Results** of this study showed; there were improvement of mothers knowledge regarding mumps infection after the program especially for site of parotid gland, complication and mode of transmission which represent 92.5% compared by 45.0%, 37.5%, and 65.0% respectively pre program. **This study concluded that:** The nursing intervention program has showed a highly statistically significant effect on knowledge and practices of the mothers post program compared by pre program. **The study recommended that:** Health education program should be provided for mumps children and their mothers regarding epidemiological model during follow-up visits, illustrated booklet should be provided with description of disease control and prevention measurement.

Key words: Mumps, Epidemiological Model, and Nursing Intervention Program.

Introduction

Mumps is an acute viral illness, caused by mumps virus and spread from human to human via direct contact or by airborne droplets; sometimes called infectious parotitis, and primarily affects the salivary glands. Mumps epidemics have occurred worldwide with school-aged children generally serving as the vector for horizontal spread to household family members. However, the mumps virus can infect adults as well and complications are more likely to be serious (*World Health Organization (WHO), 2015; Albrecht, 2015*).

Mumps is characterized by fever and swelling of one or more salivary glands, usually the parotid gland; non-specific or primarily respiratory symptoms occur in about one-half of those infected. Orchitis occurs in 20-30% of post-pubertal males, with testicular atrophy in about one-third of these cases and rarely sterility; oophoritis occurs in 5% of post-pubertal females. Pancreatitis, usually mild, occurs in 4% of cases. Aseptic meningitis occurs in 10% of cases (*Heymann, 2015*).

Mumps has an incubation period of 16-18 days; however, cases can arise 12-25 days after exposure; after this period, prodromal symptoms occur; these symptoms can last 3-5 days. The clinical path of the virus depends on which organ is affected. The most common presentation is a parotitis, which occurs in 30 to 40% of all patients and in 95% of those who are symptomatic. Parotitis is caused by the direct viral infection of the ductal epithelium and presents with localized gland inflammation. Other reported sites of infection are the central nervous system (CNS), eyes, pancreas, kidneys, testes, ovaries, and joints. Recent evidence suggests that while mumps virus can be isolated from saliva and respiratory secretions for up to nine days after the onset of parotitis, there is a significant (*Defendi, and Steele 2015*).

The classic symptom of mumps is parotitis or inflammation of other salivary glands, which may be unilateral, or more commonly bilateral; approximately one third of infections does not cause clinically apparent salivary gland swelling and may manifest primarily as respiratory tract infection. Parotitis may be preceded by several days of fever, headache, malaise, and anorexia; fever lasts 1-6 days, but parotid enlargement may persist for 10 days or longer (*Division of Infectious Disease Epidemiology, 2015*).

Specific laboratory diagnosis should be sought in all cases of suspected mumps. Viral parotitis can also be caused by Epstein –Barr virus, coxsackievirus and other enteroviruses, lymphocytic choriomeningitis virus and influenza A and parainfluenza viruses. Acute suppurative parotitis can be caused by *Staphylococcus aureus*, *Streptococcus* species, anaerobes and gram negative rods. The gold standard for mumps diagnosis is viral culture isolation from buccal swabs. Acute serum for IgM antibody is also useful in persons without a history of immunization or disease (*Division of Infectious Disease Epidemiology, 2015*).

Epidemiology is concerned with the distribution of disease and their determinants and consequences in population groups, and that are integral components of population change (*Omran, 2005*). An epidemic can occur when several aspects of the agent (pathogen), population (hosts), and the environment create an ideal situation for spread. Low vaccination rates, poor nutrition, age (young and elderly), and immunosuppression all contribute to infectious risk. Overcrowding, poor hygiene, dirty drinking water, and rapid climate changes, can lead to allow easier transmission of disease. And the prevention should be involved cleanliness, vaccination, vector control, and education (*Ameli, 2015*).

The epidemiological model is a logical representation of the epidemiology of disease transmission, its associated processes, facilitates the evaluation of the efficacy of the potential control measures, provides estimates of the future magnitude, and duration and geographical extent of an outbreak given the application of specific control measures. It also provides frameworks that allow ideas about the behavior of a particular system to be conceptualized and communicated (*Dubé et al., 2007*).

