DOI: https://doi.org/10.21784/IwP.2024.010

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# Analiza stopnia zaawansowania objawów biegunki ostrej wywołanej rotawirusami u dzieci oraz poziomu wiedzy rodziców na temat profilaktyki tego stanu

## Analysis of the severity of symptoms of acute diarrhoea caused by rotaviruses in children and the level of parental knowledge about the prevention of this condition

### Abstract

**Wstęp.** Zakażenia żołądkowo-jelitowe u małych dzieci w postaci ostrej biegunki, o etiologii wirusowej stanowią poważny problem epidemiologiczny i terapeutyczny.

**Cel**. Celem pracy jest określenie stopnia zaawansowania objawów biegunki ostrej u dzieci o etiologii rotawirusowej oraz zbadanie poziomu wiedzy rodziców na temat czynników predysponujących do tego stanu i działań profilaktycznych.

**Materiał i metody.** Zbadano grupę 100 osób w wieku od 18 do 40 lat, rodziców dzieci do 4 roku życia hospitalizowanych z powodu ostrej biegunki Pytania dotyczyły określenie stopnia zaawansowania objawów biegunki ostrej u dzieci o etiologii rotawirusowej oraz zbadanie poziomu wiedzy rodziców na temat czynników predysponujących do tego stanu i działań profilaktycznych. W badaniach wykorzystano metodę sondażu diagnostycznego z wykorzystaniem kwestionariusza ankiety własnej konstrukcji oraz standaryzowanego kwestionariusza oceny stanu dziecka przy przyjęciu i z wykorzystaniem skali CDS.

**Wyniki.** Analiza wyników badań wykazała, że poziom wiedzy rodziców na temat przebiegu, postępowania i profilaktyce w biegunce infekcyjnej u dzieci jest niski. Rodzice niechętnie korzystają ze źródła informacji, jakim jest pielęgniarka i lekarz, a wybierają treści zamieszczone w mediach i internecie, traktując je jako wiarygodne. W wyniku przeprowadzonych badań ustalone zostało, jakie czynniki socjodemograficzne mają wpływ na taki stan wiedzy rodziców.

**Wnioski.** Istotny wpływ na wiedzę rodziców na temat przebiegu, postępowania i profilaktyce w biegunce infekcyjnej u dzieci ma wiek, wykształcenie i miejsce zamieszkania. Okazało się, że płeć rodziców nie ma istotnego wpływu na poziom wiedzy w zakresie omawianego schorzenia.

**Słowa kluczowe:** rotawirus, biegunka, odwodnienie, profilaktyka, szczepienia

## Summary

**Introduction.** Gastrointestinal infections in young children in the form of acute diarrhoea of viral aetiology constitute a serious epidemiological and therapeutic problem.

**Aim.** The aim of the study is to determine the severity of symptoms of acute rotavirus diarrhoea in children and to evaluate the level of parental knowledge about the factors predisposing to this condition and the preventive measures.

**Material and methods.** A group of 100 individuals aged 18 to 40, parents of children under the age of 4 who were hospitalised due to acute diarrhoea, was surveyed. The questions concerned determining the severity of symptoms of acute diarrhoea in children of rotavirus aetiology and assess the level of parental knowledge about the factors predisposing to this condition and preventive measures. The study utilised the diagnostic survey method with a self-designed questionnaire, as well as a standardised questionnaire for assessing the child's condition on admission and the CDS scale.

**Results.** The analysis of the results showed that parental knowledge about the course, management, and prevention of infectious diarrhoea in children is low. Parents tend to avoid seeking information from nurses and physicians, instead relying on media and Internet sources, which they consider as credible. The study identified sociodemographic factors that influence parental knowledge.

**Conclusions**. Age, education, and place of residence significantly influence parental knowledge about the course, management, and prevention of infectious diarrhea in children. It was found that the gender of the parents does not have a significant impact on the level of knowledge regarding the disease in question.

**Keywords:** rotavirus, diarrhoea, dehydration, prevention, vaccinations

## Introduction

Acute infectious diarrhoea is a very common gastrointestinal infection, especially in children. Based on the duration of the condition, diarrhoea is classified as either acute or chronic. Considering the causes, diarrhoea can be divided into infectious and non-infectious. The most frequent cause of this condition in children under two years of age is an infectious agent, which includes bacteria or viruses. The condition is very often seasonal and, as it spreads, can create epidemic outbreaks in the environment. Diarrhoea in children can pose a life-threatening risk, as they become dehydrated much more quickly. Regardless of the cause of acute diarrhoea, it is always accompanied by loss of water, electrolytes, and bicarbonates. In most cases, acute diarrhoea is self-limiting and does not require the use of antibacterial drugs. The most common aetiological agent of acute enteritis in children, responsible for the majority of acute diarrhoea cases, are rotaviruses. Rotavirus infection can lead to various complications. The most common of these are maldigestion and malabsorption syndromes.

## Aim

The aim of the study was to determine the severity of symptoms of acute rotavirus diarrhoea in children and to evaluate the level of parental knowledge about the factors predisposing to this condition and the preventive measures.

## Material and methods

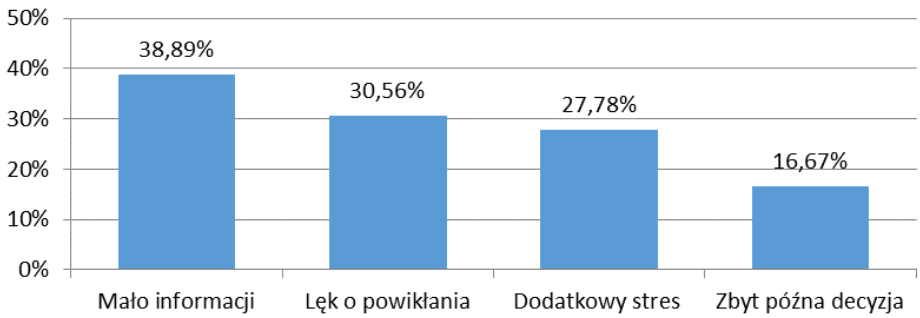
A group of 100 individuals aged 18 to 40, parents of children under the age of 4 who were hospitalised due to acute diarrhoea, was surveyed. The questions concerned determining the severity of symptoms of acute diarrhoea in children of rotavirus aetiology and assess the level of parental knowledge about the factors predisposing to this condition and preventive measures. The study utilised the diagnostic survey method with a self-designed questionnaire, as well as a standardised questionnaire for assessing the child's condition on admission and the CDS scale.

