

Online ISSN: 2682-2628  
Print ISSN: 2682-261X

# IJC CBR

## INTERNATIONAL JOURNAL OF CANCER AND BIOMEDICAL RESEARCH

<https://jcbr.journals.ekb.eg>

Editor-in-chief

Prof. Mohamed Labib Salem, PhD

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comparing internet and healthcare professionals  
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PUBLISHED BY

**EACR** EGYPTIAN ASSOCIATION  
FOR CANCER RESEARCH

Since 2014

## Assessing mother's antibiotics information by comparing internet and healthcare professionals as sources of informatics

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### ABSTRACT

designed to assess mother's antibiotics information by comparing the Internet and healthcare professionals as sources of informatics. A cross-sectional descriptive study was performed in the outpatient pediatrics clinics at the Children Hospital and Benghazi Medical Centre, from February 2018 to June 2018. The sample size was 308 mothers attending the outpatient pediatrics clinic during the period of data collection. Knowledge/beliefs, behaviors, adherence, and awareness of antibiotic resistance were determined through the analysis of data obtained from the questionnaires. Eighty-two percent of mothers had a poor level of knowledge and beliefs regarding antibiotic use; however, about half of the mothers had good behaviors toward the antibiotic and a good level of awareness of antibiotics resistance. Despite this poor knowledge, 61.7% of the mothers had an overall good Adherence to antibiotic use. Furthermore, half of the mothers obtained their information about the antibiotic from the internet. A good knowledge level and good awareness of antibiotics resistance levels were attained from the Internet source. Meanwhile a good behavior and good adherence regarding antibiotic usage were gained from a healthcare professional. In conclusion, mother's good information showed a significant difference existed between the Internet and the healthcare professional sources. Therefore, this study recommends that healthcare professionals should educate mothers concerning online information. Moreover, there is a need to improve mother's knowledge about antibiotics uses.

**Keywords:** antibiotics information on Internet, misuse, mothers, resistance

Editor-in-Chief: Prof. M.L. Salem, PhD - Article DOI: 10.21608/jcbr.2019.37773

### ARTICLE INFO

#### Article history

Received: December 16, 2018

Revised: February 15, 2019

Accepted: April 6, 2019

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### BACKGROUND

Mother's perceptions and practices on drug usage have an important impact on the management of childhood illness (Abozed *et al.*, 2016). Misuse of antibiotics is an important issue that antibiotics are prescribed for a disease where antibiotics are not indicated as a treatment; especially using antibiotics to treat viral infections, which are the most common in children (Alumran *et al.*, 2013; Yu *et al.*, 2014; Yossof *et al.*, 2016). Moreover, up to 50% of antibiotics use is inappropriate which is the main cause of resistance to antibiotics; a growing problem affects children's health (Saam *et al.*, 2016; Havens *et al.*, 2016).

A few published studies on antibiotics resistance were available in Libya. A study reviewed Libyan researches on antibiotics

resistance from 1970 to 2011; the researchers reported that resistance to antibiotics was observed during the treatment of children. These studies concluded that most Salmonella, Shigella, and E. coli in diarrheic children resisted three or more antibiotics which is a serious health problem (Ghenghesh *et al.*, 2013).

Many studies have indicated factors affecting the misuse of antibiotics in children including easy access to antibiotics for self-medication (internet or pharmacies) and parents' limited antibiotic knowledge (Alumran *et al.*, 2013; Yu *et al.*, 2014; Yossof *et al.*, 2016). Moreover, the parents' knowledge about antibiotics and their resistance were assessed in many studies which highlighted incorrect information gained (Alumran *et al.*, 2013; Yu *et al.*, 2014; Yossof *et al.*, 2016). WHO stated that antibiotic awareness campaigns from 2010

to 2016 across 55 developed and developing countries; 40% of the campaigns specifically targeted parents of young children to overcome the lack of knowledge (Saam *et al.*, 2016).

Parents use different sources to get information about their child's health care, including healthcare professionals and the internet. Studies conducted in Greece, China, and USA showed that the parents believed in the healthcare professionals as the best source of information on antibiotics uses. Moreover, mothers usually inquire for more detailed antibiotic information use than fathers do (Panagakou *et al.*, 2011; Yu *et al.*, 2014; Havens *et al.*, 2016).

However, using the Internet to access health-related information is rapidly increasing; parents especially educated mothers view the Internet as a source to get information about their children's health care (Bianco *et al.*, 2013; Zuccoa *et al.*, 2018). Fifty-one percent of participants from the 28 countries of the European Union used the Internet as the first source of health-related information according to Eurostat data (Bianco *et al.*, 2013). In this context, the healthcare professionals and the internet can be used as useful health promotion tools.

