Abstract

Background. Antibiotics are a group of drugs which, when taken not according to doctor’s recommendations, may contribute to the increase of antibiotic resistance. Wide use of antibiotics in the fight against pathogenic strains of bacteria has contributed to the resistance of bacteria. An important problem related with the phenomenon of antibiotic resistance is the spread of acquired resistance, which is associated with the unreasonable use of antibiotics by humans, i.e., their abuse.

Objectives. The aim of the research was to analyze the attitude of young people towards the use of antibiotics.

Material and methods. The diagnostic survey method was used. The study involved 215 people over 20 years of age, using the services in the Primary Health Care facilities located in the city and municipality of Sędziszów in the Świętokrzyskie voivodeship who expressed their willingness to fill in the proprietary questionnaire. The most numerous group were women, people aged 30–39 years, city residents, and people with higher education.

Results. Statistical analysis showed that the place of residence affects the opinions about the possibility of terminating the antibiotic therapy ($p = 0.013$). In the group of people living in the countryside, a higher percentage of people claimed that better health condition is tantamount to the possibility of ending the antibiotic use. There is a significant relationship between age and deciding to take an antibiotic without consulting a doctor ($p = 0.004$). Individuals between 40 and 49 years of age and over 50 are more likely than younger people to take the drug without consulting a specialist.

Conclusions. The study participants are aware of the negative consequences of unjustified use of antibiotics; however, in many instances, they do not consult their doctor.

Key words: knowledge, antibiotics, antibiotic therapy, antibiotic resistance
Streszczenie

Wprowadzenie. Antybiotyki są lekami, które — jeśli przyjmuje się je niezgodnie z zaleceniami lekarza — mogą przyczynić się do pogłębiania zjawiska antybiotyko-oporności. Szerokie wykorzystanie antybiotyków w zwalczaniu chorobotwórczych szczepów bakterii przyczyniło się do oporności bakterii. Ważnym problemem związany z antybiotykoopornością jest rozprzestrzenianie się oporności nabytej, która związana jest z nierzacjonalnym stosowaniem antybiotyków przez człowieka, czyli ich nadużywaniem.

Cel pracy. Analiza postaw ludzi młodych wobec stosowania antybiotyków.

Materiał i metody. W pracy zastosowano metodę sondowania diagnostycznego. W badaniu wzięło udział 215 osób powyżej 20 r.ż. korzystających ze świadczeń medycznych w placówkach podstawowej opieki zdrowotnej znajdujących się na terenie miasta i gminy Sędziszów w województwie świętokrzyskim, które wyraźnie chęci wypełnienia autorskiego kwestionariusza ankiety. Najliczniejszą grupę stanowiły kobiety, następnie osoby w przedziale wiekowym 30–39 lat, mieszkańcy miast oraz respondenci z wykształceniem zawodowym wyższym.

Wyniki. Analiza statystyczna wykazała, że miejsce zamieszkania wpływa na decyzję o możliwości zakończenia antybiotykoterapii (p = 0,013). W grupie osób zamieszkujących na wsi większy odsetek twierdził, iż lepszy stan zdrowa jest jednoznaczny z możliwością zakończenia zarysowania antybiotyku. Występuje istotna zależność między wiekiem a decyzją o przyjmowaniu antybiotyku bez konsultacji z lekarzem (p = 0,004). Osoby w wieku 40–49 lat oraz powyżej 50. r.ż. są bardziej skłonne do zarysowania antybiotyków bez opinii specjalisty niż osoby młodsze.

Wnioski. Osoby biorące udział w badaniu zdają sobie sprawę z negatywnych konsekwencji nieuzasadnionego sięgania po antybiotyk, jednak mimo to zdarza im się zarysować go bez konsultacji z lekarzem.