Nursing management for mumps child based on supportive care and good follow-up. Current evidence suggests that children diagnosed with mumps should be isolated for 5 days from the onset of symptoms to prevent spread infection; so children should be advised to stay at home from school for at least five days from symptom onset; and isolation of the child is important to prevent exposure of susceptible individuals to the virus (*Public Health Agency of Canada (PHAC), 2013*).

Children should be investigated to determine the source of infection; no antiviral agent is indicated for viral illness, as mumps is a self-limited disease.

Encouraging oral fluid intake is essential, as maintenance of adequate hydration and alimentation of children is important. Refrain from acidic foods and liquids as they may cause swallowing difficulty, as well as gastric irritation. Prescribe analgesics (acetaminophen, ibuprofen) for severe headaches or discomfort due to parotitis. Topical application of warm or cold packs to the swollen parotid may soothe the area, stronger analgesics may be required for patients with orchitis, bed rest, scrotal support, and ice packs are recommended (*Defendi and Steele, 2015*).

Significance of the study

Mumps outbreaks can occur any time of year but often occur in winter and spring. A major factor contributing to outbreaks is being in a crowded environment, such as attending the same class, playing on the same sports team, or living in a dormitory with a person who has mumps. Approximately 7.626 children in Egypt are affected with mumps in year 2015 (*WHO, 2015*)

Over 100 children have been affected by a mumps outbreak in Marashda, Egypt, with 43 cases and 70 infections reported. Officials at the Ministry of Health insist that this is not a serious outbreak. However, many children are not attending school out of fear of infection (*Health Map, 2012*).

Aim of the study:

The study aimed to evaluate the effect of nursing intervention program for mothers and their mumps child by using epidemiological model through:

- 1- Assessing mothers' knowledge related to mumps and epidemiological model.
- 2- Assessing practices as reported by mothers toward the potential control measure.
- 3- Developing a nursing intervention program for mothers to dealing with child suffering from mumps infection.

Research hypothesis

Mothers who will receive the nursing intervention program based on epidemiological model will have better knowledge and practices regarding mumps.

Subject and methods

Research design: Quasi-experimental study was used in this study.

Setting: The study was conducted at Pediatric Out-Patient Clinics in Health Insurance Hospital where the children with inclusion criteria were treated and referral.

Sample: Convenient sample of all students were admitted to previous mentioned setting which include 40 child and their mothers through five months; with inclusion criteria aged up to 8 years and free from other medical health problems.

Tools of data collection

An interviewing questionnaire which consisted of three parts:

Part I: Socio-demographic characteristics; a): Mothers characteristics as age, occupation, education, and income. b): Child characteristics as age, sex, child class, and child ranking.

Part II: Mothers' knowledge regarding; a) Mumps as meaning, signs and symptoms, complications, treatment and follow-up. b) Epidemiological model including person, agent, and environment.

Scoring system for mothers' knowledge about mumps: The mothers' knowledge was calculated as one score for correct answer and 0 for incorrect or unknown. The total knowledge score was calculated as adequate for $\geq 60\%$ and inadequate for $< 60\%$

Scoring system for mothers' knowledge about epidemiological model: the mothers' awareness regarding epidemiological model was calculated as one score for yes and 0 for no. The total score was calculated as adequate for $\geq 60\%$ and inadequate for $< 60\%$

Part III: Practices as reported by mothers toward control measure to prevent mumps infection and decrease the disease as: Isolation of the infected, using especial equipment, using mask and gloves, using handkerchief, safety disposal of child discharge, proper nutrition during disease period, regularity of taking medication, good ventilation of the place, continues follow-up and frequently hand washing.

Scoring system: The mothers' practices were calculated as 2 score for always practices while 1 score for sometimes practices and 0 for rarely done practices. The total practices score was calculated as satisfactory for $\geq 60\%$ and unsatisfactory for $< 60\%$.

Content validity: Tools were revised by five expertise from Faculty Members of Community Health Nursing Department and Pediatric Nursing Department.

Reliability: Internal consistency reliability of the questionnaire was 0.78 (Cronbach's alpha), so the questionnaire is reliable to identify the mothers knowledge and practices as perceived by Epidemiological Model.

