

# Effectiveness of Learning Package Application on the Use of Antibiotics for Mothers of Children with Upper Respiratory Tract Infection

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**Abstract:** Despite efforts to decrease unnecessary use of antibiotics, misconceptions about antibiotics use persist and continue to be more prevalent among mothers of children with URTIs. **Aim:** This study aimed to study the effectiveness of learning package application on the use of antibiotics for mothers of children with URTIs. **Method:** A quasi-experimental design was conducted on 214 mothers with their children regardless their gender, age, free from chronic diseases, diagnosed with URTIs and managed by antibiotics, who attended the General Outpatient Clinics at Mansoura University Children's Hospital (MUCH). **Tools:** A structured interview questionnaire sheet for mothers' knowledge and practical knowledge, observational checklist for mothers' practices about administration of antibiotic suspension and learning package evaluation checklist. **Results** indicated that, the majority of the studied mothers had good knowledge (85.5%) and most of them (98.6%) had competent practices immediately post the learning package application with highly statistical significant differences ( $p=0.00$ ). **Conclusion:** There was an improvement in mothers' knowledge, practical knowledge and practices after application of learning package. **Recommendations:** Provide in-services, up to date and regular training programs to improve mothers' knowledge and practices regarding the use of antibiotics for their children with URTIs. Further studies are recommended to repeat this study on a larger sample size and on a wide scale in various governorates of Egypt.

**Keywords:** Antibiotics, Bacterial resistance, Children, Knowledge, Learning package, Mothers, Practices and Upper respiratory infections.

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## 1. INTRODUCTION

Acute Respiratory Infections (ARIs) are considered one of the major public health problems worldwide. ARIs are among the leading causes of morbidity and mortality in many developing countries. ARIs are estimated to cause 5 millions death among children every year and are among the leading causes of hospital admission (Abdel Khalek and Abdel-Salam, 2016). ARIs include, Upper Respiratory Tract Infections (URTIs) and Lower Respiratory Tract Infections (LRTIs). The URTIs involve; rhinitis, rhino-sinusitis, pharyngitis, epiglottitis, tonsillitis, laryngitis, common cold, influenza and Acute Otitis Media (AOM) (Hockenberry, Wilson and Rodgers, 2017). The overall worldwide reported incidence of URTIs is 6-8 episodes during the first 5 years of life. URTIs are the most frequent reason for children's visits to a General Practitioner (GP) and are accountable for greater than 20 million missed days of school and greater than 20 million days of work lost, thus generating a large economic burden (Ahmed and Soltan, 2018).

The main pathogens that trigger URTIs are viruses and account 90% of URTIs. Viral URTIs are usually mild and self limited illnesses. While bacterial URTIs are less common and account only 10%, but associated with a greater risk of complications and death (Schaad, Esposito and Razi, 2016). In the light of what have been mentioned before, symptomatic management is usually sufficient for most URTIs. Conventional therapy for URTIs involves; antipyretics, analgesics, antihistamines, expectorants, decongestants and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) (Gupta, Joshi and Dewan, 2017). Additionally, the numerous forms of Complementary and Alternative Medicines (CAM) are inexpensive and relatively safe measures that provide temporary relief of respiratory symptoms include; herbal remedies, honey, zinc and vitamins supplementation, steam inhalation and warm saline gargles (Hawke, van Driel, Buffington, McGuire and King, 2018). Mothers play an important role in decreasing the morbidity and mortality related to URTIs by providing home management, remaining cautious about deterioration of signs and symptoms and making appropriate help seeking decision (Atif, Sadeeqa, Afzal and Latif, 2018).

Antibiotics are one of the greatest discoveries in medicine and have remarkably minimized the morbidity and mortality rates of infectious diseases during the last 75 years. However, large quantities of antibiotics are used inappropriately and empirically, especially for URTIs where they are not indicated for treatment (Pignatari and Myake, 2016). Seventy-four per cent of antibiotics prescription takes place in Primary Health Care (PHC), much of this is for inappropriate treatment of URTIs ranging from 20 to 90% with the highest rates being reported in Africa and Asia (Long et al., 2019). In Egypt, 63.6 % of antibiotics prescriptions are dispensed in PHC and for ARIs (Sabry, Farid and Dawoud, 2014). Antibiotics misuse is considered one of the major public health issues worldwide. Antibiotics misuse has emerged from interactions between several factors include; pediatricians- related and parents- related factors that influencing pediatricians behaviors to prescribe antibiotics, affecting parents use of antibiotics and increasing self medication (Alrafiaaha, Alqarnya, Alkubedana, AlQueflied and Omairc, 2017).

