

KNOWLEDGE AND ATTITUDES OF PARENTS TOWARDS RESPONSIBLE ANTIBIOTIC THERAPY IN RESPIRATORY SYSTEM INFECTIONS

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ABSTRACT

Background: Testing general knowledge on antibiotics, and the rational application of them in practice, is very important in order to understand the need to educate society and the irreversible problem of antibiotic resistance.

Aim of the study: The aim of the study was to analyze the knowledge and practice of parents regarding responsible antibiotic therapy in respiratory infections.

Material and methods: This study was carried out among 317 parents aged 22-61 ($M = 34.74$; $SD = 6.31$). The diagnostic survey method was applied, and the research tool was a survey questionnaire. Statistical analysis was performed using the IBM SPSS Statistics 25.0 statistical package. Statistical significance was set at $p < 0.05$.

Results: Viruses were identified as the most frequent cause of respiratory tract infection by respondents ($n = 245$, 77.3%). According to 91.2% of participants, antibiotics are used against a bacterial infection. Almost all ($n = 315$, 99.4%) respondents are of the opinion that antibiotics ought to be applied after a medical examination if they are definitely recommended, 97.5% ($n = 309$) believed that taking antibiotics could not be stopped at any time, whereas 10.4% ($n = 33$) used antibiotics without contacting a physician. 15.1% ($n = 48$) of the respondents used the antibiotics left over from previous treatment.

Conclusions: The respondents possess knowledge concerning indications for antibiotic treatment and on their rational use, but unfortunately, not everyone uses this knowledge in practice.

KEYWORDS: antibiotics, antibiotic resistance, knowledge, practice, parents

BACKGROUND

The discovery of antibiotics, and their implementation in the treatment of human infections, was a very important event in the history of medicine, which made it possible to cure millions of patients. However, over time, the over-prescription of antibiotics has given rise to the problem of antibiotic resistance. Antibiotics are used not only in medicine but also, on a massive scale, in other fields, e.g., in agriculture. The phenomenon of drug-resistance has become a global concern for public health. Both globally and in Poland, much is said and written about responsible antibiotic treatment – the European Centre for Disease Prevention and Control warns that every single year, in the countries of the European Union (EU), there are 33,000 deaths from infections caused by bacteria resistant to multi-

ple antibiotics [1,2]. The Antibiotic Resistance Threat Report (2013) in the United States estimated at least 2 million people each year acquire antibiotic-resistant infections, with about 23,000 dying as a result [3]. It is estimated that 700,000 people all over the world die every year due to antibiotic resistance (ABR), and this number is expected to rise to 10 million by 2050 if no action is taken [1,4]. The challenge constituted by antimicrobial resistance (AMR) requires a coordinated approach on the part of all countries, as well as sectors such as the environment and human and animal health [5]. In 2015, the World Health Organization (WHO) published the Global AMR Action Plan (GAP), describing relevant strategic goals, one of which is to raise the awareness and understanding of AMR [6].

Many countries, including Poland, have taken steps to make society aware of resistance to antimicrobial

medications by means of broad-scope educational campaigns, whilst many magazines raise the issue of responsible antibiotic treatment. It is quite noticeable how easy it is to gain access to antibiotics; frequently, parents demand that a physician prescribe an antibiotic, or even force them to do it, when a child starts to show the symptoms of a respiratory tract infection. In the case of children, the problem is particularly important because they start their lives without fully developed immunity, and the unjustified application of antibiotic treatment results in antibiotic resistance, which may have an impact later in their life. That is why the knowledge of parents and the guardians of children is so important and, if they do not possess such knowledge, it is necessary to provide relevant education. One of the strategic goals in fighting antibiotic resistance is to cause a change in consumer behaviors by means of promoting the responsible use of antibiotics. We hypothesize that the knowledge of parents on antibiotic treatment is insufficient, and that antibiotics are administered to children irresponsibly, and in excess, by adults.

AIM OF THE STUDY

The aim of this study was to analyze the knowledge and practice of parents regarding responsible antibiotic therapy in respiratory infections.

MATERIAL AND METHODS

Study population and data collection

The study group comprised of 317 parents living in Warsaw. The criterion to be included in the study was having children. The study was conducted in November and December 2018.

Questionnaire

The research tool used was an original questionnaire. The survey was sent by electronic means using the Google form; participation in the study was voluntary and anonymous. The survey was divided into two parts: the first included a personal questionnaire, consisting of 4 questions, whilst the second consisted of 16 questions concerning antibiotic treatment. For the statistical analysis of this dissertation, the questions in the second part were divided into two groups: the first one concerned general knowledge, and the second one, practice.