Among the surveyed parents, 36% were aged between 26 and 30 years, 24% were between 21 and 25 years, 20% were aged 31 to 35 years, 12% were between 18 and 20 years, and 8% were aged between 36 and 40 years. Among the 100 respondents, 71% were women and 29% were men; 66% of the parents lived in an urban area, while 34% lived in a rural area; 35% had secondary education. Vocational education was reported by 30% of respondents, while 28% had higher education. The least, 7% of individuals, had primary education. The largest group of parents, 30%, had a child between 2 and 3 years old. Slightly fewer respondents (29%) had a child aged between 1 and 2 years. An older child, between 3 and 4 years, was reported by 22% of the respondents, while 19% of the surveyed parents had the youngest child, i.e. up to 1-year-old.

The verification of statistical hypotheses regarding the relationships between quantitative variables was conducted using the correlation coefficient test. The significance of differences between quantified variables was tested using the Student's t-test or one-way analysis of variance. In the case of testing the statistical significance of the difference in percentages, a test for two or more fractions (proportions) was used. The commonly assumed significance level of $\alpha=0.05$ was adopted.

## Results

In the case of 40% of respondents, their child had been hospitalised twice due to acute diarrhoea, 36% of parents were in the hospital with their child for the first time, 19% indicated it was their child's third hospital stay, and 5%. According to the survey data, perineal care was performed for 44.14% of the children, and over 36.55% were placed in a single room. In 35.86% of the children, antibiotic therapy was applied. Antiseptic and aseptic measures, e.g. washing and disinfection, were taken in 16.55%, and in 11.72% of the cases, the child was safeguarded during vomiting. According to the respondents, 64% of the parents had vaccinated their child against rotaviruses, while 36% had not.

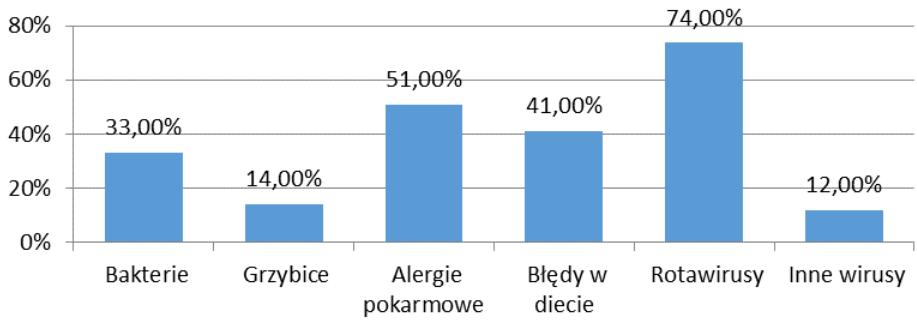



Mało informacji - Insufficient information Lęk o powikłania - Fear of complications Dodatkowy stres - Additional stress Zbyt późna decyzja - Late decision

**Figure 1.** Reasons for not vaccinating

Among the 36 parents who decided not to vaccinate their child against rotavirus, 38.9% cited insufficient information on the topic as the reason. Fear of complications was indicated by 30.56% of respondents. Additional stress was a reason for 27.8% of parents, and 16.7% reacted too late.

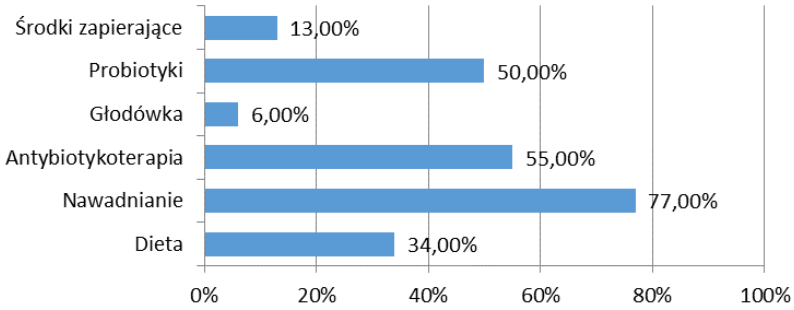
In the final, third of the questionnaire, parents were asked to answer questions about the causes of diarrhoea, treatment methods and prevention. Parents also expressed their views on complications and sources of knowledge. They also made a subjective assessment of their knowledge regarding the causes, symptoms, and management of diarrhoea, including preventive measures.




Bakterie - Bacteria Grzybice – Fungal infections Alergie pokarmowe - Food allergy Błędy w diecie - Dietary errors Rotawirusy - Rotavirus Inne wirusy - Other viruses

**Figure 2.** Distribution of causes of diarrhoea according to parental knowledge

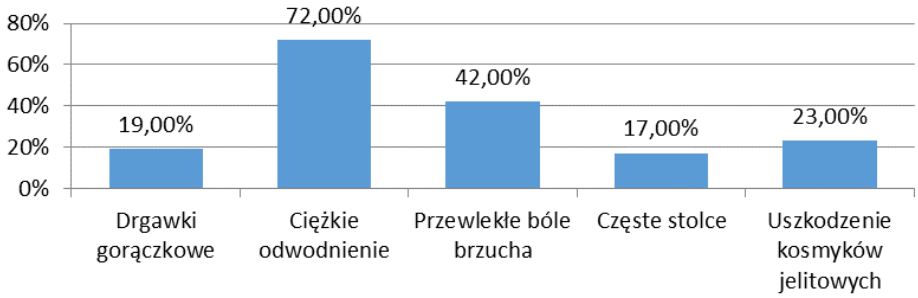
Among the 100 respondents, 74% of parents identified rotavirus as the cause of diarrhoea. Food allergies were indicated by 51.00% of the respondents. According to 41.00% of the parents, dietary errors were the cause, while 33.00% pointed to bacteria, 14.00% to fungal infections, and 12.00% to other viruses.




