

Original papers

The level of knowledge about parasitic diseases and the threats resulting from their presence in the environment evaluated in a group of parents of preschool children

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ABSTRACT. Despite a significant civilization advancement, parasitic diseases still pose a serious diagnostic and therapeutic problem. Children's susceptibility to these infections stems from their immature immune system and lack of basic hygiene routines. The objective of the study was to evaluate the level of knowledge which parents of preschool children possess about parasitic diseases in their children's environment. The study was carried out in the group of 151 parents of preschool children living both in the city and in the country. The survey was carried out by means of a diagnostic poll with the application of a self-designed research questionnaire. To make the evaluation even more objective, a special scale was created in which parents could score points for their answers (0 – wrong answer, 1 – correct answer). The total number of points ranging from 0 to 9 indicated an unsatisfactory level of knowledge, from 10 to 13 – satisfactory level, from 14 to 16 – good level and from 17 to 20 – very good level of parents' awareness. The results of the study reveal that the level of parents' knowledge about parasitic diseases is only satisfactory. A statistically significant relationship was observed between the variables such as education and sex. The higher education, the higher level of knowledge. Moreover, women were more knowledgeable in the field of parasitic diseases than men were. Financial status of the family did not influence the level of parents' awareness. Well-planned educational programmes might have a positive influence on developing proper hygiene routines in families, which, in turn, will limit the risk of spreading parasitoses in the population of children.

Key words: parasitic diseases in children, parents' knowledge

Introduction

Despite a significant civilization advancement, parasitic diseases still pose a serious diagnostic and therapeutic problem in the world [1,2] and in Poland [3–5]. The importance of this problem as well as its supervision is regulated by the act of 5 December 2008 about preventing and eradicating contagious infections and diseases among people [6].

Parasites constitute an inseparable part of the ecosystem and they are likely to attack its weakest

link, which is children. Giardiasis, toxoplasmosis, ascariasis, enterobiosis, toxocarosis, taeniosis or pediculosis are only a few examples of diseases that children might be exposed to as a result of their contact with parasites. Children's susceptibility to these infections stems from their immature immune system, lack of hygiene routine and bad hygiene habits or specific behavior (e.g. geophagia, onychophagia, playing with pets). These infections are frequently remittent and chronic [1–5]. It cannot be ignored that the efficiency of the treatment might

be affected by changeable genetic features of the parasite [7,8]. Although in our climatic zone parasites are not usually life-threatening, still their impact on our lives cannot be underestimated. In the diagnostics of parasitic infections basic laboratory tests such as stool analysis, complete blood count with differential and platelet counts and serological test (especially important in the case of tissue parasitoses) play a prominent role. Parasitic diseases prevention should include widespread prophylaxis targeted on the family.

The aim of the study was to evaluate the level of parents' knowledge about parasitic diseases, which their preschool children might be exposed to in the environment in which they stay.

Materials and Methods

The research was carried out by means of a diagnostic poll with the application of research questionnaire in three randomly chosen blood sample collection points run by Diagnostyka Company in Krakow. As many as 151 people took part in the study and they were parents (both men and women) who had a preschool child or children and who came to the sample collection point on that particular day for screening tests or to have their children analytically tested because of a suspicion of a parasitic disease.

The study was carried out by means of a diagnostic survey with the application of a self-designed questionnaire based on the up-to-date bibliography. The questionnaire consisted of 29 questions, 6 of which dealt with demographic data and the health condition of the respondents' children. The questions numbered from 7 to 23 were meant to check the respondents' knowledge about parasitoses and the respondents were awarded points for them according to the following scale: 0 (wrong answer), 1 (correct answer). In the case of most questions there was only one correct answer. The exception was question 23, which was a multiple-choice question (maximum number of points awarded for this question was 3). The remaining 5 questions (from 24 to 29) were connected with following the rules of antiparasitic prophylaxis by parents. The level of the surveys' knowledge was evaluated according to the following criteria: from 0 to 9 points – unsatisfactory, 10–13 points – satisfactory, 14–16 points – good, 17–20 points – very good.

In statistical analysis t-student test and χ^2 -test of

independence were applied. ANOVA variation analysis and Turkey's post hoc test were used as well. Correlations were determined by means of Spearman's rank correlation coefficient. The significance level was assumed as $p=0.05$.