Ethical considerations: Oral consent was taken from each mother, and the Director of Health Insurance Hospital. Mothers were informed that the data collected was used for the research only, confidentiality manner is assured.

Pilot study: Carried out on 10% of mothers' child (4 mothers) and excluded from the main study sample, to identify the clarity of the tools' items, and the estimated time needed for applicability of the tools.

Field Work

- Preparation of data collection was carried out from the beginning of August 2015 to the end of August 2015 and data collection from beginning of September 2015 to end of December 2015.
- An official letter was issued from the Dean of the Faculty of Nursing to the Directors of the Health Insurance Hospital in Benha City including the aim of the study to get their approval to carry out the study.
- Approval taken from the Directors, an oral consent was also taken of mothers' child for participation.
- The researchers conducted the program twice/week (Saturdays and Thursdays), from 10.00 a.m. to 1.00 p.m. in the Outpatient Clinic in the hospital
- The mothers' child was interviewed individually by the researchers to implement the program in the outpatient clinics.
- Handout about the nursing intervention program was provided for mumps child mothers'.

The Nursing Intervention Program Construction

The program was conducted at four phases:

1- **Preparatory phase:** A review of recent, current, national and international literature in various aspects of the problem. The tools questionnaire was designed to

assess the mothers' of child knowledge and practices regarding the epidemiological model before and after implementing the program.

2- **Assessment phase:** The pretest questionnaire was implemented to identify the mothers' knowledge about mumps and their practices regarding mumps infection.

3- **Planning and implementing phase:** The nursing intervention program was designed, with general objective to evaluate the effect of the nursing intervention program for mumps child by using epidemiological model through mothers' knowledge and practices.

The program content included:

- Knowledge about mumps related to epidemiological model as: Meaning, signs and symptoms, incubation period, treatment, infectious period, high risk person, and diagnosis.
- An epidemiological model regarding: **Person** as increasing risk of disease when contact with infected person, increasing disease when decreasing immunity, poor nutrition increasing infection with disease, faulty habits increasing risk by infection, healthy habits decreasing infection by disease, sports and exercise decreasing risk by infection, early detection better for early treatment. **Agent** as the disease occur with facing microorganism, microorganism activated with low immunity, the organism affect the salivary gland, incubation period ranged from 2-6 weeks, microorganism is effect by vaccine, and **Environment** as mumps is epidemiological disease, mumps is transmitted by air borne infection, microorganism is transmitted by using infected person articles, home cleanliness protect against infection, crowding places increasing infection, good ventilation decreasing infection.
- Practices as reported by mothers toward control measure of infection and decrease the disease as: isolation of the infected, using especial equipment, using mask and gloves, using handkerchief, safety disposal of child discharge, proper nutrition during disease period, regularity of taking medication, good ventilation of the place, continues follow-up and frequently hand washing.

The program included five sessions 2 for theory and 3 for practices.

Each session takes from 20-30 minutes for theory and practical.

At the end of the program implemented, a booklet of the program was given to each mother as a reference.

A post test was done to evaluate the effect of the program on increasing mothers' knowledge and improving their practices.

The teaching methods used were discussions, brainstorming, demonstration and re-demonstration. Booklets were distributed as teaching media.

4. Evaluating Phase

To evaluate the effect of nursing intervention program of mothers' knowledge and practices regarding mumps by using epidemiological model through using posttest that similar to the pretest was applied.

Statistical Design

The collected data were analyzed and tabulated using "chi square" for number and percentage distribution, and correlation coefficient (r); was used by using the Statistical Package for Social Sciences (SPSS), version 18 to determine if there are statistically significance relations.

Results

Table (1): Show that 40.0% of studied children their mothers aged 25 to 30 years with mean 27.0 ± 4.7 . Regarding mothers' education there are 40.0% of them completed university education and 42.5% of them had sufficient family income.

Table (2): Show that 62.5% of child aged $6 < 7$ years, 82.5% of them was girls 62.5% of them engaged in primary schools and 37.5% of them were older.

Figure (1): Illustrate that 55.0% of mothers gaining their source of information from health team while 22.5% their information gained from mass media and only 2.5% of mothers depend on neighbors and friends for their information.