Środki zapierające - Constipating agents Probiotyki - Probiotics Głodówka - Fasting Antybiotykoterapia - Antibiotic therapy Nawadnianie - Rehydration Dieta - Diet

**Figure 3.** Distribution of diarrhoea treatment methods according to parental knowledge

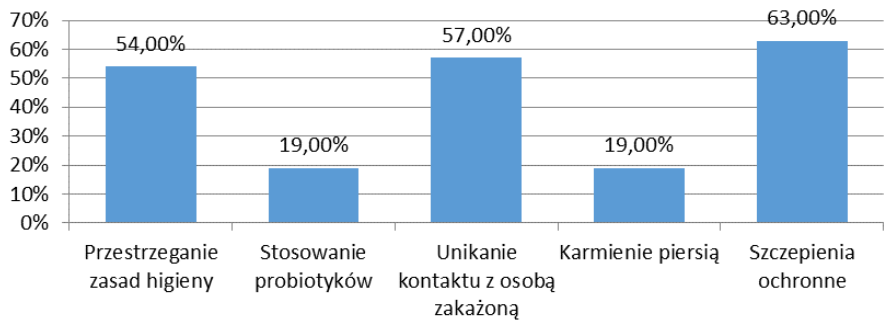
The majority of parents, 77.0%, identified rehydration as the method for treating diarrhoea in children, 55.0% pointed to antibiotic therapy, and 50.0% considered the use of probiotics as a treatment method. A total of 34.0% of respondents indicated the adoption of a diet, 13.0% mentioned the use of anti-diarrheal medications, and 6% suggested fasting.




Drgawki gorączkowe - Febrile seizures Ciężkie odwodnienie - Severe dehydration Przewlekłe bóle brzucha - Chronic abdominal pain Częste stolce - Frequent stools Uszkodzenie kosmków jelitowych - Damage to the intestinal villi

**Figure 4.** Distribution of complications according to parental knowledge

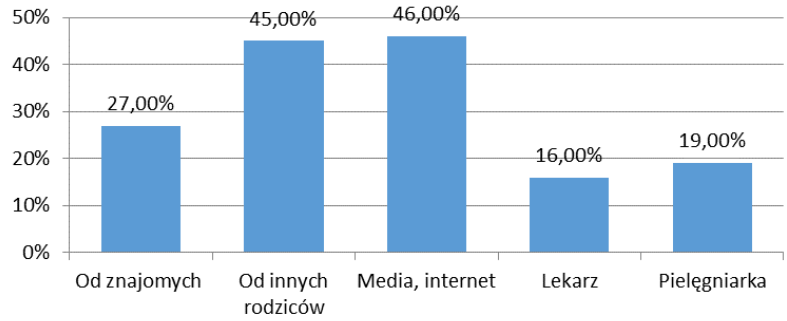
Among all respondents, 72.0% of parents cited severe dehydration as the most serious complication, whereas chronic abdominal pain was cited by 42.0% of respondents. Intestinal villi damage was noted by 23.0%, febrile seizures by 19.0%, and frequent stools by 17.0%.




Przestrzeganie zasad higieny - Practising good hygiene Stosowanie probiotyków - Use of probiotics Unikanie kontaktu z osobą zakażoną - Avoidance of contact with an infected person Karmienie piersią - Breastfeeding Szczepienia ochronne - Protective vaccination

**Figure 5.** Distribution of methods for preventing rotavirus diarrhoea according to parental knowledge

Among the 100 respondents, 63.0% of parents identified vaccination as the most commonly used method to prevent rotavirus infection. More than half of the respondents, 57.0%, considered avoiding contact with an infected person as an effective method, and 54.0% emphasised the importance of practising good hygiene. The use of probiotics and breastfeeding was mentioned by 19.0% of parents.




Od znajomych - Friends Od innych rodziców - Other parents Media, internet - Media, Internet Lekarz - Physician Pielęgniarka - Nurse

**Figure 6.** Distribution of sources of knowledge about rotavirus according to parents

A total of 46.0% of parents obtained knowledge about the causes, symptoms, and management, including prevention of diarrhoea, from the media and the Internet. For 45.0% the source of knowledge were other parents and for 27.0% friends. Only 19.0% obtained knowledge from a nurse and 16.0% from a physician.

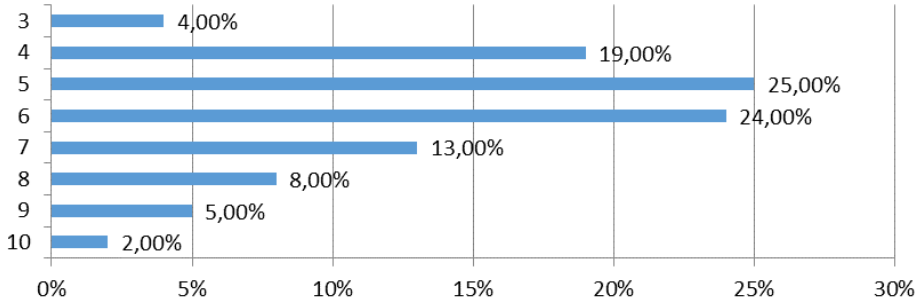



**Figure 7.** Distribution of subjective assessment of knowledge according to parents

In this question, parents provided a subjective assessment of their knowledge on a scale from 1 to 10. The largest group of respondents, 25%, rated their knowledge of the causes, symptoms, and management of diarrhoea at 5 points, while 24% rated it at 6 points, 19% at 4 points, and 13% at 7 points. Only 8% of parents rated their knowledge at 8 points, and just 5% gave themselves 9 points. A mere 4% of respondents rated their knowledge at 3 points, and 2% rated it at 10 points. The mean score of all parents was 5.77, which, considering the 1-10 scale, is close to its midpoint (5.5). Therefore, parental knowledge should be considered low.