Informed consent for this anonymous survey was obtained both from the parents and the company's management.

Results

The vast majority of the study participants were women – 118 (78%), whereas 33 men made up 22% of the respondents. As many as 67 respondents (44.4%) had secondary education, 55 parents (36.4%) – higher education, 26 people (17.2%) finished a vocational school and 3 respondents had only primary education. Seventy-six parents (50.3%) lived in the country and seventy-five respondents (49.7%) were city dwellers. A significant number of respondents claimed their financial status was average (N=69; 46%), a similar percentage declared it was fairly good (N=65; 43.3%). The others considered their financial status as either very good (N=8; 5.3%), or very bad (N=8; 5.3%).

More than half of the respondents (N=83; 56.5%) ticked the correct definition of a parasite, that is: an animal or plant organism that lives in or on another animal or plant and gets food or protection from it. However, more than one third of the respondents (N=57; 38.8%) ticked the wrong definition. Five respondents believed that a parasite has a positive influence on its host (3.4%), two people ticked the answer that parasites are organisms which continuously compete for environmental resources and four respondents did not give any answer.

The respondents were right to observe that while playing in the sandbox a child may get infected with *Toxocara canis* and *T. cati* (75.5%), *Toxoplasma gondii* (43%) and *Giardia intestinalis* (21.2%), but they also believed that this place can also be a source of infections with *Enterobius vermicularis* (48.3%), *Ascaris lumbricoides* (24.5%) and tapeworms from the genus *Taenia* (14.6%) and *Echinococcus* (7.3%). Most parents correctly defined the most frequent route of infection as alimentary canal (N=89; 61%), but still 40 respondents (27.4%) were convinced that it is a contact route. The other routes of infection mentioned by parents included faecal-oral (8.2%) and vertical route (3.4%).

For 126 respondents (86.3 %) the main source of infections with larvae of tapeworm was raw pork meat, which actually is true. According to 117 people (80.1%) contact with soil or sand contaminated with animal faeces was the reason of toxocarosis. The highest level of respondents' knowledge was observed as far as pediculosis symptoms were concerned (89% of parents gave the correct answers to the questions) and while indicating the age group which is the most vulnerable to parasitic infections (87% of correct answers). The most difficult questions were the ones in which the respondents had to indicate the laboratory test which was the basis of enterobiosis diagnosis (15% of correct answers) and in which they had to decide after what period of time control tests on ascariasis should be carried out (21%).

The evaluation carried out by means of the questionnaire indicated that respondents' knowledge can be classified as satisfactory. The average number of points scored by the respondents was 10, the median also reached 10. The highest number of respondents scored 11 points (N=28). The minimum number of points scored by the respondents was 3 (N=1), whereas the maximum number was 17 (N=1) – Fig.1.

The awareness of parasitic infections was higher among women than among men. The women scored on average 10.4 points (with the standard deviation of 2.4), whereas men gave, on average, 8.8 correct answers (with the standard deviation of 2.4) – Table 1. The differences observed were statistically significant ($t=3.2$; $p=0.002$).

The factor which affected the level of knowledge about parasitic infections in a significant way was education ($F=7.6$; $p=0.000$). The lowest average score was observed in the case of respondents with primary education. However, there might be a mistake in these results as the number of respondents in this group was very low (only 3 people). The parents with vocational education gave correct answers to 8.3 questions on average, the

Table 1. The average score achieved by the respondents evaluating their knowledge about parasitic diseases listed according to the respondents' sex

Sex		N	Average	Standard deviation
Total score	Female	118	10.36	2.377
	Male	33	8.82	2.686