Słowa kluczowe: wiedza, antybiotykoterapia, antybiotyki, antybiotykooporność

Introduction

The moment when Alexander Fleming discovered the first antibiotic in 1928 was an important event in the history of mankind. The progress of pharmacology made it possible to treat infections that previously caused deaths of a large number of people. Mortality from pneumonia caused by Streptococcus pneumoniae before the antibiotics became available was 40% and from endocarditis it was 97%. Wound infections, which often resulted in a loss of a limb, were also very dangerous. During World War I, 70% of amputations were performed as a result of wound infection.¹

Unfortunately, with the invention of this type of drugs, the phenomenon of antibiotic resistance appeared. The production of antibiotics on a large scale led to the phenomenon that people started to use them very often without realizing the consequences of such action. This was predicted by Alexander Fleming, who emphasized that their overuse and use in inappropriate doses will lead to the microbes becoming resistant to their effects. The first strain of bacteria resistant to the antibiotic was Staphylococcus aureus.²

Antibiotic resistance is a global public health problem. Frequent and inappropriate use of antibiotics causes a rapid spread of drug resistance in bacteria. Bacterial strains that are not sensitive to most of the antimicrobial agents used are a major challenge for modern medicine.³

The MDR (multidrug-resistance) bacteria are defined as bacteria that are not susceptible to at least 1 antibiotic of 3 or more groups of antibacterial drugs. The XDR (extensive drug resistance) means that the microorganism remains sensitive to only 1 or 2 antibiotics groups of drugs used in the treatment of given infections. The PDR (pandrug-resistant) strains are resistant to all available antibiotics used for a given species of the microorganism.⁴,⁵

Improper use of antibiotics, lack of observance of doctor’s recommendations, as well as lack of knowledge on the rationality of antibiotic use all result in the problem of antibiotic resistance affecting more and more people. According to the World Health Organization (WHO) report, antibiotic resistance is one of the main health challenges in the modern world. There may come a time when pneumonia, postoperative infections, sexually transmitted diseases, tuberculosis, or malaria will become increasingly difficult to treat due to drug resistance.⁶

Currently, the problem of antibiotic resistance causes about 700.000 deaths per year. According to specialists’ predictions, this number will reach 10 million in 2050. The main reasons for the acquisition of antibiotic resistance by bacteria are: 1) possibility of genes entering between different species of organisms, 2) overuse of antibiotics when they are not necessary, 3) use of antibiotics in inappropriate doses, without consulting a doctor, and 4) limited development of new antibacterial drugs.⁷

When antibiotics are used, the physiological flora of the patient, which performs many important functions in the body, changes. Therefore, rational antibiotic therapy is crucial. The administration of an antibiotic when it is not needed can have serious consequences, so it is important to choose the proper therapy to minimize the side effects of drugs and interference with the natural physiological flora in patient. The limited amount of an-
tibiotics and their use in unjustified cases is also a problem. This is due to the fact that bacteria have the ability to transmit and exchange resistance genes between themselves, resulting in an increasing number of bacteria strains resistant to antibiotics.

The aim of the research was to analyze the attitudes of young people towards the use of antibiotics.

**Material and methods**

The study covered 215 people over 20 years of age. The sample selection for the study was deliberate – they were patients using the services in the primary healthcare facilities located in the city and municipality of Sędziszów in the Świętokrzyskie voivodeship (province), Poland, who voluntarily expressed their willingness to fill in the proprietary questionnaire. Women (58.60%), people between 30 and 39 years of age (30.23%), city residents (57.21%), and people with higher education (41.40%) dominated in the study population.

The diagnostic survey method was used. All persons participating in the study were informed about the purpose of the study. The respondents were also provided with complete anonymity; possibility to identify a person based on particular answers was excluded.

The tool that was used for the research was a self-design questionnaire containing 24 single-choice closed-ended questions concerning the basic knowledge about antibiotics, the frequency of their use, the effects of improper use, sources the respondents used to obtain knowledge about this group of drugs, and sources from which they would like to obtain such information in the future.