## Assessment of the Child's Condition According to the Clinical Dehydration Scale – CDS (*CLINICAL DEHYDRATION SCALE*)

More than half of the children examined (53%) were calm and conscious on the day of hospital admission. Agitation and anxiety were reported in 39% of the children, while 8% were drowsy, unconscious, and limp. From the data obtained, weight loss of less than <3 kg was experienced by 85% of children and loss of <4-10 kg by 15% of children. Among all 100 children, 54% drank normally, though they may have refused fluids at times. A total of 43% drank poorly, and 3% were thirsty and drank eagerly The data shows that 96% of the children had normal eye appearance, while slightly sunken eyes were observed in 4% of the children. According to the data obtained, tears were found in 52% of the children. Most of the children, about 54%, had dry mouths and tongues, while moist mucous membranes were observed in 44% of the children, and only 2% had very dry mucous membranes. Regarding skin turgor, the study found that in 70% of children the skin fold returns to normal quickly and in 30% of children the skin fold returns to normal over a period of <2s. Normal or reduced diuresis was reported in 39% of children, while 61% had reduced diuresis.

**1. The severity of symptoms on admission allows the majority of children to be classified into Group II according to the Clinical Dehydration Scale**

The clinical dehydration scale (CDS according to ESPGHAN guidelines – European Society for Paediatric Gastroenterology Hepatology and Nutrition) can be used to determine the degree of dehydration. On the basis of four parameters, the child's condition is determined by assigning points to the individual symptoms.

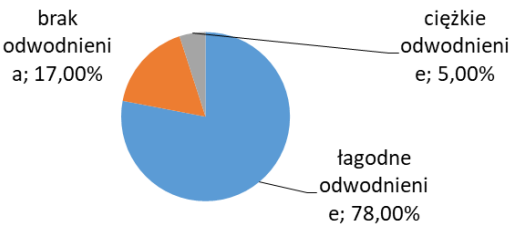
**Table 1.** Clinical characteristics of CDS

| | 0 punktów | 1 punkt | 2 punkty |
|---|---|---|---|
| Stan ogólny | prawidłowy | Dziecko spragnione. Niespokojne lub senne, ale drażliwe przy dotknięciu | Dziecko senne, wiotkie, skóra zimna lub spocona, śpiączka |
| Oczy | Prawidłowe | Nieznacznie zapadnięte | Znacznie zapadnięte |
| Błony śluzowe | Wilgotne | Klejące | Suche |
| Łzy | Normalna objętość | Zmniejszona objętość | Brak |

0 punktów – brak odwodnienia;
1-4 punktów – łagodne odwodnienie;
5-8 punktów – umiarkowane lub ciężkie odwodnienie

0 punktów – 0 points, 1 punkt – 1 point, 2 punkty – 2 points. Stan ogólny – General appearance Prawidłowy - Normal Dziecko spragnione, niespokojne lub senne, ale drażliwe przy dotknięciu – Thirsty, restless, lethargic, but irritable when touched Dziecko senne, wiotkie, skóra zimna lub spocona, śpiączka – Drowsy, limp, cool or sweaty; comatose or not Oczy - Eyes Prawidłowe - Normal Nieznacznie zapadnięte – Slightly sunken Znacznie zapadnięte - Very sunkenB łony śluzowe - Mucous membranes Wilgotne - Moist Klejące - Sticky Suche - Dry Łzy - Tears Normalna objętość - Present Zmniejszona objętość - Decreased Brak - Absent 0 punktów - brak odwodnienia – 0 points – no dehydration 1-4 punktów - łagodne odwodnienie - 1-4 points - mild dehydration 5-8 punktów - umiarkowane lub ciężkie odwodnienie - 5-8 points - moderate to severe dehydration

Based on the 100 parents surveyed, the following results were obtained:




Brak odwodnienia - No dehydration
Łagodne odwodnienie - Mild dehydration
Ciężkie odwodnienie - Severe dehydration

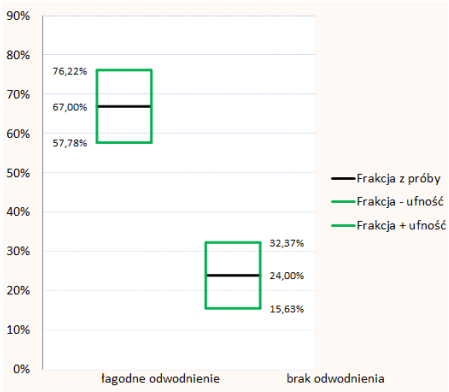
**Figure 8.** Degree of dehydration

Mild dehydration was found in 78% of the children, 17% showed no dehydration, and 5% had severe dehydration. Thus, the largest group consisted of children with mild dehydration, which corresponds to Group II according to the Clinical Dehydration Scale.

**Table 2.** Results of the test for two fractions

| | |
|---|---|
| Sample 1: | mild dehydration |
| Sample size (mild dehydration) | 67 |
| Total sample size | 100 |
| Sample 1 proportion | 0.67000 |
| 95% confidence interval (upper) | 0.76216 |
| 95% confidence interval (lower) | 0.57784 |
| | |
| Sample 2: | no dehydration |
| Sample size (no dehydration) | 24 |
| Total sample size | 100 |
| Sample 2 proportion | 0.24000 |
| 95% confidence interval (upper) | 0.32371 |
| 95% confidence interval (lower) | 0.15629 |
| | |
| Test statistic: Z = (0.67 - 0.24) / 0.0704 = | 6.1059 |
| Two-tailed critical region p | **0.00000** |
| **One-tailed critical region p** | **0.00000** |

Box plot of mild dehydration and no dehydration fractions +/- 95% confidence:




Łagodne odwodnienie - Mild dehydration
Brak odwodnienia - No dehydration
Frakcja z próby - Sample fraction Frakcja - ufność – Fraction - confidence Frakcja + ufność – Fraction + confidence

**Figure 9.** Box plot of fractions

Given that p = 0.000 < 0.05, it was determined that the fraction, i.e., the percentage of children with mild dehydration, is significantly higher than the fraction of children without dehydration. Comparing the percentage of children with mild dehydration to

those with severe dehydration will also yield significant results, as the latter group makes up only 9%.