Statistical analyses

The statistical analyses were performed using IBM SPSS Statistics 25.0 suite. As the statistical significance threshold, the conventional level of $p < 0.05$ was adopted. The results of the study were presented in comparison with the qualitative data, with the application of size and percentage of quantitative data: the average, standard deviation, and minimum and maxi-

imum values. The relationships between the number of children of the respondents were analyzed using likelihood ratios with a normal distribution.

RESULTS

The study group

The study sample comprised of 317 people aged 22–61 ($M = 34.74$; $SD = 6.31$), 311 of whom were women, 6 of whom were men. The majority of subjects had higher education ($n = 272$, 85.8%), 12.9% ($n = 41$) had secondary education, and 1.3% ($n = 4$) had basic/vocational education. Individuals with two children were the majority ($n = 154$, 48.6%). Those with a single child constituted the second-largest group ($n = 130$, 41%), and the remaining 12.6% ($n = 33$) had 3–5 children. The analyses concerning the correlations between the number of children and the answers to the remaining questions were conducted dividing the respondents into a group of 130 (41.0%) with a single child, and a group of 187 (59%) with at least two children. Considering the possible experience of parents with the use of antibiotics when having children, it was decided to separate these two groups.

General knowledge

As the cause of the infection of the respiratory tracts, the respondents most frequently mentioned viruses ($n = 245$, 77.3%), whereas bacteria were mentioned by only 20.2% ($n = 64$) (of the studied). A significant number of respondents ($n = 289$, 91.2%) said that antibiotics ought to be applied in the treatment of a bacterial infection, whereas 5.7% ($n = 18$) thought them useful against a viral infection.

Most frequently, the respondents answered that antibiotics ought to be applied in the case of infections of the upper respiratory tract, such as tonsillitis ($n = 299$, 94.3%) and bronchitis ($n = 254$, 80.1%), pharyngitis ($n = 114$, 36.0%), influenza was indicated by 13.9% ($n = 44$), and a cold by 0.9% ($n = 3$).

Almost all respondents ($n = 315$, 99.4%) expressed the opinion that antibiotics ought to be applied after a medical examination when the need to use them is evident; 309 (97.5%) expressed the opinion that antibiotic treatment may not be discontinued without consulting a physician.

The majority of respondents expressed the opinion that antibiotics can cause adverse reactions, or may have an adverse impact on health; 1.3% ($n = 4$) of the group were not aware of that. 96.8% ($n = 307$) of respondents mentioned microbial antibiotic resistance as the result of the excessive prescribing of these medications.

Practice in the application of antibiotics

The majority ($n = 258$, 81.4%) of respondents did not discontinue receiving antibiotics without first consulting a physician. Only 3.2% ($n = 10$) had never received

antibiotics. The remaining group of 15.4% ($n = 49$) had done so once or more. Most frequently, the respondents purchased antibiotics prescribed by a general practitioner ($n = 270$, 85.2%); 11.4% ($n = 36$) received such prescriptions from a physician at a private surgery. The majority of respondents ($n = 253$, 79.8%) had never taken antibiotics remaining after a previous treatment, whilst 15.1% ($n = 48$) had done so sometimes. Those who had a single child more frequently chose the answer “not applicable”, whereas those with at least two children more frequently chosen the answer “sometimes” ($p < 0.05$).

The majority of respondents ($n = 306$, 96.5%) did not suggest to the physician that antibiotics ought to be prescribed when exhibiting symptoms of a common cold. The majority ($n = 278$, 88%) did not use antibiotics without first consulting a physician, whereas 10.4% ($n = 33$) admitted that they had used this kind of medication without consulting a physician. The majority ($n = 299$, 94.3%) always followed medical recommendations concerning the regimen of antibiotic treatment, and 3.2% ($n = 10$) did so only sometimes.

Regular probiotic application was undertaken by 75.4% ($n = 239$) of respondents during the course of antibiotic treatment, and followed the information in leaflets, whereas 10.4% ($n = 33$) did it irregularly, and 4.1% ($n = 13$) did not do it at all.

The sources and self-assessment of possessed knowledge

The following sources of knowledge on antibiotics were mentioned by the respondents: firstly, a general practitioner and the internet, and the smallest group mentioned a nurse (Fig. 1).