Table (3): Show that there were improvement of mothers knowledge regarding mumps infection after the program especially for site of parotid gland, complication and mode of transmission which represent 92.5% compared by 45.0%, 37.5, and 65.0% respectively pre program. The table showed also statistically significant difference regarding all items of mothers' knowledge pre program than post program.

Figure (2): Clarify that 95.0% of mothers have adequate knowledge after the program compared by 22.5% pre program

Table (4): Clarified that there statistically significant differences regarding mothers' awareness about epidemiological model of the disease pre/post intervention program in relation to person, agent, and environment.

Figure (3): Demonstrate that 85.0% of mothers have adequate knowledge regarding epidemiological model after the program compared by 17.5% pre program.

Table (5): showed that the majority of mothers' practices improved regarding all items except for using mask and gloves 40.0% of studied mothers' pre program compared by 62.5% after the program. The table showed also statistical significant differences between pre and post program regarding all items.

Figure (4): Demonstrated that 90.0% of mothers have satisfactory practices after the program compared by 70.0% pre program

Table (6): showed that highly statistically significant relation between mothers' knowledge and epidemiological model but no statistically significant relation between epidemiological model and practices.

Table (1): Frequency distribution of mothers' socio-demographic data (n=40).

Items	No.	%
Age		
<25	8	20.0
25-	16	40.0
30-	9	22.5
35+	7	17.5
Mean \pm SD	27.0 \pm 4.7	
Mothers' education		
Basic education	24	60.0
University education	16	40.0
Mothers' occupation		
Working	10	25.0
Housewife	30	75.0
Income		
Sufficient	17	42.5
Insufficient	23	57.5

Table (2): Frequency distribution of child characteristics (n=40).

Items	No.	%
Child Age		
<6	8	20.0
6≤7	25	62.5
7≤8	7	17.5
Sex		
Boys	7	17.5
Girls	33	82.5
School Grade		
Nursery school	15	37.5
Primary school	25	62.5
Child Ranking		
Older	15	37.5
Middle	13	32.5
Younger	12	30.0

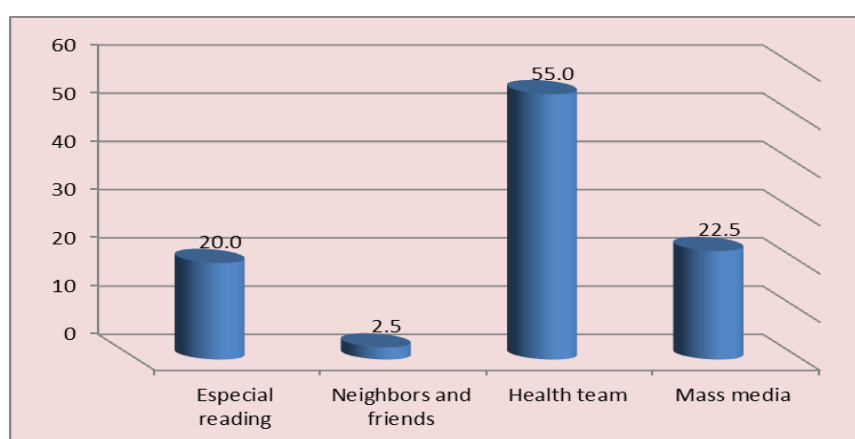


Figure (1): Frequency distribution of mothers' regarding source of information

Table (3): Frequency distribution of mothers' correct knowledge regarding mumps infection pre and post intervention program (n=40).