In conclusion, the main hypothesis that a significant majority of children belongs to Group II of the Clinical Dehydration Scale has been confirmed.

**2. The level of parental knowledge about the course and management of infectious diarrhoea in children, as well as preventive measures in this regard, is assessed as low**

Parental knowledge in the survey questions was assessed both objectivelyand subjectively. Parents rated their own knowledge on a scale of 1 to 10. For analytical purposes, these two assessments were combined to form an overall score. In questions 1-5, a correct answer earned the parent 1 point, while no answer earned 0 points. The maximum possible score was 13 points. Adding 10 points from the parent's subjective assessment resulted in a possible maximum total score of 23 points in the overall knowledge assessment based on this questionnaire.

Accordingly, the following knowledge assessment key was adopted:

0-12 points: insufficient knowledge

12-16 points: sufficient knowledge

16-20 points: good knowledge

20-23 points: very good knowledge

**Table 3.** Percentage of respondents in each knowledge score category:

| **Knowledge assessment** | Insufficient | Sufficient | Good | Very good |
|---|---|---|---|---|
| **scoring range-->>** | up to 12 points | 12 to 16 points | 16 to 20 points | 20 to 23 points |
| **Number of respondents** | 54 | 40 | 6 | 0 |
| **Percentage** | 54.0% | 40.0% | 6.0% | 0.0% |

According to the study, 54% of parents scored up to 12 points, receiving an insufficient knowledge grade regarding the course and management of infectious diarrhoea in children, as well as preventive measures in this area. Based on the study, 40% of parents had at most sufficient knowledge, meaning their overall knowledge of infectious diarrhoea in children was unfortunately low. Only 6% of parents achieved a good overall score, and no one achieved a very good score.

The mean knowledge score of the respondents was estimated at 12.16 points, with an estimation error of 0.3 points, meaning the knowledge was on the borderline between insufficient and sufficient, i.e. very poor. On average, the scores differed from the mean by 3 points, representing 24.3% of the mean, indicating significant variation in the knowledge scores of the parents. In other words, parents significantly differed in their level of knowledge The highest score recorded was 20 points (good) and the lowest was 5 points (insufficient). The hypothesis was confirmed.

### 3. Sociodemographic factors differentiating the level of parental knowledge include gender, age, education, place of residence, Level of knowledge and gender of parents

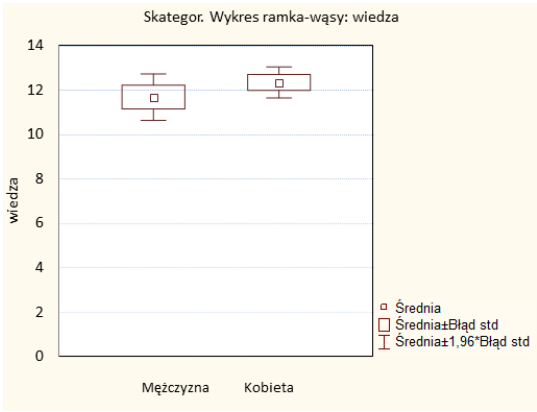
To examine differences between genders in terms of knowledge, the means of both groups were compared using the Student's t-test for independent samples.

**Table 4.** Two-sample t-test assuming equal variances

| | Male | Female |
|---|---|---|
| Mean | 11.690 | 12.352 |
| Variance | 8.293 | 8.917 |
| Standard deviation | 2.88 | 2.986 |
| Observations | 29 | 71 |
| Pooled variance | 8.739 | |
| Mean difference (null hypothesis) | 0 | |
| Cohen's d | 0.222 | |
| Df | 98 | |
| t Stat | 1.016 | |
| One-tailed P(T<=t) | 0.15607 | |
| One-tailed t-test | 1.661 | |
| Two-tailed P(T<=t) | 0.31213 | |
| Two-tailed t-test | 1.984 | |

The mean knowledge score for the male group was 11.69 with a standard deviation of 2.88, while for the female group, it was 12.352 with a standard deviation of 2.986.

Box plot showing the means in both groups, the mean +/- error of the mean and the 95% confidence interval for the means:




wiedza - knowledge Skategor: Wykres ramka-wąsy: wiedza - Categorisation: Box-and-whisker plot: knowledge Mężczyzna - Male Kobieta - Female Średnia - Mean Średnia±Błąd std. - Mean±Std error Średnia±1,96*Błąd std. - Mean±1.96*Std error

**Figure 10.** Confidence interval for the means

Given the calculated p-value = 0.15607, which is higher than the assumed significance level of 0.05, there is no reason to reject the null hypothesis. It can be concluded that the means are statistically equal. The effect size, expressed as Cohen's d, was 0.222, indicating a small effect size. The analysis did not reveal any significant differences between the means of the two groups. This means that gender has not been proven to have a statistically significant influence on the parental knowledge and management of diarrhoea. Women and men do not differ significantly in their knowledge.

**Level of knowledge and age of parents**

An analysis of the influence of age (divided into five categories) on the level of parental knowledge was conducted using Pearson's linear correlation coefficient significance test (StatisticaPL)

**Table 5.** Result of the StatisticaPL analysis

| Variable X & Variable Y | Correlation (Sheet1)Marked correlation coefficients are significant at p < 0.05000(Missing data were removed on a case-by-case basis) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Mean | Standard deviation | r(X,Y) | r* | r2 | t | p |
| knowledge | 12.1600 | 2.9567 | | | | | |
| age | 27.8200 | 5.5439 | 0.28956 | 0.19655 | 0.08384 | 2.99477 | 0.00348 |

The critical value for the two-tailed 5% critical region with a sample size of n=100 is r* = 0.19655. The linear correlation coefficient between age and knowledge is r = 0.28956. Given the p-value = 0.0035 < 0.05, the null hypothesis was rejected, and the alternative hypothesis H1, indicating a statistically significant correlation between the two variables, was accepted. As the modulus of the calculated correlation coefficient exceeds the critical value, it is considered statistically significant. In summary, there is a significant linear correlation between age and knowledge. The increase in parents' age is significantly associated with an increase in knowledge.