Although various international guidelines recommend the limited use of antibiotics for URTIs, the noncompliance of these guidelines and the frequency of antibiotics prescription is common, causing a significant increase in the incidence of Antimicrobial Resistance (AMR) (Iftikhar, Sarwar, Saqib, Sarfraz and Shoaib, 2019). The considerable dramatic increase in the AMR prevalence has gained attention from several national organizations. Multifaceted interventions to decrease the misuse of antibiotics have been found to be effective, influential and better than single initiatives (Al-Ayed, 2019). Interventions should comprise the use of Antimicrobial Stewardship (AMS) programs, the enforcement of the policy of forbidding the Over-The-Counter (OTC) antibiotics sale, adopt and use protocols or guidelines based on strong evidence, the enhancement of communication skills with pediatric patients and their parents with the aid of informatic brochures and educational interventions (Gulliford et al., 2019).

Learning Package (LP) is a collection of materials that contains instructions for the learner in multiple formats (i.e. text, image, animation, audio and video) that enhancing interaction with the material being presented, creating an interactive environment for learning, facilitating quick learning and high memory retention of experience to generate new knowledge and change the previous attitudes (Sawangri, 2016). developing a LP to increase the mothers' awareness about the use of antibiotics for their children with URTIs will help to protect children from the adverse consequences associated with antibiotics misuse.

Unfortunately, data regarding endemic AMR and the use of antibiotics in Egypt, where OTC antibiotics use is common, are unavailable. Researches about mothers' knowledge, beliefs and practices regarding antibiotics and their use are lacking. In the light of what have been mentioned before, we hypothesized that correcting these misconceptions through mothers' education would reduce antibiotic misuse, especially among rural mothers who have low educational level and have less health education facilities. To the best knowledge of the researcher, there has been no study in Mansoura city that explored mothers knowledge and practices regarding antibiotic use for their children with URTIs. Within this context and based on the previous study results of the researcher (Abozed, 2017), the need to understand mothers' knowledge and practices about the use of antibiotics for URTIs is required to develop an interventional LP to raise their awareness and avoid misuse of antibiotics.

#### Research hypothesis:

1. Mothers' will have better knowledge regarding the use of antibiotics for their children with URTIs after application of the learning package.
2. Mothers' practices regarding the use of antibiotics for their children with URTIs will be improved after application of the learning package.

**Aim of the study**

The study aims to study the effectiveness of learning package application on the use of antibiotics for mothers of children with upper respiratory tract infection.

**2. SUBJECTS AND METHOD**
**Research Design:**

A quasi-experimental design was used to accomplish this study. It is an empirical study used to estimate the effect of an intervention on its target population without random assignment. One-group pre-post test is one of the most frequently used quasi-experimental research designs in which a single group of research participants or subjects is pretested, given some treatment or independent variable manipulation, and then post tested (**Spurlock, 2018**).

**Setting of the study:**

The study was carried out at the General Outpatient Clinics number 4, 5 and 8 affiliated to Mansoura University Children's Hospital (MUCH), which provides health services to children from the surrounding areas at Dkahlia governorate.

**Research Subjects:**

A convenient sample of 214 mothers with their children who were attended the previously mentioned setting after fulfilling the following inclusion criteria; having a child of both gender regardless their age, diagnosed with URTIs, free from chronic diseases, managed by antibiotics and willing to participate in the study.

**Tools of Data Collection:**

Data were collected by using the following three tools:

**Tool I: A structured interview questionnaire sheet (Pre & Immediate Post Format):**

Adapted from (**Abozed, 2017**), in Arabic format and some modifications were done after reviewing the related literature. It comprised of four parts:

**Part 1: Characteristics of the studied mothers and their children with URTIs such as;** mothers' age, level of education, marital status, occupation, family income, residence, number of children and access to health services. Children's age, gender and birth order.