**Table 1. Respondents’ answers about antibiotics**

| Question                                                                 | Answer                                                                 | n   | %   |
|-------------------------------------------------------------------------|------------------------------------------------------------------------|-----|-----|
| Definition of antibiotics in the opinion of respondents                 | antibacterial drugs, not effective in treating colds or flu             | 97  | 45.12 |
|                                                                        | antivirals, effective in the treatment of influenza                      | 36  | 16.74 |
|                                                                        | drugs that are effective, in any disease                                | 60  | 27.91 |
|                                                                        | drugs that are worth using prophylactically to avoid serious bacterial diseases | 14  | 6.51  |
|                                                                        | I don't know                                                           | 8   | 3.72  |
| Actions to be taken by the subjects when the doctor decides that there are no indications to prescribe an antibiotic | I’m going to another doctor to get the medicine                        | 12  | 5.58  |
|                                                                        | I urge the doctor to prescribe an antibiotic                            | 72  | 33.49 |
|                                                                        | I agree with the doctor’s decision                                     | 131 | 60.93 |
| Sources of knowledge on antibiotics                                      | from a pharmacist                                                      | 7   | 3.26  |
|                                                                        | from a doctor                                                          | 64  | 29.77 |
|                                                                        | from the Internet                                                      | 144 | 66.98 |
| Sources from which the subjects would like to learn about antibiotics    | by a doctor                                                            | 163 | 75.81 |
|                                                                        | in clinics                                                             | 3   | 1.40  |
|                                                                        | in schools                                                             | 38  | 17.67 |
|                                                                        | in hospitals                                                           | 7   | 3.26  |
|                                                                        | in TV                                                                  | 4   | 1.86  |

**Statistical analysis**

The research material was analyzed statistically using Microsoft Excel 2013 (Microsoft Cop., Armonk, USA) and STATISTICA v. 13.1 (StatSoft Inc., Tulsa, USA). Basic descriptive statistics such as mean, standard deviation (SD), minimum, maximum, and median, were calculated. The Shapiro–Wilk test was used to check the normal distribution. If the distribution was not normal, the Mann–Whitney U test was performed. The χ² test was used to detect the differences between the compared groups. The significance level of $p < 0.05$ was assumed, indicating the occurrence of statistically significant differences.

**Results**

The respondents were asked about basic knowledge on antibiotics, their use and the sources from which they have drawn their knowledge. Table 1 presents answers to individual questions.

The respondents were asked about the basic concepts associated with the treatment with antibacterial drugs, including the definition of antibiotic. The majority of respondents believe that antibiotics are a group of antibacterial drugs that are not effective in treating colds or flu (45.12%). Among the respondents there were also people who claimed that these drugs are effective in every disease (27.91%).

It was also analyzed whether the respondents always agree with the doctor’s opinion. Over 60% of people agree with decisions made by doctors and trust their knowledge. Among the respondents there was also a group that
tries to convince a specialist to prescribe a drug they will take in case of worsening symptoms (33.49%).

It is extremely important whether the sources from which people draw their knowledge about antibiotics contain proven and reliable information, and what sources they would like to use to expand their knowledge in the future.

According to the analysis of the research, the vast majority of the knowledge about antibiotics comes from the Internet (66.98%). Some people also indicated a doctor as a source (29.77%).

In the future, the respondents would like to obtain more information about this group of drugs from their doctor (75.81%). Some people indicated that school is the place where such information should be disseminated (17.7%).

After analyzing the answers and examining their relation to sociodemographic variables, it can be concluded that gender does not significantly influence the differentiation of individual answers in which knowledge about the rationality of antibiotics used was assessed. A non-parametric χ² test was performed. Statistical analysis did not reveal a significant relationship (p > 0.05). Significant variability was observed in relation to such variables as place of residence, age and education.

The respondents were asked when in their opinion the antibiotic therapy can be terminated (Fig. 1). Statistical analysis showed that the place of residence affects this opinion (χ² = 8.618, p = 0.013). The vast majority of respondents living both in the city and in the countryside believe that they can finish the treatment when the treatment time as recommended by the doctor expires. However, in the group living in the countryside, a higher percentage of people claimed that an improvement health condition is tantamount to the possibility of stopping taking the antibiotic (15.22%).

The analysis of the collected data shows that age influences whether the examined person tries to convince the doctor to prescribe an antibiotic despite the lack of indications (χ² = 12.216, p = 0.006). In the youngest group (20–29 years of age), the vast majority of people agree with the decision of the specialist because they know that the antibiotic can lose its effectiveness when really needed (72.55%). Those between 40 and 49 and over 50 years of age more often persuade their doctor to give them antibiotics because they want to feel better quickly (Fig. 2).