**Level of knowledge and education of parents**

A one-way analysis of variance (ANOVA) was conducted to examine whether the average level of knowledge differs between the separate education groups.

**Table 6.** Variance analysis

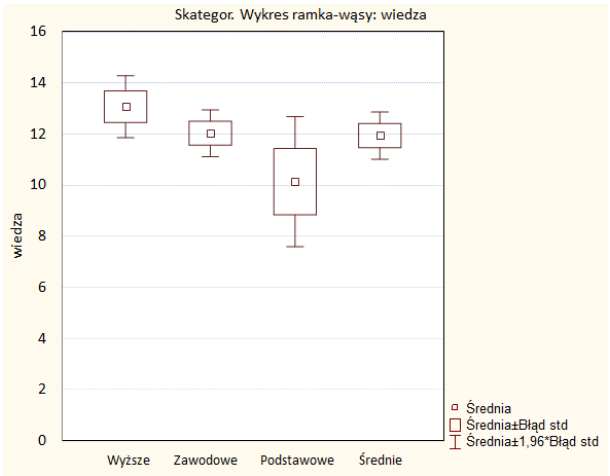
| SUMMARY | | | | | | |
|---|---|---|---|---|---|---|
| Groups | Count | Sum | Mean | Variance | Standard deviation | |
| Higher Ed. | 28 | 366 | 13.071 | 10.661 | 3.265 | |
| Vocational Ed. | 30 | 361 | 12.033 | 6.516 | 2.553 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Primary Ed. | 7 | 71 | 10.143 | 11.810 | 3.436 | |
| Secondary Ed. | 35 | 418 | 11.943 | 7.761 | 2.786 | |
| | | | | | | |
| ANALYSIS OF VARIANCE | | | | | | |
| Source of variance | SS | df | MS | F | P-value | F-test |
| Between groups | 53.87333 | 3 | 17.95778 | 2.124221 | 0.04219 | 2.6993926 |
| Within groups | 811.5667 | 96 | 8.453819 | | | |
| | | | | | | |
| Total | 865.44 | 99 | | | | |

Bar chart showing the mean knowledge scores of parents across different education levels:

Parents with higher education scored an average of 13.07 points, with a standard deviation of 3.27. Those with vocational education scored 12.03 points, with a standard deviation of 2.55. Parents with primary education scored an average of 10.14 points, with a standard deviation of 3.44, while those with secondary education scored an average of 11.94 points, with a standard deviation of 2.79.

Box plot showing the means in both groups, the mean +/- error of the mean and the 95% confidence interval for the means:




wiedza - knowledge Skategor: Wykres ramka-wąsy: wiedza - Categorisation: Box-and-whisker plot: knowledge Wyższe – Higher Ed.Zawodowe - Vocational Ed.Podstawowe - Primary Ed.Średnie - Secondary Ed.Średnia - MeanŚrednia±Błąd std. - Mean±Std errorŚrednia±1,96*Błąd std. - Mean±1.96*Std error

**Figure 11.** Means for both groups, means +/- standard error, and 95% confidence interval for the means

Given the calculated p-value = 0.04219, which is less than the assumed significance level of 0.05, the null hypothesis was rejected, confirming that the means of all groups are statistically different. Since the test showed significant differences between the means, further analysis would be necessary to identify which pairs of variables (education groups) differ significantly.

**Table 7.** Student's t-test for mean difference between all pairs

| | Higher Ed. | Vocational Ed. | Primary Ed. | Secondary Ed. |
|---|---|---|---|---|
| Higher Ed. | | 0.090608 | 0.021634 | 0.072007 |
| Vocational Ed. | 0.090608 | | 0.053637 | 0.446272 |
| Primary Ed. | 0.021634 | 0.053637 | | 0.070371 |
| Secondary Ed. | 0.072007 | 0.446272 | 0.070371 | |

Statistically significant differences in mean knowledge scores were found between parents with higher education (mean M=13.07) and those with primary education (M=10.14).

In summary, parents with higher education have significantly greater knowledge than those with primary education.

**Level of knowledge and place of residence of parents**

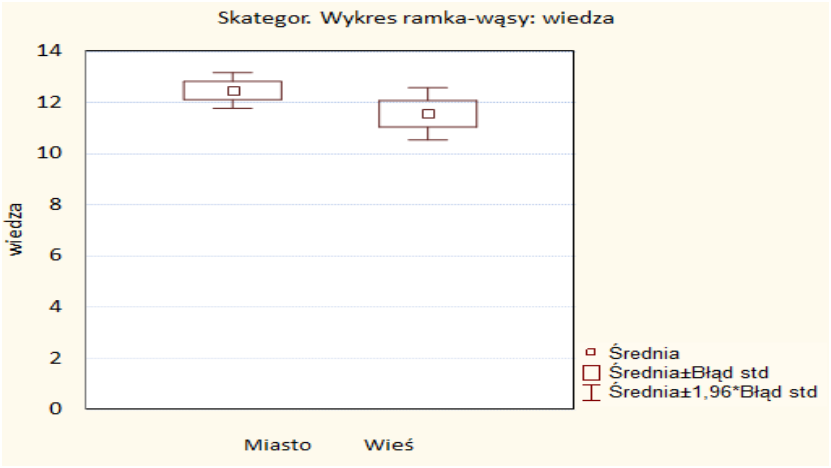
To examine differences in knowledge based on place of residence, the mean scores of groups from rural and urban areas were compared using the Student's t-test for independent samples.