Respondents scored their personal knowledge on antibiotics from 1 to 10 points ($M = 6.36$; $SD = 2.14$) (Fig. 2).

DISCUSSION

The discovery of antibiotics was a very important event in the history of medicine, making it possible to treat infections, thus saving countless lives. In this study, it was observed that 91.2% of parents are aware of the fact that antibiotics are antibacterial medications, but 5.7% are convinced that they are effective against viruses. The respondents are aware that antibiotics are not used against common colds, however, 13.9% think that they are used against flu. In comparison with the results of the study conducted by J. Senderowska *et al.*, who surveyed public health students on rational antibiotic treatment in primary medical care (PMC), in this study, there were many more people who answered the question correctly. The above study was conducted in 2013, and demonstrated that only 15% of the students answered correctly [7]. Much different results than those already presented were those of Eurobarometer 445 (2016), with respondents from 28 countries in Europe, including Poland; 57% of Europeans did not know that antibiotics are ineffective against viruses [8]. In the studies conducted under Eurobarometer 478 in 2018, only 46% of Poles answered the ques-

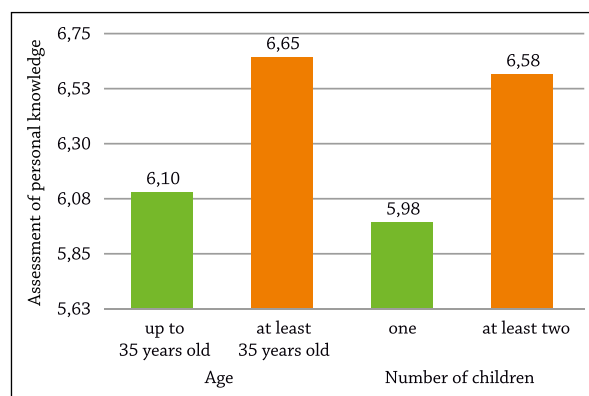


Figure 1. Sources of knowledge on antibiotics mentioned by respondents

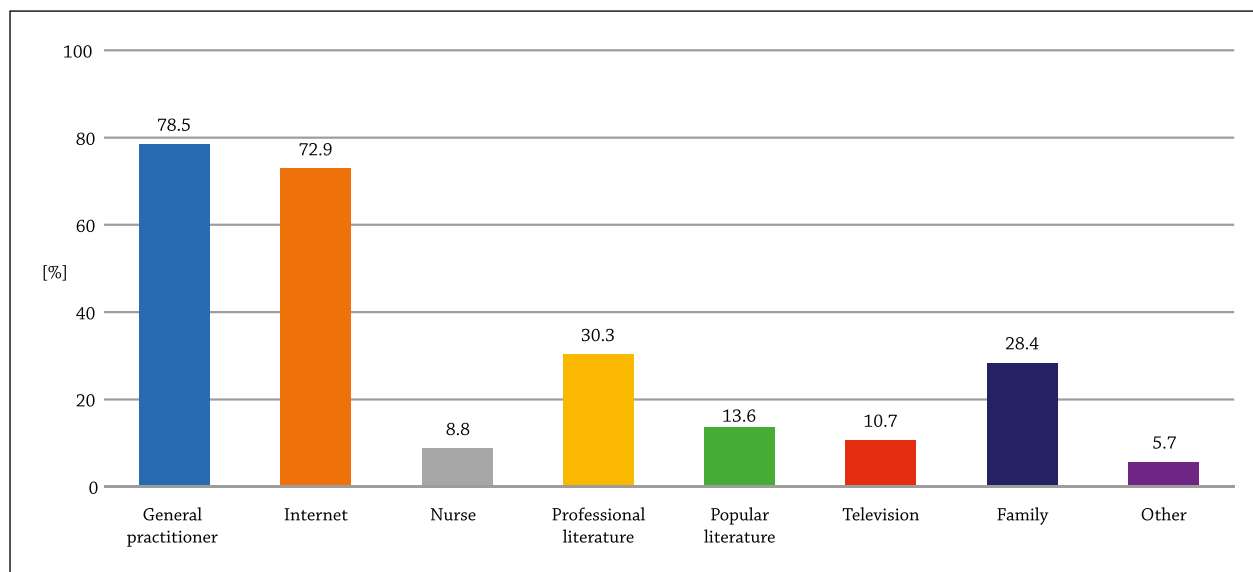


Figure 2. Average values of results on the scale of the assessment of personal knowledge in correlation with age and number of children of respondents.

