

## Original article

### Use of antibiotics for asthma attacks in Egyptian children

**Background:** Bacterial infection plays a negligible role in pediatric acute asthma attacks. However, many patients are treated empirically with antibiotics. **Objective:** This study attempted to investigate the problem of antibiotic usage as a part of treatment of acute asthma among children living in Egypt. **Methods:** The current exploratory study included a random sample of 300 children visiting the allergy clinic, Faculty of Medicine, Cairo University from September 2016 to September 2017. A study researcher applied a validated questionnaire to the child's parents about usage of antibiotics. **Results:** Most families belonged to the low or middle social class. About 65.7% of children had sub-optimal asthma control, 73.7% experienced acute attacks, with over half of them (51%) receiving antibiotics; 41.8% of those who received antibiotics were self-medicated. Over 90% reused previous prescriptions. Main single reasons for resorting to self-medication were to save money and the assumption that previous prescriptions can be reused. About 45.3% expressed intention to employ self-medication in the future. Low social class was associated with significantly higher odds of resorting to self-medication (odds ratio=3.32;  $p=0.05$ ). **Conclusion:** A remarkable antibiotic use was detected among children who had acute asthma, a large proportion of which was without medical consultation. Family social class was an independent predictor for adopting self-medication.

**Keywords:** Asthma, attacks, antibiotics, Egyptian, children.

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## INTRODUCTION

Bronchial asthma is a common health problem in children with increasing burden over time<sup>1,2</sup>. Since bacterial infection seems to play a minor role in acute exacerbation of asthma, guidelines for asthma management do not recommend the routine use of antibiotics<sup>3,4</sup>. In acute asthma, the clinical manifestations and laboratory parameters of bacterial infections are often inconclusive, which makes it difficult for physicians to determine accurately in clinical practice whether there is bacterial infection. Consequently, many patients are treated empirically with antibiotics, leading to antibiotics abuse, side effects, and bacterial resistance<sup>5</sup>. In developing countries, the trend of self-medication is high due to educational, economic, and cultural factors<sup>6</sup>, knowing the fact that in many of these countries, including Egypt, antibiotics are available and dispensed at pharmacies without a physician's prescription<sup>7</sup>. This study attempted to investigate the problem of antibiotic usage as a part of treatment of acute asthma among children living in Cairo, Egypt.

## METHODS

**Study setting:**

Allergy clinic, Faculty of Medicine, Cairo University, Egypt.

**Study design:**

Exploratory study

**Study population:**

Children aged 2-12 years attending the Allergy clinic, if they were Cairo residents, were accompanied by at least one of their parents and were diagnosed with asthma and asthma control was assessed according to GINA guidelines<sup>3</sup>. Patient's social class was determined by the social scoring system suggested by the National Nutrition Institute of Egypt in 1995<sup>8</sup>. Patients were excluded if they did not meet the inclusion criteria or refused to participate in the study.

**Sample size:**

Sample size was calculated by using Epi info software at the confidence level of 95%, prevalence 50% and  $\alpha=0.05$ , minimum sample size was calculated to be 300. A convenient sample of 300 children from September 2016 to September 2017 was studied.

**Data collection tool:**

A study researcher applied a validated questionnaire developed in-house to the child's parents. Parents who reported acute attacks in the last 4 weeks were asked 3 questions detailing usage of antibiotics in those attacks, and those who self-medicated their children with antibiotics were asked 4 more questions. The questionnaire was tested for validity and reliability on a pilot sample of 20 participants.

**Data analysis:**

Pre-coded data were entered on Microsoft Office Excel Program for Windows, 2007. Data were analyzed using IBM SPSS (Statistical Package for Social Sciences version) version 17. Data were explored for normal distribution using Kolmogorov-Smirnov test and Shapiro-Wilk test. Numerical data were described as mean and standard deviation or median and interquartile range (IQR). Simple statistics such as frequency distribution, bivariate relationship and comparisons were used. Logistic regression analysis was used to identify predictors of self-medication with antibiotics. A p value less than or equal to 0.05 were considered statistically significant. All tests were two tailed.

**Ethical considerations:**

An informed written consent was obtained from parents before enrollment. The study design conformed to the requirements of Revised Helsinki Declaration of Bioethics<sup>9</sup>. The study protocol was approved by the scientific research committee of

Pediatrics Department, Faculty of Medicine, Cairo University.

**RESULTS**

Table 1 shows basic data of study group. Median age was 4 years (IQR= 3), and 56.3 % of them were males. Most children resided within reasonably near distance- distance that can be walked on foot- from healthcare facilities and pharmacies (75.7% and 76.7%, respectively). Most families belonged to the low or middle social class, with only 15% belonging to the high-class. Nearly two-thirds (65.7%) of children had sub-optimal asthma control. About 73.7% experienced acute attacks, with over half of them (51%) receiving antibiotics; Sixty-four of those who received antibiotics were self-medicated. Table 2 shows the characteristics of antibiotics-self-medication. Over 90% was through dispensing previous prescriptions. Only one-third of them sought medical consultation later. Main single reasons for employing self-medication were to save money and the assumption that previous prescriptions can be reused. About 45.3% were determined to employ self-medication in the future. Table 3 shows logistic regression model for predictors of self-medication with antibiotics. Low social class was 3.3 times more likely to exhibit self-medication than high social class associated with significantly higher odds of resorting to self-medication (p=0.05).