**Table 8.** Two-sample t-test assuming equal variances.

| | **Urban area** | **Rural area** |
|---|---|---|
| Mean | 12.470 | 11.559 |
| Variance | 8.345 | 9.224 |
| Standard deviation | 2.889 | 3.037 |
| Observations | 66 | 34 |
| Pooled variance | 8.641 | |
| Mean difference (null hypothesis) | 0 | |
| Cohen's d | 0.307 | |
| df | 98 | |
| t Stat | 1.468 | |
| One-tailed P(T<=t) | 0.04266 | |
| One-tailed t-test | 1.661 | |
| Two-tailed P(T<=t) | 0.09531 | |
| Two-tailed t-test | 1.984 | |

The mean knowledge score among the urban parent group was 12.47 with a standard deviation of 2.889 and in the rural group, it was 11.559 with a standard deviation of 3.037.

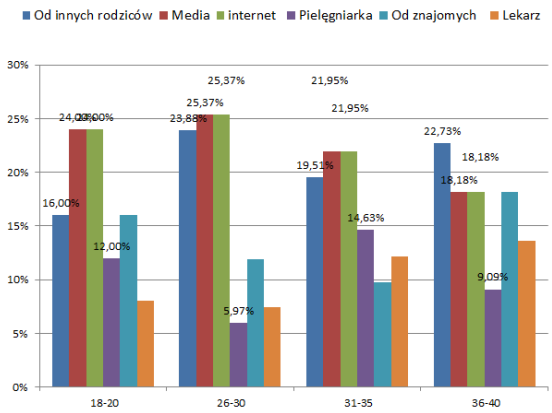
Box plot showing the means in both groups, the mean +/- error of the mean and the 95% confidence interval for the means:




wiedza - knowledge Skategor: Wykres ramka-wąsy: wiedza - Categorisation: Box-and-whisker plot: knowledge Miasto – Urban area Wieś – Rural area Średnia - MeanŚrednia±Błąd std. - Mean±Std errorŚrednia±1,96*Błąd std. - Mean±1.96*Std error

**Figure 12.** Means for both groups, means +/- standard error, and 95% confidence interval for the means

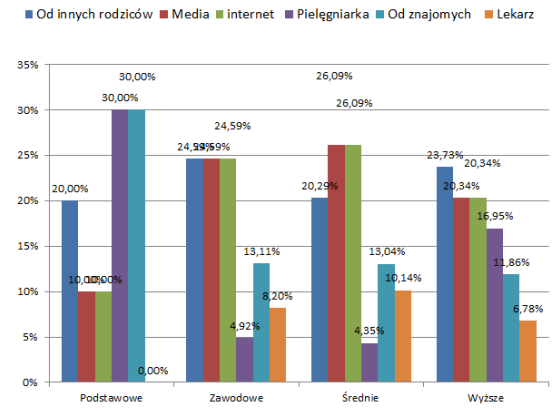
Given the calculated p-value = 0.04266, which is smaller than the assumed significance level of 0.05, the null hypothesis was rejected and the mean knowledge score of rural parents (M=11.412) was found to be significantly lower than that of urban parents (M=12.47). The effect size, expressed as Cohen's d, was 0.358, indicating a small effect size. In other words, urban parents have significantly greater knowledge than rural parents regarding the course and management of infectious diarrhoea in children.




Od innych rodziców - Other parents Media - Media Internet - Internet Pielęgniarka - Nurse Od znajomych - Friends Lekarz - Physician

**Figure 13.** Bar chart of respondents' answers by category

Among the 12 respondents aged 18-20, 6 people (24%) sourced their knowledge from the media and the Internet, while the least—only 2 (8%)—from a physician. Among the 23 respondents aged 26-30, 17 people (25.37%) obtained their information from the media and the Internet, and the least—only 4 (5.97%)—from a nurse. Among the 20 respondents aged 31-35, 9 people (21.95%) sourced their knowledge from the media and the Internet, and the least—9.76%—from their friends. Among the 8 respondents aged 36-40, 5 people (22.73%) sourced their knowledge from other parents, while the least—only 2 (18.18%)—from a nurse.



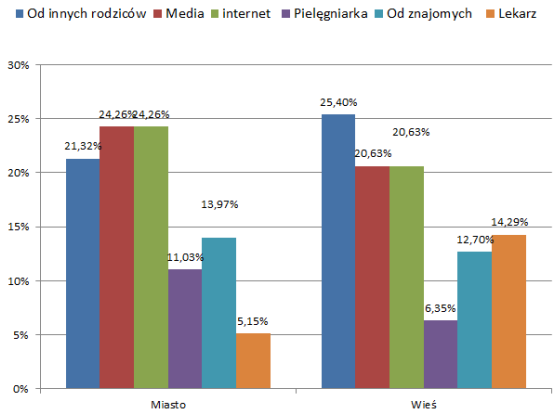

Od innych rodziców - Other parents Media - Media Internet - Internet Pielęgniarka –-Nurse Od znajomych - Friends Lekarz - Physician Podstawowe - Primary Ed.Zawodowe - Vocational Ed.Średnie - Secondary Ed.Wyższe - Higher Ed.

**Figure 14.** Bar chart of respondents' answers by category

Among the 35 respondents with a secondary education, 18 (26.09%) identified the Internet and media as their main source of information, while 20.29% indicated other parents, 13.04% mentioned friends, 10.14% indicated physicians, and the fewest—4.35%—chose a nurse.

Among the 28 respondents with higher education, 28.57% indicated other parents as their main source of information, while the media and Internet were equally indicated at 20.34%, 16.95% pointed to nurses, 11.86% to friends, and only 6.78% to physicians.

Among the 30 respondents with vocational education, three main sources of information emerged: other parents, the media, and the Internet (24.59% each). Friends were in second place (13.11%). The last sources mentioned were healthcare workers, with physicians at 8.2% and nurses at 4.92%. Among the 7 respondents with primary education, 3 (30%) sourced their information from nurses and friends, 2 (20%) from other parents, 10% from the Internet and media, and 0% from physicians.