Mothers' knowledge	pre		post		χ^2	p-value
	No	%	No	%		
Site of parotid gland	18	45.0	37	92.5	14.5	.000
Function of parotid gland	23	57.5	35	87.5	9.02	.003
Meaning of mumps	22	55.0	32	80.0	5.69	0.017
Age susceptibility	27	67.5	35	87.5	4.58	.03
Causes of mumps	26	65.0	34	85.0	4.26	.03
Signs and symptoms	24	60.0	34	85.0	6.27	.012
Complication	15	37.5	37	92.5	26.5	0.000
Mode of transmission	26	65.0	37	92.5	9.03	.003
Incubation period	14	35.0	36	90.0	25.8	.000

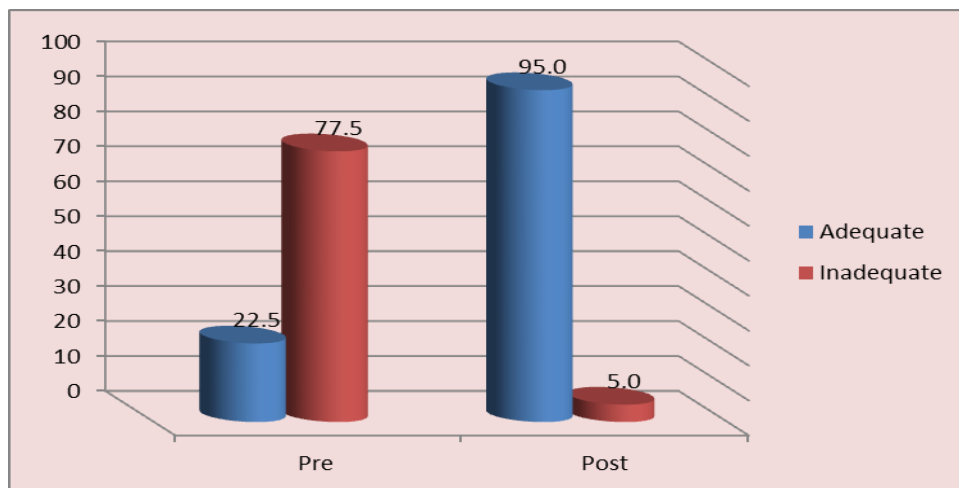


Figure (2): Frequency distribution of total score mothers' knowledge regarding mumps pre and post program (n=40).

Table (4) Percentage distribution of mothers' knowledge regarding epidemiological model pre and post program (n=40).

Mothers' awareness about epidemiological model	pre		post		x ²	p- valve
	Yes	No.	Yes	No.		
	%	%	%	%		
Person						
Increasing risk of disease when contact with infected person	27.5	72.5	82.5	17.5	13.6	0.000
Increasing disease when decreasing immunity	27.5	72.5	72.5	27.5	16.2	0.000
Poor nutrition increasing infection with disease	17.5	82.5	80.0	20.0	31.2	0.000
Faulty habits increasing risk by infection	50.0	50.0	95.0	5.0	20.3	0.000
Healthy habits decreasing infection by disease	52.5	47.5	80.0	20.0	6.7	.009
Sports and exercise decreasing risk by infection	47.5	52.5	82.5	17.5	10.7	0.001
Early detection better for early treatment	42.5	57.5	87.5	12.5	17.8	0.000
Agent						
The disease occur with facing microorganism	60.0	40.0	87.5	12.5	7.8	.005
Microorganism activated with low immunity	32.5	67.5	80.0	20.0	18.3	0.000
The organism affect the salivary gland	60.0	40.0	90.0	10.0	9.6	0.002
Incubation period ranged from 2-6 weeks	72.5	27.5	87.5	12.5	2.8	.09
Microorganism is effect by vaccine	65.0	35.0	87.5	12.5	5.59	.01
Environment						
Mumps is epidemiological disease	52.5	47.5	97.5	2.5	21.6	0.000
Mumps is transmitted by air borne infection	70.0	30.0	90.0	10.0	5.00	.02
Microorganism is transmitted by using infected articles	70.0	30.0	95.0	5.0	8.65	.003
Home cleanliness protect against infection	72.5	27.5	90.0	10.0	4.02	.04
Crowding places increasing infection	67.5	32.5	77.5	22.5	1.00	.31
Good ventilation decreasing infection	50.0	50.0	87.5	12.5	13.0	0.000