**Part 2: Children's medical history with URTIs such as;** type, symptoms, frequency and complications of URTIs, frequency of hospital admission, medications prescribed and the last antibiotic for the child.

**Part 3: Mothers' knowledge about antibiotics for their children with URTIs** which composed of 12 questions about ; definition of URTIs, the main cause of URTIs, purpose of antibiotics for URTIs, source of information about antibiotics, indications, side effects, adverse reactions, interactions of antibiotics.....ect.

**Scoring system of mothers' knowledge:**

Mothers' knowledge was scored one for each correct answer and zero for incorrect, missed or unknown answer. The total knowledge score was (25) marks. The knowledge level was classified into three categories (**Abozed, 2017**):

- Poor = scores less than 50% of total scores (Less than 12.5 marks).
- Fair = scores 50% to 75% of total scores (12.5-18.75 marks).
- Good= scores more than 75% of total scores (>18.75 - 25 marks).

**Part 4: Mothers' practical knowledge about antibiotics for their children with URTIs.** It included (4) categories as following:

- a. Mothers' practical knowledge about the use of antibiotics.
- b. Mothers' practical knowledge about the preparation of antibiotic suspension.

- c. Mothers' practical knowledge about measurement of antibiotic suspension dose.
- d. Mothers' practical knowledge about storage of antibiotic suspension.

**Scoring system:**

**The total score for mothers' practical knowledge (parts a, b, c & d) was (29) marks, classified into the following three categories (Abozed, 2017):**

- Poor = scores less than 50% of total scores (Less than 14.5 mark).
- Fair = scores 50% to 75% of total scores (14.5 – 21.75 marks).
- Good = scores more than 75% of total scores (> 21.75 - 29 marks).

**Tool II: Observational checklist (Pre and Immediate Post Format):**

Adopted from **Bowden & Greenberg (2016)**, it composed of 10 steps to assess mothers' practices about administration of antibiotic suspension for their children with URTIs through direct observation pre and immediately post the application of learning package.

**Scoring system:**

Mothers' practice was scored two for each step done completely correct, while step done incompletely correct was given a score of one and zero was given for not done step. The total score of the studied mothers' practice was (20) marks.

**The mothers' practical level was classified into two categories (Abozed, 2017):**

- Mothers' practices score more than 60%; they had competent practices (12.5-20 marks).
- Mothers' practices score less than 60%; they had incompetent practices (< 12.5 marks).

**Tool III: Learning package evaluation checklist:**

Adopted from **Gad, (2015)**, to evaluate the mothers' feedback (opinions) about the developed learning package after application with 5 point rating scale for each item (Poor, Fair, Good, Very good and Excellent). It composed of (14) closed-ended questions which covered mothers' feedback about package design, writing, pictures, words, time, place, teaching strategies, teaching methods and scientific content.

**Scoring system:**

Total learning package evaluation checklist consists of 14 items, each of which could be scored from 1 to 5. The score ranged from 14 (lowest score) to 70 (highest score).

- Good evaluation score: > 75% (> 52.5marks).
- Fair evaluation score: 50-75% (35-52.5marks).
- Poor evaluation score: < 50% (<35 marks).

**Operational design****1. Preparatory phase:**

This phase included a review of the past and current related literature and studies, using available books, periodicals, magazines and articles to be acquainted with the various aspects of the study and develop the study tools. The learning package was prepared by the researcher in a simple Arabic language to meet mothers' needs. The content validity of the study tools was assessed and revised by a jury that involved a panel of five experts in the field of nursing for its clarity, sequence of items and relevance of content. According to their suggestions, the required modifications were done. The internal consistency of the study tools was tested by using Cronbach's alpha coefficient test;  $r = 0.82$  and  $0.71$  for tool I (part 3 & 4 respectively),  $r = 0.63$  for tool II and  $r = 0.86$  for tool III.

### 3. EXPLORATORY PHASE

#### 3.1 Pilot study

A pilot study was conducted on 10% of the total sample size (20 mothers) who were selected randomly from the same setting to evaluate the clarity, feasibility and applicability of the study tools, identify the possible obstacles that may hinder data collection and the overcome measures. The subjects of the pilot study were included among the study total sample.