Statistical analysis showed that there is a significant relationship between age and a decision to take an antibiotic without consulting a doctor, as shown in Fig. 3 (χ² = 18.635, p = 0.004). Individuals between 40 and 49 years of age and over 50 are more likely than younger people to take the drug without consulting a specialist. The majority of respondents between 20 and 29 years of age have never reached such decision (66.67%).

The respondents were asked if they ever gave their antibiotic to another person (Fig. 4). The differences in results were analyzed in relationship to the level of education of the respondents. The statistical analysis shows it influences whether the respondents hand over to somebody else their antibiotic that was left after previous antibiotic therapy (χ² = 27.301, p = 0.001). Most often, people with higher level of education provided answers that they never hand over their antibiotic to another person, even if they are asked to (71.91%). Among the surveyed group, there were also people who happened to give the drug to members of their families.
Discussion

The invention of antibiotics was an extremely important event. They made it possible to treat diseases that previously caused deaths of millions of people worldwide. Unfortunately, their improper use led to a dangerous phenomenon of bacterial resistance, which is why the rational use of antibiotics is so important. This problem has been recognized by the WHO, which supports broadening public knowledge about the principles of antibiotic therapy.9,10

According to the data obtained from the study by Hwang et al., women were more likely to give correct answers (51%) concerning the use of antibiotics in comparison to men (44%). Those who graduated from university presented better knowledge on this subject (70%) than those who did not have secondary education (37%).11

On the basis of the study presented in this paper, such dependence can also be observed.

A significant proportion of people in the examined group are also aware of the fact that the antibiotic can be discontinued only when the time recommended by the specialist during the visit has passed (82%). A smaller proportion of people claim that an improvement of their condition can be a basis for discontinuation of therapy, regardless of the doctor’s recommendations (9%).

In the study by Napolitano et al., where knowledge on and experience in the use of antibiotics in Italy were analyzed, only 9.8% of the respondents knew the definition of antibiotic resistance, and 21.2% knew when to use antibiotics.12

The analysis of research results from Lithuania also indicates insufficient knowledge about antibiotics. The respondents often confused antibiotics with non-steroidal anti-inflammatory drugs and antipyretic drugs. Half of the respondents defined antibiotic incorrectly, believing it to be effective in treating viral or both viral and bacterial infections. It is worrying that some of the respondents used antibiotics without consulting a doctor (27.8%). From the material collected through the questionnaire, it appears that more than half of the respondents (54.42%) have never decided to hand over to another person an antibiotic that was left at home after previous antibiotic therapy.
person an antibiotic that was left at home. Unfortunately, among the respondents, there were also people who did such thing within the family circle (33.33%). It is worrying that a large number of respondents take antibiotics without consulting their doctor when they feel unwell and cannot visit a doctor due to lack of time (52.09%).

The Antimicrobial Resistance report shows that Europeans receive information about antibiotics from their GP (32% of respondents), from their pharmacist (10%) and from other healthcare professionals (6%). As far as less professional sources were concerned, these were TV commercials (27%), news (27%), newspapers (19%), and Internet (13%).

The respondents most often indicated the Internet as a source of knowledge about antibiotics (66.98%). They also reported that a doctor is the person from whom they draw their knowledge on this subject (29.77%). The majority of the respondents believe that in the future, they would like to obtain knowledge about the proper use of antibiotics from a specialist (75.81%). The lack of indication of the Internet as a place to obtain knowledge about drugs may indicate that they are aware of the fact that it is not the most reliable source of information.

Conclusions

The study shows that the respondents generally have knowledge of the general principles of proper antibiotic use and know the negative consequences of their unjustified use; however, they often take them without consulting their doctor. There is a need to increase public awareness of the effects that may occur when antibiotics are improperly administered. This may contribute to containing the growing phenomenon of antibiotic resistance.

ORCID iDs
Magdalena Anna Wasik https://orcid.org/0000-0003-2249-8498

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