Although most parents believe health-related information received from healthcare professionals is trustworthy, they feel it is not enough because such information focuses on immediate care only. Parents consider health-related information on the internet is more up to date, faster and easier to access than healthcare professional information (Bianco *et al.*, 2013; Zuccoa *et al.*, 2018).

Despite, the Internet has become an essential source of information, patients and healthcare professionals to get knowledge about health and treatment. Some researchers believe that the health-related information presented on the Internet is unreliable. As the Internet health-related information can be misunderstood, it is considered a risk for managing a child's health care and outcome (Bianco *et al.*, 2013; Zuccoa *et al.*, 2018; Walsh *et al.*, 2015).

Mother's good antibiotic information is one of the major strategies for reducing the antibiotics

misuse and resistance to antibiotics in children (Abozed *et al.*, 2016). Investigating mother's information sources in this context seems necessary. Therefore, this study aims to assess mother's antibiotics information by comparing the internet and healthcare professionals as sources of informatics.

## MATERIALS AND METHODS

A cross-sectional descriptive study was performed in the outpatient pediatrics clinics at the Children Hospital and Benghazi Medical Centre, from February 2018 to June 2018. A convenience sample of 308 Libyan mothers attended the outpatient pediatrics clinics during 3 months; they should have at least one child aged from 6 months to less than 12 years, also they agreed to participate in the study.

Data were collected by a questionnaire form, which was designed based on previous studies (Alumran *et al.*, 2013; Yu *et al.*, 2014; Yossof *et al.*, 2016; Havens *et al.*, 2016), and the questions were divided into six sections. The first was socio-demographic characteristics such as age and level of education. The second was a question to select the main information sources. The third was knowledge about antibiotics use. The fourth was mother's behaviors about antibiotic use. The fifth was antibiotics adherence, and the final was antibiotics resistance awareness. The questions from three to six were assessed on a Likert scale with rates from 1 strongly disagree to 5 strongly agree. Correct responses to questions were (strongly disagree and disagree), which means a good level. While incorrect responses to questions were (don't know, agree, and strongly agree), which means a poor level (Alumran *et al.*, 2013; Yu *et al.*, 2014; Yossof *et al.*, 2016; Havens *et al.*, 2016).

Data analysis was executed using the Statistics Package Social Science (SPSS) program version 18; frequency distribution table and cross-tabulation table were calculated to describe and compare variables. The relationship between mother's information about antibiotics and type of main information sources variable were investigated by using Chi-square test; the test was performed at a level of significance ( $P \leq 0.05$ ) was considered to be statistically significant.

## RESULTS

The Participants were 308 Libyan mothers with a mean age of 32.6 years; 50% of the mothers used the Internet as the main source to get information about antibiotics (Figure 1).

The association between mother's socio-demographic characteristics and main information sources as shown in Table 1. The mother's age and a number of children were statistically significant factors that impact on the type of information sources used ( $P < 0.05$ ). In general, the internet as the main information source was used by older (40-50 years old; 61.1%) more educated working mothers with a smaller number of children. In contrast, these socio-demographic characteristics were more in the mothers who gained information from healthcare professionals.

As shown in Table 2, 82% of all mothers (308) had a poor level of knowledge and beliefs concerning antibiotic use; however, about half of the mothers had good behaviors toward antibiotics and a good level of antibiotic resistance awareness. Despite this poor knowledge, 61.7% of the mothers had an overall good Adherence to antibiotic use.

In Table 3 and Figure 2, the mother's information about antibiotics use was evaluated by information source type. Statistical analysis showed significant differences existed between all sections of mother's antibiotics information and information source type ( $P < 0.05$ ). More than 60 % of good knowledge level and 60.1% of good awareness of antibiotics resistance level were obtained from the Internet source. While 61% of good behavior and 60% of good adherence concerning antibiotic usage were gained from the healthcare professionals.

## DISCUSSION

The Internet is well recognized as an important source to get health related-information [9]. This study found that 50% of the mothers used the Internet for searching antibiotics information as much as gaining information from healthcare professionals. Many studies considered the Internet as the second most important health-related information source (Panagakou *et al.*, 2011; Yu *et al.*, 2014, Havens *et al.*, 2016).

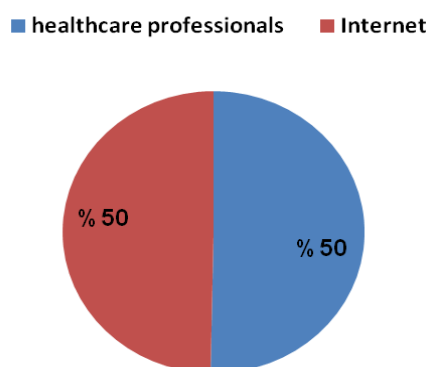


Figure 1. Distribution of mothers according to type of information sources about antibiotic use