#### 3.2 Field work

##### 3.2 a. Data collection period:

The actual fieldwork started after an approval that was obtained to conduct the study from the Director of MUCH to facilitate data collection. Once the permission was granted to proceed in the study, the researcher started by introducing herself to the mothers and giving them a brief idea about the aim and nature of the study. The researcher attended two days per week in the study setting from 8.00 am to 3.00 pm. Data collection extended over a period of six months from first of June to the end of November 2018.

##### 3.2.b. Study framework:

The framework of the study was carried out according to 5 phases as the following:

##### **Phase 1: Initial data collection (Assessment phase):**

Each mother was interviewed individually before applying the learning package in order to collect mothers' data base line , their knowledge, practical knowledge and practices

**Phase 2: Setting goals and objectives of the learning package:** Based on the findings of the assessment phase; goals, priorities, and expected outcomes were formulated to meet mothers' needs regarding the use of antibiotics for their children with URTIs.

**Phase 3: Development of learning package (Planning phase):** According to the preliminary data assessment of knowledge, practices and mothers' needs, the learning package was developed by the researcher. It included the mothers' package (trainee guide) and the researcher package (tutor guide).

- **The trainee guide** is targeted for mothers to provide them with adequate knowledge and correct practices about the use of antibiotics for their children with URTIs. Its content was developed in a simple Arabic language and was revised and modified by the study supervisors. It included two parts with a certain number of messages; each message focused on what the mothers need to know and to do. Messages were written in short lists and with a tone that encourages mothers to compliance with instructions. It was given to each mother after the assessment phase (during the first session) for attracting her attention, motivated her and help her for reviewing its content when needed.
- **The tutor guide** is relevant to the researcher and health educators to provide them with health education instructions to teach mothers about the use of antibiotics for their children with URTIs. Its content was developed in English language from the electronic databases and was revised and modified by the study supervisors. In this package, the researcher was planned four sessions (around 45-60 minutes for each) and each session contains estimated time, session objectives, topic summary, required materials, session delivery and delivery tips. .

##### **Phase 4: Implementation phase:**

Mothers were divided into 12 groups; each one was consisted of approximately 16-18 mothers. Each session started in the morning at 10.00 am. During the session, the researcher used various teaching methods in the form of lectures, group discussion, demonstration and re-demonstrations. Various teaching media were used, such as colored posters, power point presentation, videos, colored handout and colored brochures. Brief, clear and simple words were used during the session by the researcher. As well as at the end of each session, a brief summary was given.

**Phase 5: Evaluation of learning package effectiveness:**

Each mother was interviewed separately for immediate post test and for their feedback (opinions) about the developed LP.

**Ethical consideration**

An official approval was obtained from the Research Ethics Committee of Mansoura Faculty of Nursing to carry out the study. An informed oral consent was obtained from each mother for her participation after explanation of the purpose of the study. Anonymity and confidentiality of collected data were assured and used only for research purposes. Participants were informed that participation in the study is voluntary and they have the right to withdraw from the study at any time freely without any responsibilities.

**Statistical analysis**

The collected data were coded and entered to the statistical package of social sciences (SPSS) version 20. After complete entry, data were explored for detecting any error, then it was analyzed by the same program for presenting frequency tables with percentages. Qualitative data was presented as number and percent. Paired sample t-test was conducted to indicate whether the difference between sample averages is likely to represent an actual difference between target group knowledge, practical knowledge and practice averages before and immediately after application of package. Person and spearman correlation (r) was performed to measure the strength of a linear relationship between quantitative and qualitative variables (paired data), it can range from -1 to 1. An r of -1 indicates a perfect negative linear relationship between variables, an r of 0 indicates no linear relationship between variables, and an r of 1 indicates a perfect positive linear relationship between variables. The Chi-Square or fisher's exact test ( $\chi^2$ ) was used to check whether the variables are independent of each other or not. Quantitative data were described as mean  $\pm$  SD as appropriate. They were tested for normality by Kolmogorov-Smirnov test. For all the statistical tests mentioned above the threshold of significance is set at a level of 5% (P-value); the results were considered not significant ( $P > 0.05$ ), significant ( $P \leq 0.05$ ), and highly significant ( $P < 0.001$ ).