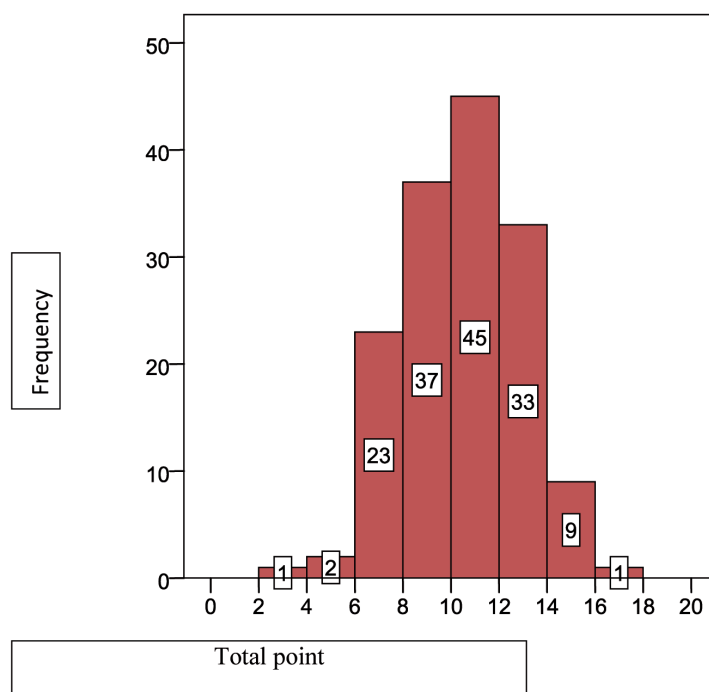


Fig.1. The level of the respondents' knowledge about parasitic diseases – histogram of the scores

ones with secondary education to 9.9 and those with higher education scored 10.9 points on average (Table 2). Further *post hoc* analysis carried out by means of Turkey's test proved a statistically significant difference between the group with vocational education and the ones with secondary or higher education (the level of significance reached $p=0.014$ and $p=0.000$ respectively). No statistically significant relationships were found between parents' financial status ($p=0.710$) and their level of knowledge as well as the number of children ($p=0.584$) and their health condition ($p=0.239$).

In the evaluation of antiparasitic prophylaxis declared by parents the information about pets and hygiene and eating habits were taken into consideration. The questions dealt also with the

Table 2. The average score achieved by the respondents evaluating their knowledge about parasitic diseases listed according to the education they declared

Education	N	Average	Standard deviation
Primary	3.0	10.3	1.2
Vocational	26.0	8.3	2.9
Secondary	67.0	9.9	2.1
Higher	55.0	10.9	2.4
Total	151.0	10.0	2.5

sources of respondents' knowledge about parasitoses. More than half of the respondents owned a pet (N=86; 57%). The most common pets were dogs (N=54; 35.8%) and cats (N=35; 23.2%). Other pets included domesticated rodents (hamsters, guinea pigs, chinchillas). The vast majority of owners claimed that their pets were dewormed regularly. Most respondents declared they wash their hands before they start preparing meals (N=131; 87%), those who did it sometimes made up 11.25% of the group (N=17) and only 2 respondents admitted to not doing it at all. Over 90% of the respondents (N=136) washed their hands after using the bathroom, 8.6% (N=13) claimed that they sometimes do it and two respondents admitted that they never do it. As far as the gardening is concerned, only 1.98% of the group (N=3) did not wash their hands afterwards and 15.1% (N=10) did it only from time to time. One person did not answer this question. The others always washed their hands after gardening (N=137; 90.7%). As many as 81.3% of the respondents (N=122) washed food products before preparing them. Only 3.97% (N=6) did not do it and 14.56% of the respondents (N=22) did it only occasionally.

Most surveyees drank tap water or water of unknown origin. As many as 46.0% of the respondents (N=69) claimed to do it regularly and 17.9% (N=27) drank such water only from time to time. Only 36% of the respondents (N=54) declared never to drink tap or untested water. Almost 30% of parents (N=45) let their children drink tap water or unboiled milk.

Almost 59% of the respondents (N=89) shared a towel with other people. The number of parents who sometimes shared a towel reached 19.9% (N=30) and the same number of parents never did it. Most respondents (74.2%; N=112) vacuumed and dusted their houses regularly and carefully. While 19.2% of parents (N=29) did it from time to time, only 5.3% of the respondents (N=8) never did it. The answer distribution seemed to be sex-dependent. Over 80% of women (N=95) dusted the house and only two women never did it. As far as men are concerned, 60% of them (N=20) dusted the house. This relationship was statistically significant ($\chi^2=21.63$; $p=0.000$).