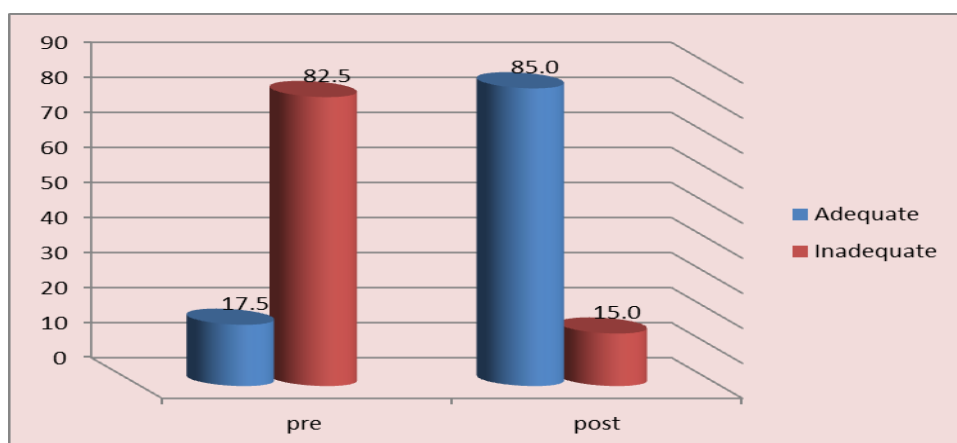


Figure (3): Frequency distribution of total score of mothers' knowledge about epidemiological model regarding mumps pre and post program

Table (5): Percentage distribution of practices as reported by mothers' ' regarding mumps infection pre and post intervention program (n=40).

mothers' practices'	pre			post			x ²	p-value
	always	somet-imes	rarely	always	Some times	rarely		
	%	%	%	%	%	%		
Child isolation	47.5	25.0	27.5	87.5	12.5	0.0	17.4	0.000
Using especial equipment	27.5	57.5	15.0	90.0	10.0	0.0	32.6	0.000
Using mask and gloves	40.0	42.5	22.5	62.5	25.0	12.5	6.06	.04
Using handkerchief	45.0	50.0	5.0	82.5	17.5	0.0	12.67	.002
Safety disposal of child discharge	60.0	25.0	15.0	80.0	20.0	0.0	7.36	.025
Proper nutrition during disease period	42.5	37.5	20.0	75.0	25.0	0.0	12.59	0.00
Regularity of taking medication	57.5	42.5	0.0	90.0	10.0	0.0	10.9	.001
Good ventilation of the place	72.5	27.5	0.0	92.5	7.5	0.0	5.54	.019
Continues follow-up	82.5	17.5	0.0	100.0	0.0	0.0	7.67	.006
Frequently hand washing	42.5	37.5	20.0	92.5	7.5	0.0	8.88	.003

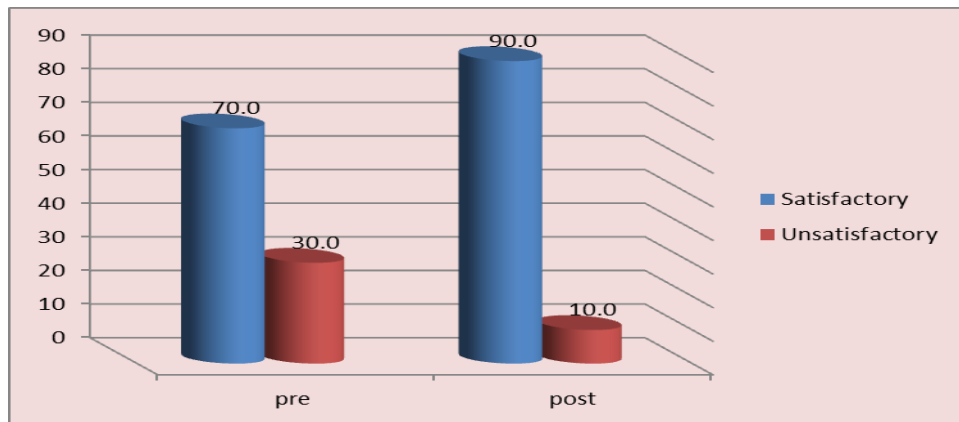


Figure (4): Frequency distribution of total score of practices as reported mothers' regarding mumps pre and post program

Table (6): Correlation between mothers' knowledge, practices, and epidemiological model post program.