**4. RESULTS**

Characteristics of the studied mothers' are illustrated in **Table (1)**. It showed that 49% of them aged from 20 to 30 years old with the mean age of  $25.42 \pm 6.19$  years. The majority of them (84.1%) were married, 67.3% of them were rural residents and 66.8% of them had less than 3 children. The same table elucidated that, 49.5% of them were technically educated, more than half (56.5%) were working mothers and 50.9% of them had not enough income. Nearly three quarter of them (73.8%) had a near access to health services.

**Table (2)**; explained that, the majority of the studied mothers (82.2%) had poor knowledge about antibiotics for their children with URTIs pre the application of learning package, which increased to become 85.5% good knowledge immediately post the learning package application. In addition, it was observed that, the mean score of mothers' knowledge pre the application was  $7.64 \pm 5.452$  which increased to  $22.182 \pm 3.503$  immediately post the learning package application with highly statistically significant difference ( $p=0.00$ ).

**Table (3)**; proved that, more than two thirds of the studied mothers (67.8%) had poor total practical knowledge about antibiotics for their children with URTIs pre the application of learning package, which increased to become 94.4% good total practical knowledge immediately post the package application. Nevertheless, it was noted that, the mean score of mothers' total practical knowledge pre the application was  $2.93 \pm 0.25$  which increased to  $13.12 \pm 4.83$  immediately post the application with highly statistically significant difference ( $p=0.000$ ).

**Figure (1)**; revealed that, 63.1% of the studied mothers had incompetent practices pre the application of learning package, which markedly decreased to 1.4% immediately post the package application. Furthermore, the mean scores of mothers' practices about administration of antibiotic suspension for their children with URTIs pre the package application was  $14.15 \pm 3.64$  that increased immediately after the application to  $19.252 \pm 1.81$  with a highly statistically significant difference ( $p = 0.00$ ).

**Figure (2)**; clarified that, the majority of the studied mothers (83%) reported that the learning package about the use of antibiotics for their children with URTIs was good.

**Table (4):** showed that, the total mothers' knowledge positively correlated with both their practical knowledge and practices immediately post the application of learning package (p=0.00).

**Table (1): Number and Percentage Distribution of the Studied Mothers according to their Characteristics:**

Mothers' Characteristics		No.=214	
		No.	%
Age in years	<20yrs.	65	30.4
	20-30yrs.	105	49.0
	>30yrs.	44	20.6
	<b>Mean ± SD = 25.42± 6.19</b>		
Marital status	Married	180	84.1
	Divorced	25	11.7
	Widowed	9	4.2
Residence	Rural	144	67.3
	Urban	70	32.7
Number of children	< 3 child	143	66.8
	≥ 3 child	71	33.2
Educational level	Do not read or write	33	15.4
	Read and write	63	29.5
	Technical	106	49.5
	Bachelor	12	5.6
Occupation	Employee	121	56.5
	Housewife	93	43.5
Monthly income	Enough	94	43.9
	Not enough	109	50.9
	Enough and saves	11	5.2
Access to health services	Near	158	73.8
	Far	56	26.2

**Table (2): Number and Percentage Distribution of the Studied Mothers' Total Knowledge Categories Scores about Antibiotics for their Children with URTIs Pre and Immediately Post Learning Package Application:**

Mothers' Total Knowledge Categories	Total number of mothers =214					
	Total Knowledge Scores				Test of Significance	
	Pre		Immediate Post			
	No.	%	No.	%	t	P
Poor	176	82.2	5	2.3	33.86	<b>0.00**</b>
Fair	21	9.8	26	12.1		
Good	17	7.9	183	85.5		
<b>Mean ± SD</b>	7.64 ± 5.452		22.182 ± 3.503			

(\*) statistically significant at p ≤0.05

(\*\*) highly statistical significance at p < 0.001

t = paired t test.