tion on antimicrobial medication resistance correctly: namely, that antibiotics do not kill viruses [9]. Eurobarometer 478 and 445 [8,9] suggest lesser knowledge among respondents than in this study. In studies conducted in 2019, better results were received by the customers of Norwegian pharmacists: only 1/3 of them claimed that antibiotics could be effective against viral infections [10]. Italians were also aware that antibiotics cannot cure a viral infection, cold, or flu; however, only 1/5 said when they ought to be applied [11]. Unfortunately, reports from other countries such as the United Arab Emirates [12,13], Pakistan [14], Hong Kong [15], Saudi Arabia [16,17], Malaysia [18], and Turkey [19] are not satisfying; as many as half of the respondents mentioned the use of antibiotics as recommendable against a cold, flu, sore throat, and cough, i.e. viral infections. The results of other studies are also alarming, as it is revealed that even those who plan on working in the health service sector in the future do not possess complete knowledge concerning the use of antibiotics. Half of selected medicine students in Nigeria [5] erroneously defined when antibiotics ought to be utilized, claiming that it is possible to use them against a cold, flu, and sore throat. A tenth of Polish dentistry students would apply antibiotics in the treatment of flu [20], and 70.3% of selected nursing students in Saudi Arabia find it justified to use antibiotics against cold, sore throat, flu, and fever [21]. Almost half (43.44%) of Chinese medicine students were convinced it was recommendable to prescribe antibiotic treatment against viral infections [22]. Nearly half (41.34%) of selected pharmacists from Riyadh, Saudi Arabia find it justified to apply antibiotics mainly against fever and infections of the upper respiratory tracts [23]. Quite different results were those of students from Nepal, where almost all respondents agreed that antibiotics could be used only in bacterial infections (98.2%) [24]. Looking at such data, one may conclude that many, even future workers in medical services, do not know the difference between bacterial and viral infections.

Virtually everyone participating in this study agreed that antibiotics ought to be prescribed after a medical examination when it is certain they are needed, and that therapy may not be discontinued without first consulting a physician. This knowledge was reflected in practice, and the majority of respondents purchased prescribed medications after a visit to the physician, and when it was clearly recommended, with 81.4% indicating that they would never have discontinued a therapy. However, is it really so? Such an attitude would be a positive step toward preventing antibiotic resistance, of which 96.8% of respondents were aware. In the study conducted by J. Senderowska *et al.*, the majority of participants (98%) knew that it is not allowed to discontinue treatment without consulting a physician when symptoms are no longer observed, and that it is a physician who decides when therapy can be discontinued [7], whereas in Eurobarometer 478, 17% of the surveyed Poles believed it was possible to discon-

tinue a treatment when a patient felt better. The correct answer was given by the majority of respondents (79%) [9], as in this study. According to the respondents in Eurobarometer 445, a whole dose of an antibiotic ought to be taken in accordance with medical recommendations (82%), and this answer is similar to that from Eurobarometer 478 [8].

The respondents in this study claimed that they follow medical recommendations concerning the regimen of antibiotic treatment (94.3%), i.e. that they take antibiotics at the appropriate time, and take them for as long as indicated. However, it should be noted that answers to other questions prove that a larger number of individuals fail to follow these recommendations. The study demonstrated that some of the respondents discontinue antibiotic treatment before the time recommended by a physician (8.5% – once, 6.3% – twice or several times), and many more (34%) finished antibiotic treatment before the recommended time at least once, as was shown by B. Zając *et al.* [25]. An even greater number of individuals discontinuing antibiotic treatment was observed by K. Król-Turmińska *et al.* (46% did so at least once in their lifetime) [26]. It has been shown that discontinuing antibiotic treatment after a patient starts to feel better is a common practice in other countries as well [5,14,16–18,27,28]. Better results were seen in medical students, 78.9% of whom stated that they took antibiotics for the recommended period of time [24].

The most frequent source of antibiotics is a general practitioner, which is demonstrated by this study's results; this finding is confirmed in the studies conducted by K. Król-Turmińska *et al.* In that study, the largest number of respondents received prescriptions from a general practitioner [26]. Unfortunately, in other studies, respondents admitted that they attempted to use antibiotics without consulting a physician, even in the case of their own children, which may be a common practice [5,11–14,16,21,23,29]. Regardless of the fact that parents are aware of the detrimental consequences of the improper use of antibiotics, the risk of antibiotic resistance, and the risk of adverse effects, their approach to the non-consulted application of antibiotics in the case of children is intolerable.