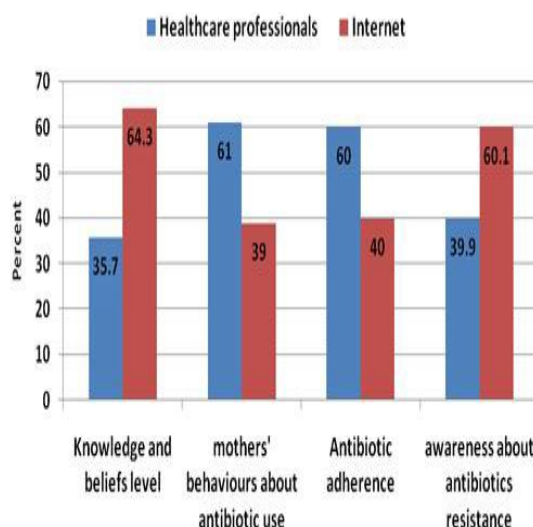


Figure 2. Distribution mother's good information about antibiotic use according to type of sources information.

In addition, age and education were reported as the strongest predictors impacting Internet access (Walsh *et al.*, 2015). In the present study, the Internet use to search for antibiotics information was higher among older more educated working mothers with less number of children; present finding is not consistent with previous studies concerning age (Walsh *et al.*, 2015; Abozed *et al.*, 2016; Zucco *et al.*, 2017; Bianco *et al.*, 2018).

Nevertheless, healthcare professionals could play an important role in the dissemination of knowledge about the misuse and the side effects of antibiotic use. Our study found that 50% of the mothers believed healthcare professionals are the best source to get information on antibiotics. This observation is similar to the results of previous studies that were conducted in Greece, China, and USA [Panagakou *et al.*, 2011 Yu *et al.*, 2014; Havens *et al.*, 2016).

**Table 1.** Socio-demographic characteristics of mothers and the percentages of the information sources about the antibiotic use for their children.

Mothers (n=308)			
Socio-demographic characteristics	Healthcare professional*	Internet*	Total No. (% of row)
	No. (% of row)	No. (% of row)	
<b>Age group in years</b>			
Less than 31	85 (55.6%)	68 (44.4%)	153 (100%)
31-40	49 (48.5%)	52 (51.5%)	101 (100%)
41-50	21 (38.9%)	33 (61.1%)	54 (100%)
<i>P = 0.03**</i>			
<b>Educational level</b>			
Elementary school	17 (70.8%)	7 (29.2%)	24 (100%)
High school	41 (50%)	41 (50%)	82 (100%)
High diploma/bachelor	91 (48.4%)	97 (51.6%)	188 (100%)
Master or PhD	6 (42.9%)	8 (57.1%)	14 (100%)
<i>P = 0.1**</i>			
<b>Employment</b>			
Employed	56 (47.5%)	62 (52.5%)	118 (100%)
Housewife	57 (57.6%)	42 (42.4%)	99 (100%)
Self-employed	7 (36.8%)	12 (63.2%)	19 (100%)
Student	35 (48.6%)	37 (51.4%)	72 (100%)
<i>P=0.26**</i>			
<b>Number of children***</b>			
1-2	93 (47.2%)	104 (52.8%)	197 (100%)
3-4	44 (51.8%)	41 (48.2%)	85 (100%)
5 or more	18 (69.2%)	8 (30.8%)	26 (100%)
<i>P = 0.04 **</i>			

\* Healthcare professional and Internet are sources information about antibiotic use. \*\* A chi-square test was performed; level of significance is at  $P < 0.05$ . \*\*\* Children aged 6 months to less than 12 years

**Table 2.** Evaluating mother's information about antibiotics use (n=308)

Mother's information	No. (%)
<b>Knowledge and beliefs level</b>	
Good	56 (18%)
Poor	252 (82%)
<b>Mother's behaviors about antibiotic use</b>	
Good	154 (50%)
Poor	154 (50%)
<b>Antibiotic adherence</b>	
Good	190 (61.7%)
Poor	118 (38.3%)
<b>awareness about antibiotics resistance</b>	
Good	143 (46.4%)
Poor	165 (53.6%)

**Table 3.** Evaluating mother's information about antibiotics use according to information sources

Mothers (n=308)			
Mother's information	Healthcare professional*	Internet*	Total No. (% of row)
	No. (% of row)	No. (% of row)	
<b>Knowledge and beliefs level</b>			
Good	20 (35.7%)	36 (64.3%)	56 (100%)
Poor	135 (53.6%)	117 (46.4%)	252 (100%)
<i>P=0.02**</i>			
<b>Mother's behaviors about antibiotic use</b>			
Good	94 (61%)	60 (39%)	154 (100%)
Poor	61 (39.6%)	93 (60.4%)	154 (100%)
<i>P=0.000**</i>			
<b>Antibiotic adherence</b>			
Good	114 (60%)	76 (40%)	190 (100%)
Poor	41 (34.7%)	77 (65.3%)	118 (100%)
<i>P=0.000**</i>			
<b>Awareness about antibiotics resistance</b>			
Good	57(39.9%)	86 (60.1%)	143 (100%)
Poor	98 (59.4%)	67 (40.6%)	165 (100%)
<i>P=0.001**</i>			

\* Healthcare professional and internet are information sources about antibiotic use. \*\* A chi-square test was performed; level of significance is at  $P < 0.05$ .