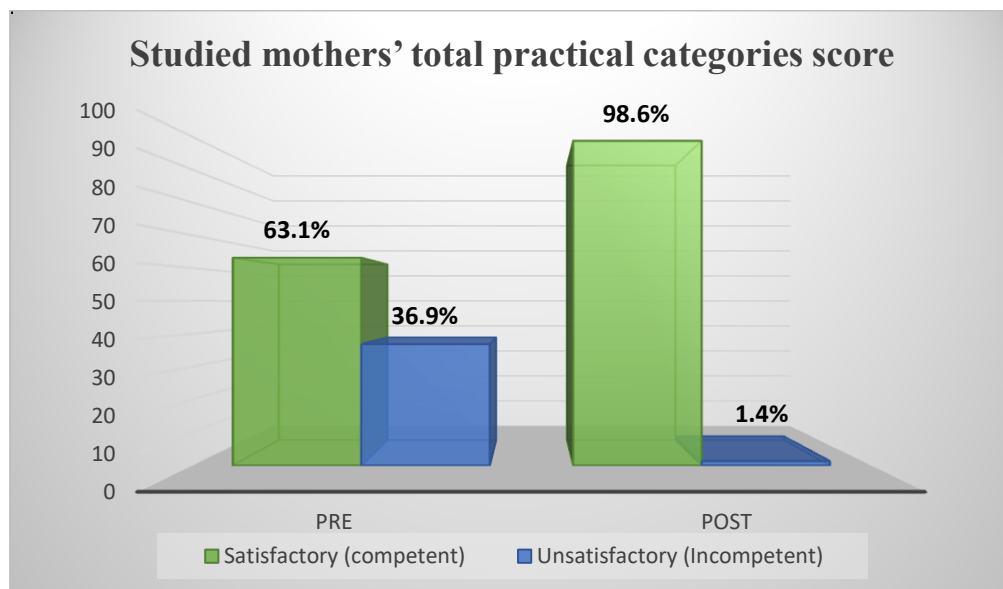
**Table (3): Number and Percentage Distribution of the Studied Mothers' Total Practical Knowledge Categories Scores about Antibiotics for their Children with URTIs Pre and Immediately Post Learning Package Application:**

Total Practical Knowledge Categories	Total number of mothers =214					
	Pre		Immediate Post		Test of significance	
	No.	%	No.	%	t	P
<b>Total Practical Knowledge Scores</b>						
Poor	145	67.8	1	0.5	37.1	0.000**
Fair	50	23.3	11	5.1		
Good	19	8.9	202	94.4		
<b>Mean ± SD</b>	2.93±0.25		13.12±4.83			

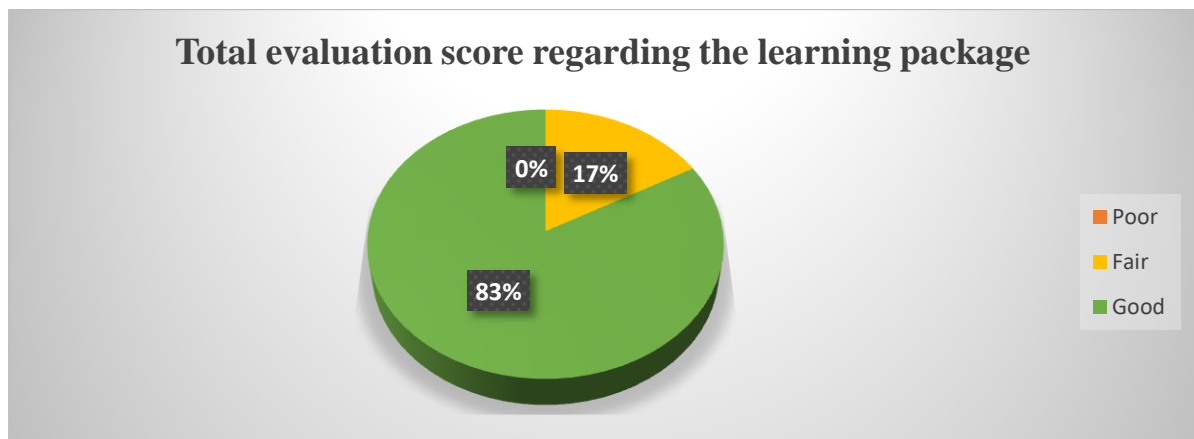
(\*) statistically significant at  $p \leq 0.05$

(\*\*) highly statistical significance at  $p < 0.001$

t = paired t test.