In this study, 15.1% of respondents admitted that they sometimes used the antibiotics remaining after a previous treatment, which means that they also did not complete this treatment, and applied antibiotics without consulting a physician. In such a situation, in the study group of parents, we can notice self-treatment, and, according to statistical data, it was more frequently observed among parents with more than one child. In the study conducted by K. Król-Turmińska *et al.* on the application of antibiotics prescribed during a previous treatment, there was a question on self-treatment, and a large group of respondents (43.1%) admitted to attempting self-treatment with the application of antibiotics from a home medicine chest (55.3%) [26]; this suggests as well that these antibiotics were stored after a previous treatment. When asked a straight-

forward question about self-treatment in this study, approximately only 10% of respondents admitted to using antibiotics before consulting a physician. In the study conducted by J. Strumiło *et al.*, in Białystok, 7.6% of participants admitted to attempting antibiotic self-treatment and to storing them [6]. The majority of respondents in this study (96.5%) did not admit to suggesting to a physician that an antibiotic ought to be prescribed against the infection of the upper respiratory tracts. The study conducted by A. Senderowska *et al.* confirms the result of this study, where a substantial majority of those surveyed (92%) did not force a physician to prescribe antibiotics when it was not recommended [7], whereas in comparison to the results of J. Stumiło, a large group of participants exerted pressure on a general practitioner. The most frequent factor of this pressure in this study (21.15%) was a diagnosis formulated by the surveyed, e.g. "It must be bronchitis." Another factor in this study was emphasizing the severe course of the disease and the presence of a medical problem (18.68%) [6]. According to a report by the National Institute of Public Health – National Institute of Hygiene (NIPH-NIH) in 2017, 88% of Polish society is of the opinion that a physician prescribes antibiotics when it is unnecessary, and 9% go as far as to ask that they not be prescribed [30]. In turn, PMC physicians themselves think that antibiotics are applied excessively, and that they are prescribed even when it is not necessary, but a large group of them feel pressured by patients to prescribe such medications [4,31].

In studies performed by J. Kraśnicka *et al.* among 200 PMC patients, the source of information in the case of the application of antibiotics was a physician (90.5%), followed by a pharmacist (11.5%) [32]. In this study, the majority of respondents mentioned a general practitioner and the Internet. Unfortunately, a nurse is hardly ever mentioned as a source of knowledge in both studies. According to our data, a nurse was mentioned by 8.8%; in the studies from Białystok, only 2.5% mentioned a nurse [6]. In Eurobarometer 478, nurses were mentioned by more respondents (13% of Poles and 14% of Europeans), whereas a physician was mentioned by a similar number of people in Europe (86%) and in Poland (81%). In turn, the second most frequent source of credible information on antibiotics was that of a pharmacist, similar to the study of PMC patients [8,9].

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The problem of gaps in knowledge on the causes of the flu and acute bronchitis among the respondents in this study, and also in the aforementioned Polish and foreign literature, is noteworthy. Becoming aware of the appropriate treatment of these diseases would significantly limit the excessive use of antibiotic treatment.

After the analysis of this study and studies by other authors mentioned, it is possible to emphasize the continuous need to educate society on antibiotics and their use, including also, and perhaps above all, the medical sector.

LIMITATIONS OF THE STUDY

The study comprised a relatively small group of parents, mostly women – mothers. Therefore, it was not possible to analyze knowledge and attitudes broken down by gender. As a next step, the study should be extended to include male – fathers. The research did not take into account the financial status and the level of education, which could theoretically affect the state of knowledge and attitudes of the respondents.

CONCLUSIONS

1. Respondents possess knowledge concerning recommendations to apply antibiotic treatment and the rational use of antibiotics, but, unfortunately, not all of them apply this knowledge in practice.
2. Regardless of the fact that parents know they should have a medical recommendation to use antibiotics, some of them apply such medications without it, and use antibiotics remaining after a previous treatment.
3. As the main source of information on antibiotic treatment, respondents mentioned a general practitioner and the Internet. As can be concluded from the study, knowledge acquired from these sources is insufficient.
4. In practice, parents with two or more children reached for the antibiotics remaining after a previous treatment significantly more frequently.
5. The continuous education of society in the scope of antibiotics and their applications, including, and perhaps above all, the medical service sector, is required.

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