Additionally, the current socio- demographic characteristics of mothers who gained antibiotics information from healthcare professional sources were in contrast to the mothers who gained information from the internet.

In general, more women seek health-related information about diseases or treatment than men as traditional behaviors. Indeed, women often play important roles as family caregivers and a manager of treatment, such as managing antibiotics for family members (Zuccoa *et al.*, 2017). The results of this study are important for understanding mother's perceptions of antibiotic use. This study identified important results, related to inadequate knowledge about antibiotic use among studied mothers; 80% of the mothers had poor knowledge of antibiotics usage for treating their children. This result is similar to those of previous studies conducted in India and Malaysia, while reported that 72% of the Indian mothers and 69.1% of the Malaysian mothers had a poor level of knowledge and beliefs (Agarwal *et al.*, 2015; Teck *et al.*, 2016).

The main problem is the quality of such information; poor quality of information may encourage misbehavior and lack of awareness, which could be potentially hazardous (Walsh *et al.*, 2015; Zuccoa *et al.*, 2017). In our study, some mothers gained good quality antibiotics information; approximately half of the mothers had good behaviors on antibiotics use and a good level of awareness about antibiotics resistance. Despite this poor knowledge among the studied mothers, 61.7% of the mothers had an overall good adherence to antibiotic use.

The mother's information about antibiotics use was evaluated by information source type; where statistically significant differences existed between all sections of mother's antibiotic information in relation to their information source. Interestingly, more than 60% of good knowledge level and 60.1% of good awareness of antibiotics resistance information were obtained from the internet source. Internet use may be necessary as the internet provides up-to-date information and a way of diagnosing and treating symptoms without medical intervention. Also, it is the best source to gather a huge information (Bianco *et al.*, 2018; Zuccoa *et al.*, 2018). Our results supported by Bianco *et al.*'s study, and Zucco *et al.*'s study. These studies pointed out those younger females with a higher level of education were not satisfied with their healthcare professionals' information; therefore, they were more frequently accessing the internet to seek health-related information (Bianco *et al.*, 2016; Zuccoa *et al.*, 2017). Although only limited evidence shows that the Internet use for health-related information results in harmful health outcomes, this could be an issue because the scientific quality of information is difficult to be evaluated by the public (Bianco *et al.*, 2016; Zuccoa *et al.*, 2017).

Meanwhile, 61% of good behavior and 60% of good adherence concerning antibiotic usage were gained from the healthcare professionals. These results may be attributed to the healthcare professionals focusing on the practical and management aspects of the current case thus missing the knowledge part. It also may be attributed to the doctor's limited time or overcrowding in the outpatient clinics that unable doctors to inform the mothers about

antibiotics use. Similar results were found by Abozed *et al.* (2016).

The Internet may have remarkable potential for improving the physician-patient relationship to include enhanced communication, shared decision-making, and more efficient use of clinical time. Moreover, the Internet could provide an efficient channel for primary health promotion (Panagakou *et al.*, 2011; Bianco *et al.*, 2018). According to Libya Status of Women Survey 2013 report; the Internet might be a good medium to reach younger women because 30% of them use the Internet on a daily basis (Abdul-Latif, 2013).

This study revealed that the responded mothers used the Internet and healthcare professionals equally as information sources to get antibiotics information. Also, the mother's information source type is affected by their age and number of children. The responded mothers had a high percentage of poor antibiotic knowledge level. Approximately half of the mothers had a good level of behavior on the antibiotic use and a good level of awareness of antibiotics resistance. Two-thirds of them had a good level of adherence to antibiotic use.

Furthermore, mother's good information showed a significant difference existed between the Internet and the healthcare professional's sources. A good knowledge and awareness of antibiotics resistance were attained from the Internet source, while a good behavior and good adherence regarding antibiotic usage were gained from the healthcare professional source.

## RECOMMENDATION

This study recommends that health education programs should be established to improve mother's knowledge and practices to the safe use of antibiotics. Policymakers should focus on both sources (healthcare professional and internet) as best mediums to educate mothers concerning rational antibiotic use. Health professionals should inform mothers to good health related-information Web-pages.

## ACKNOWLEDGMENTS

Special thanks to the questionnaire respondents who devoted their time to our study.

**CONFLICT OF INTEREST**

All authors declare to have no conflict of interest.

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