**Table 1.** Socio-demographic and clinical data (n=300).

Variables	Number (%)
Male gender	169 (56.3)
Urban residence	131 (43.7)
Near distance from a health facility	227 (75.7)
Near distance from a pharmacy	230 (76.7)
First visit to clinic	103 (34.3)
Mother's education (illiterate /educated)	40 (13.3) / 260(86.7)
Father's education (illiterate / educated)	63 (21) / 237(79)
Mother's occupation (not working/working)	237 (79) / 63 (21)
Father's occupation (not working/working)	35(11.7) / 265 (88.3)
Social class (low/middle/high)	75 (25)/ 180(60)/ 45 (15)
Asthma control (uncontrolled or partially controlled/ controlled)	197(65.7) / 103(34.3)
Acute asthma in last 4 weeks	221 (73.7)
Antibiotic use in acute asthma	153(51)
Self-medication among children who used antibiotics	64(41.8)

**Table 2.** Antibiotic self-medication in acute asthma (n=64).

Variables	Number (%)
Reuse of old prescriptions	58(90.6)
Seeking medical care after self-medication	22(34.3)
Reasons for self-medication:	
-Saving money	15(23.4)
-Previous prescriptions can be reused	22(34.4)
-Improvement of the attack	1(1.6)
-Assumption that attack was not serious	1(1.6)
-Others or combinations	25(39)
Future intention of self-medication (yes / no or uncertain)	29 (45.3) / 35(54.7)

**Table 3.** Predictors for antibiotic intake in acute asthma

Predictors	Odds ratio	95% Confidence interval	*P-value
Age	1.14	0.99-1.32	0.05
Distance from.nearest health facility	1.03	0.46-2.33	0.93
Follow-up visit to allergy clinic	0.85	0.43-1.65	0.63
Low social class	3.32	1.01-10.98	0.05

\*P value less than or equal 0.05 is statistically significant

## DISCUSSION

Despite lack of evidence that bacterial infection plays a significant role in asthma exacerbation<sup>4</sup>, doctors and parents still opt to give children antibiotics. This reflects major defects in health literacy among the population. In children with asthma-like symptoms (recurrent wheezing, cough and dyspnea), treatments more often consist of antibiotics and cough preparations and not proper asthma medications<sup>10</sup>. We found that antibiotic use for pediatric acute asthma in Greater Cairo was 51%. Searching the literature, it was found that empirical and unjustified antibiotic treatment for asthmatic children has been formerly reported in both developed and developing countries, with varying but still high rates; In the United States it was estimated that 22% of children with acute asthma received antibiotics in the emergency departments<sup>5</sup>. In Canada, the antibiotic prescription rate for pediatric wheezing episodes was 511 per 1000 prescriptions in 2001 (51%)<sup>11</sup>, while in China, it rose to 75.1%<sup>12</sup>. These findings have important health and economic implications. Unjustified treatment with antibiotics increases healthcare costs, exposes the child to side effects, and augments bacterial resistance to antibiotics<sup>13</sup>. We suggest that over-prescription is due to lack of consensus over this issue; some physicians believe that asthmatics would benefit from certain types of antibiotics<sup>14</sup>, while others argue that the evidence is inconclusive<sup>15</sup>. Other reasons comprise diagnostic uncertainty, the aim to prevent secondary bacterial

infections, and the utilization of anti-inflammatory effects of macrolides<sup>16</sup>.

The problem of antibiotic self-medication was relatively high in our study (41.8%). The World Health Organization (WHO) defines self-medication as the use of drugs to treat self-diagnosed disorders or symptoms, or the intermittent or continued use of a prescribed drug for chronic or recurrent disease or symptoms. It involves obtaining medicines without a prescription, resubmitting old prescriptions to purchase medicines, sharing medicines with relatives or members of one's social circle, or using leftover medicines stored at home<sup>17</sup>. Indeed, this was not due to medical care facilities being inaccessible, as over three-quarters of families reported living near a doctor and/or a pharmacy. Parents had earlier prescriptions for asthma exacerbation and they merely repeated them without medical consultation. The main reasons for that appeared to be poverty and prevailing health misconceptions; over half of parents rationalized their self-medication practice by the need to save money, or the belief that previous prescriptions can be dispensed several times without concerns. We have demonstrated that low family social class (which reflects low education and occupation) was a significant independent predictor of adopting self-medication (odds ratio =3.32, 95% CI= 1.01-10.98, p=0.05). A recent meta-analysis was conducted on self-medication with antibiotics (SMA) in adults in the Middle East<sup>18</sup>. It reported that age, sex,

educational and income levels were the main determinants of SMA. Socio-cultural, economic, and regulatory factors were the most commonly cited reasons for SMA.

**Limitations of the study:**

Our study was among a few to describe the problem of antibiotic indiscreet usage in Egyptian asthmatic children. However, it had its limitations; namely the small sample size, the cross-sectional design, and the one-center setting, which might hinder generalization of conclusions. Nevertheless, this can be considered as a pilot for further larger-scale research.

In conclusion, Antibiotic usage in acute asthmatic children was high in Greater Cairo, a large proportion of which was administered by parents without medical supervision. The low social class of the family was a significant independent predictor of adopting self-medication. Low social class families should be a target for health education about the misuse of antibiotics in asthmatic children

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