**Figure (1): Number and Percentage Distribution of the Studied Mothers' Total Practical Categories Scores about Administration of Antibiotic Suspension for their Children with URTIs Pre and Immediately Post Learning Package Application:**



**Figure (2): Percentage Distribution of the Studied Mothers' Total Evaluation Score regarding the Learning Package on the Use of Antibiotics for their Children with URTIs at Post-test:**



**Table (4): Correlation between the Studied Mothers' Total Knowledge, Practical Knowledge and Practices Scores about the Use of Antibiotics for their Children with URTIs Immediately Post the Learning Package Application:**

Variables	Total No.=214		
	Mothers' Total Knowledge		
	r	r square	P
Mothers' practical knowledge about the use of antibiotics	0.685	0.47	0.00**
Mothers' practical knowledge about the preparation of antibiotic suspension	0.508	0.258	0.00**
Mothers' practical knowledge about the measurement of antibiotic suspension dose	0.412	0.170	0.00**
Mothers' practical knowledge about the storage of antibiotic suspension	0.333	0.111	0.00**
<b>Total practical knowledge</b>	<b>0.676</b>	<b>0.412</b>	<b>0.00**</b>
Mothers' practices about administration of antibiotic suspension	0.407	0.166	0.00**

(\*) Statistically significant at  $p \leq 0.05$

(\*\*) High statistical significant at  $p < 0.01$

r = Pearson correlation.

## 5. DISCUSSION

As regards the studied mothers' access to health services, the present study found that, nearly three quarter of them considered a near access to health services (Table 1). This finding was in an agreement with Siddiqui et al., (2014), who conducted a study about "Knowledge, Attitudes and Practices of Parents Regarding Antibiotic Use in Children in Pakistan" and reported that (64.0%) of the participants described access to health care system as good. From the researcher point of view, access to health services affect mothers' care-seeking practices and guide the action they taken. If mothers had a good/ near access to health services, they will consult the pediatrician if their children suffered from any health problem instead of self medication or pharmacist's advice.

Concerning the total mothers' knowledge about antibiotics for their children with URTIs, the present study showed that, the majority of them had poor knowledge level pre learning package application (Table 2). The finding of the current study was congruent with Kutrani, Elhashmi, Adam and Abdlwanis, (2019) who conducted a study about "Assessment of Parents Perception concerning children's Antibiotic Use by PAPA Scale, Benghazi, Libya" and proved that, the level of knowledge was poor among 83.4% of the parents. Inconsistent with our study, a study done by Soleimani, Shahri, Teimouri, Sargolzaei and Ghavampour, (2016), about "Knowledge and Behavior of Mothers about Antibiotic Use in Children under Six Years Old with Upper Respiratory Tract Infections, Iran" suggested that, 41.2% of participants had moderate knowledge level on the use of antibiotics. The researcher attributed the poor level of mothers' knowledge pre package application to their characteristics as most of them from rural areas, with technical education and had low income. Besides, the focuses of the health care team on the disease management aspects and missing the knowledge part about it.

Moreover, the result of the current study pointed out that, the mean score of mothers' knowledge about antibiotics for their children with URTIs pre learning package application was  $7.64 \pm 5.45$ , which increased immediately post the application, with a very high statistical significant difference ( $p=0.00$ ) (Table 2). This result was proportionate with Al-Saleh, Abu Hammour and Abu Hammour, (2020) who conducted a study about "Influencing Factors of Knowledge, Attitude, and Practice regarding Antibiotic Use in Children with Upper Respiratory Tract Infections in Dubai" and conveyed that, the mean score of parents' knowledge regarding the proper use of antibiotics in children with URTI was  $7.18 \pm 2.43$ . The researcher rationalized this finding to, the lack of educational training programs for mothers and their poor knowledge level that increase the chance for lowering the mean score of their knowledge. Likewise, it may be returned to, the pediatricians' limited time or overcrowding in the outpatient clinics that enable them to teach mothers about antibiotics or their children's conditions.