Items	epidemiological model	
	r	p-value
total knowledge score	.519	.001
total practices score	.154	.350

Discussion

The primary role of nursing intervention program is to reduce the risk of infection complication, thereby protecting patients, and care provider. The functions of an infection program can generally be divided into (1) isolation of patients with transmissible pathogens, (2) education, (3) the monitoring and management of antimicrobial use and antibiotic resistance, (4) the development of infection prevention practices, and (5) environmental hygiene (*Edmond and Wenzel, 2015*)

As regard children characteristics the result of the present study revealed that more than three fifths of children aged from 6<7 years and engaged in primary

schools, the majority of them were girls and less than two fifths of them were older children in the family (table 1). The finding is in line with *kidshealth, (2016)* who stated that most cases of mumps are still in children aged 5-10, and mumps infections are uncommon in children younger than 1 year old. Also the finding is supported by *The Massachusetts Department of Public Health, (2015)* who stated that a small percentage of children had mumps over 12 years.

Regarding to the socio-demographic characteristics of the studied mothers, the results of the present study showed that around two fifths of them were aged between 25 to 30 years, as regard to education around three fifths of them had basic education (table 2). This may be majority of mothers having insufficient income and living in rural areas.

Concerning the mothers' source information, the present study revealed that more than half of the mothers gaining their information from health team (figure1). This finding agrees with *Baker et al., (2007)* who found in study that primary sources of information were physicians and nurses. This may be due to that health team in rural area have a major role in giving health education to prevent infectious diseases as mumps.

According to the effect of health education program, the current study showed that most of mothers' knowledge regarding mumps infection after the program was improvement especially for site of parotid gland, complication and mode of transmission as compared pre-program (table 3 & figure 2). There were statistically significant difference regarding all items of mothers' knowledge pre and post program ($P<0.05$). This finding is supported by *Selvakumari (2011)*, who stated that the mean post test score of knowledge was higher than mean pretest knowledge score, any formal education program such as structured teaching program and provision of self learning materials motivates mothers in improving knowledge about current health practices. Mothers represent the most important care provider as far as child health is concerned; health education inputs for mother should be strengthened.

Concerning mothers' knowledge about epidemiological model of the disease pre/post intervention program in relation to person, agent, and environment, there were statistically significant differences regarding mothers' knowledge (table 4& figure 3). The present study findings revealed that the majority of mothers' practices

improved regarding child isolation, using especial equipment, proper nutrition during disease period and regularity of taking medication after the program, There were statistical significant differences between pre and post program regarding practice items ($P < 0.05$) (table 5, figure 4). These results are supported by *Preeta et al., (2010)*, who reported that provide health education for mothers regarding mumps increase their knowledge and improve health practices measures to control mumps; and in the same line by *American Academy of Pediatrics (2007)*, who recommended that isolation of children with mumps for 5 days in community for 5 days after parotitis onset. Also finding was supported by *The Massachusetts Department of Public Health, (2015)* who stated that children with mumps should be kept away from children who are not immune until they are well again. State regulations require anyone who catches mumps to be isolated for 5 days after the onset of gland swelling. That means they must be kept away from public places like day care centers, school and work.

The result of the present study showed that there was highly statistically significant differences between mothers' knowledge and epidemiological model (table 6). *Carter, (2008)* pointed that mothers' education has become one of the most important roles for health education in every type of health care setting. The nurse has a great role in emphasizing tremendous guidance in mothers' responsiveness by raising mothers' knowledge and practices to the needs of their children and mothers represent the most important figure in the management of their children with infections. This may be due to knowledge can be able to get easily understanding.

Conclusion

According to result and research hypothesis, the present study concluded that the nursing intervention program increasing mothers' knowledge regarding mumps and epidemiological model; and improving their practices regarding measures to control infection; and also the nursing intervention program was a highly statistically significant effect on knowledge and practices of the mothers post program compared by pre program.

Recommendations

Based on finding of the present study the following recommendations are suggested:

- Health education program should be provided for mothers having mumps child regarding epidemiological model during follow-up visits.

- Distributed the nursing intervention program booklet to each mother attended to hospital with infected child with mumps which includes description of disease control and prevention.
- Further research to be carried out regarding factors affecting healthy practices for mumps child.

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