Almost 63% of the respondents (N=95) let their children play in the sandboxes which were not animal-proof. Most respondents did not allow their children to stroke the animals they met by chance (N=117; 79.5%). The men were more likely to let

their children play with such animals (33.3%). The relationship was statistically significant ($\chi^2=3.94$; $p=0.047$). Also the people who lived in the city were more likely to allow for their children's contact with accidentally met animals than the country people ($\chi^2=4.94$; $p=0.026$).

More than half of the respondents washed their children's hands when they came back home from kindergarten, playground or after their contact with animals (N=120; 82.2%). Men were far less likely to wash their children's hands than women were ($\chi^2=7.02$; $p=0.008$). Almost 90% of the respondents (N=135) tried to take regular care of the hygiene of their children's nails and cut them short.

Most respondents claimed that their main source of information about parasitic infections was the Internet (62.9%; N=95), other helpful sources included consultations with a doctor (54.7%; N=82) and conversations with friends (45.9%; N=69) or family members (41.2%; N=62). The remaining sources were books and magazines (34.4%; N=52) and consultations with a nurse (14.6%; N=22). Almost 7% of parents (N=10) were not interested in this topic at all. The respondents could choose more than one option, which is the reason why the sum of these results does not make up 100.

Discussion

Parasitic diseases still pose a serious health problem in Poland [9–11]. Despite this fact, there seem to be few scientific reports on the level of social awareness of the risk which parasitic infections involve and the ways in which they could be prevented. The study carried out by Przychodzień et al. [12] on students' awareness of the risk of selected parasitic infections typical of common places in which children play in the summertime proved that their knowledge in this field was low. Moreover, the current individual study shows that also parents' knowledge about parasitic infections is only satisfactory.

It is also important to point out that both the individual study and the source mentioned above prove that the knowledge about parasitoses is higher among women than among men [12]. It might be a result of a stereotypical attitude so common in Polish society, according to which women are primarily responsible for taking care of their children's health. However, Omoigberale and Airauhi [13] in their study present slightly different results, which indicate a low level of knowledge in the group of mothers,

which is, according to the authors, one of the main reasons of spreading infections among children. The research was carried out in a different cultural environment, which might have influenced the results. At the same time the authors point out that parasitic infections were more common in the group of children with a lower social and financial status, which was not proved in the current study. It might be concluded that what is essential in the prophylaxis of parasitic infections is not only parents' awareness but also their proper health routines, which their children will follow. If parents do not know the rudiments of antiparasitic prophylaxis, their children are more vulnerable to infections.

The analysis of the answers given by the respondents in the current study indicates that most parents are aware of the fact how important it is to wash hands after work and before meals as well as to maintain proper hygiene while preparing meals and to keep the house clean. Surprisingly, more than half of these respondents admitted to sharing a towel with others, which may give rise to concerns that they may not be aware of the possibility of contracting numerous diseases, including parasitic ones, also in this way [14]. Taking into consideration the results mentioned above and also the fact that there are no commonly available analyses of parasitoses transmitted via a sexual route, it should be concluded that this problem should be urgently included in educational programmes targeted at parents.

Another important issue is the fact that a lot of parents who completed the questionnaire let their children use sandboxes which are not animal-proof. The problem of health hazard among children using city sandboxes was indicated by many researchers [15–17]. Moreover, it is worth noticing that the current study confirms the fact that some parents drink and let their children drink water from unknown sources, which may be a serious risk to their health according to the researches carried out by other authors [18–20].

Solid parents' knowledge about parasitoses is one of the most important factors leading to their eradication. As parents have the biggest influence on their children's habits, it is essential to provide them with reliable and accessible information about the prophylaxis of parasitic diseases. Thus, an important step to prepare proper educational programmes should include the study and analysis aimed at evaluating the knowledge of parents as well as medical students, doctors and nurses.

Conclusions

1. The level of parents' awareness of the risk of parasitic infections typical of the places in which their children stay is classified as satisfactory.
2. It was not proved that the family financial status, the number of children in the family and the condition of children's health have an influence on the parents' awareness.
3. The vast majority of parents who took part in the study followed the rules of antiparasitic prophylaxis, however passing these rules on to their children depended on parents' sex and place of residence.
4. Well-planned educational programmes aimed at parents might have a positive influence on developing proper hygiene routines in families, which, in turn, will limit the risk of spreading parasitoses in the population of children.

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