On top of that, it was observed from the current study that, more than two thirds of the studied mothers had poor total practical knowledge level about antibiotics for their children with URTIs pre application of learning package, which is increased to good total practical knowledge level immediately post the application with a very high statistical significant difference ( $p=0.00$ ) (**Table 3**). This finding was debated with **Abozed, (2017)**, who conducted an Egyptian study about "Maternal Knowledge and Treatment Practices regarding the Use of Antibiotics among their Children with Upper Respiratory Tract Infection" and reported that, 6.0% of the studied mothers had poor total practical knowledge regarding use of antibiotics for their children with URTIs.

As regards to the studied mothers' practices about administration of antibiotic suspension for their children with URTIs, **Figure (1)** cleared that, nearly less than two thirds of them had incompetent practices pre the application of learning package, which greatly increased to competent practices immediately post the application with a very high statistical significant difference ( $p=0.00$ ). This finding corresponded with **Lakshmi, Geetha and Vijayasamundeeswari, (2019)**, who conducted a study about "Assessing the Knowledge, Attitude and Practice on Antibiotic Use in under-5 Children with Respiratory Tract Infection among Mothers Attending a Pediatric Outpatient Department in Chennai City, South India" and reported that, 70% of mothers had unsatisfactory practices. This finding was inconsistent with **Jafari et al., (2014)**, who indicated in their study about "The Knowledge, Attitude and Practice of Mothers Regarding Acute Respiratory Tract Infection in Children in Tehran, Iran" that, the study subjects' practice level was relatively high. From the researcher point of view, this present study finding could be attributed to, the presence of many reasons that affect mothers' practices such as; their educational level that enable them to read or ask about the correct use of antibiotic, their awareness about their children's health and availability of health services or resources as well as the training programs that enhance their practices.

The result of the current study pointed out that, the majority of the studied mothers reported that the learning package about the use of antibiotics for their children with URTIs was good **Figure (2)**. The current study immediately post results showed that, the learning package was highly effective in increasing mothers' knowledge and improving their practices regarding the use of antibiotics for their children with URTIs. This finding was in the same line with **Wei et al., (2017)**, who conducted a study about "Effect of a Training and Educational Intervention for Physicians and Caregivers on Antibiotic Prescribing for Upper Respiratory Tract Infections in Children at Primary Care Facilities in Rural China: A Cluster-Randomized Controlled Trial" and publicized that, the intervention package was highly effective, with a 29% absolute reduction in the prescription of antibiotics for childhood upper respiratory tract infections in primary care facilities in rural China.

The results of the present study proclaimed that, the total mothers' knowledge positively correlated with both their practical knowledge and practices immediately post the application of learning package with highly statistical significant difference ( $p=0.00$ ) (**Table 4**). From the researcher point of view, this result may be due to the highly effectiveness of learning package in increasing the studied mothers' knowledge and improving their practices as reflected from the study findings. Otherwise, when mothers had good knowledge this in turn will be reflected on their practices. SO, the positive correlation between these variable indicates that designing an educational intervention for mothers which contains more than one educational strategies such as the learning package, are more likely to be effective than the single passive ones.

## 6. CONCLUSION

**Based on the findings of the current study, it is concluded that:**

There was an improvement in the studied mothers' knowledge, practical knowledge and practices about the use of antibiotics for their children with URTIs after the application of the learning package. The total mothers' knowledge positively correlated with both their practical knowledge and practices ( $p=0.00$ ).

## 7. RECOMMENDATIONS

**In the light of the findings of the current study, the following recommendations are suggested:**

- The Egyptian government should ban the purchase of antibiotics without medical prescriptions through strict laws and policies enforcement.
- Provide in-services, up to date, regular training programs to improve mothers' knowledge and practices regarding the use of antibiotics for their children with URTIs.

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- Develop a concise and feasible online information booklet for mothers about the use of antibiotics for their children as a promising tool to reduce antibiotics misuse.
- Pediatricians and pharmacists should be trained to follow an approach whereby they examine, explain, reassure and advise rather than simply prescribe antibiotics.

### Further Studies are needed:

- Ongoing evaluation of the learning package is recommended to ensure that package content remains evidence-based.
- Repetition of this study on a larger sample size and on a wide scale in various governorates of Egypt so that the results could be generalized and compared between Egypt and other countries.
- Study the effect of mass media on enhancing mothers' knowledge and promoting their practices about the use of antibiotics for their children with URTIs.

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### Declare:

No conflict of interest.

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