Od innych rodziców - Other parents Media - Media Internet - Internet Pielęgniarka - Nurse Od znajomych - Friends Lekarz - Physician Miasto - Urban area Wieś - Rural area

**Figure 15. Bar chart of respondents' answers by category**

Among the 66 respondents from urban areas, an equal percentage (24.26%) sourced their knowledge from the media and the Internet, followed by 21.32% from other parents, 13.97% from friends, and 11.03% from a nurse. The fewest respondents only 5.15% sourced their information from a physician.

Among the 34 respondents from rural areas, most (25.40%) sourced their information from other parents, followed by an equal percentage (20.63%) from the media and the Internet. In third place were physicians (14.29%), followed by friends (12.70%), and the fewest 6.35% sourced their information from a nurse.

## Discussion

Diarrhoea is defined as stool with a loose, often watery, consistency, passed too frequently, from three or more times a day. This condition can affect both children and adults. Diarrhoea is usually caused by viruses, and less often by bacteria. In the case of acute infectious diarrhoea, the source of the illness is either the patient or a carrier. Infection can occur through contaminated food (e.g., from unreliable sources), water, or dirty hands. The time from infection to disease progression ranges from a few hours to several days [1].

The primary treatment for excessive bowel movements is rehydration. If dehydration is mild or moderate, hospitalisation is not necessary, as treatment can be carried out at home. It is important to know what to do in such situations to avoid severe dehydration. The literature explains that dehydration occurs when the body loses more fluids than it takes in. Water intake is based on the body's fluid balance. Humans lose about 2.5 litres of water daily. Most water „escapes" with urine, less through skin evaporation and breathing or sweating. To maintain proper hydration, one should drink at least 2 litres of water daily. Children and the elderly are the most vulnerable to dehydration. This is because children are still building their immune systems and are more prone to conditions like vomiting or diarrhoea. The elderly, on the other hand, have less water in their bodies due to their age and, in addition, are often on medication, which can increase the risk of dehydration. Regardless of age, patients should consume large amounts of fluids such as water, isotonic drinks, or juices [2].

The presentation of results and discussion is based on a questionnaire conducted among 100 parents. Of the 100 caregivers of children hospitalised in the paediatric ward for rotavirus diarrhoea, the majority of respondents were women (71%), with men accounting for 29%. The largest group of respondents was aged 26-30 years (36%), while the smallest group, only 8%, was aged 36-40 years. A majority of the respondents came from urban areas (66%), while 34% were rural residents. The dominant educational level among the caregivers was secondary education (35%). Vocational education was reported by 30% of respondents and higher education by 28%. Primary education was declared by 7% of the respondents.

The first hypothesis tested was – The severity of symptoms on admission allows the majority of children to be classified into Group II according to the Clinical Dehydration Scale.

The study found that 67% of children had mild dehydration, 24% showed no signs of dehydration, and 9% had severe dehydration. In this case, the conclusion is the same—there is a significant prevalence of children in Group II according to the Clinical Dehydration Scale. However, to prove that the percentage of children with mild dehydration was the largest, a test for two fractions was conducted. It was therefore investigated whether the proportion of children with mild dehydration was greater than that of children without any signs of dehydration.

Given that $p = 0.000 < 0.05$, it was determined that the fraction, i.e., the percentage of children with mild dehydration, is significantly higher than the fraction of children without dehydration. Comparing the percentage of children with mild dehydration to those with severe dehydration will also yield significant results, as the latter group makes up only 9%.

In conclusion, the main hypothesis that a significant majority of children belongs to Group II of the Clinical Dehydration Scale has been confirmed.

The second hypothesis tested was: The level of parental knowledge about the course and management of infectious diarrhoea in children, as well as preventive measures in this regard, is assessed as low.

Parental knowledge in the survey questions was assessed both objectivelyand subjectively. Parents rated their own knowledge on a scale of 1 to 10. For analytical purposes, these two assessments were combined to form an overall score.

According to the study, 54% of parents scored up to 12 points, receiving an insufficient knowledge grade regarding the course and management of infectious diarrhoea in children, as well as preventive measures in this area. Based on the study, 40% of parents had at most sufficient knowledge, meaning their overall knowledge of infectious diarrhoea in children was unfortunately low. Only 6% of parents achieved a good overall score, and no one achieved a very good score.

The mean knowledge score of the respondents was estimated at 12.16 points, with an estimation error of 0.3 points, meaning the knowledge was on the borderline between insufficient and sufficient, i.e. very poor. On average, the scores differed from the mean by 3 points, representing 24.3% of the mean, indicating significant variation in the knowledge scores of the parents. In other words, parents significantly differed in their level of knowledge The highest score recorded was 20 points (good) and the lowest was 5 points (insufficient).

Analysis of the obtained data on children's vaccination revealed that 64% of children were vaccinated against rotavirus, while 36% had not received the vaccine. A study by Kosiorek [4] indicated that only 7.5% of 40 respondents vaccinated their children against rotavirus.

The results of this study indicate a significantly higher vaccination rate. Among the 36 parents who decided not to vaccinate their child against rotavirus, 38.9% cited insufficient information on the topic as the reason. Fear of complications was indicated by 30.56% of respondents. Additional stress was a reason for 27.8% of parents, and 16.7% reacted too late.

Literature provides information on rotavirus vaccinations and parental attitudes during the period when the vaccine was recommended and required a payment. In a study conducted by Leszczyńska [5], 42% of 100 respondents decided to vaccinate their children against rotavirus, despite the cost. Parents most commonly cited protection against infection (20%) as the reason for their decision. Since 2021, this vaccination has been mandatory and free of charge, so it can be assumed that the vaccination rate is now much higher.

In this study, 74% of parents identified rotavirus as the primary cause of diarrhoea in children, while a study conducted by Kluj [6] indicated that 90% of respondents identified viruses as the main cause of diarrhoea. The results of this study are therefore lower.

An important aspect of parental knowledge was the question concerning treatment methods for diarrhoea. When asked about treatment methods, 77% of parents correctly identified rehydration as a treatment method. The second method indicated correctly by the surveyed parents was the use of probiotics. The correct answer was provided by 50% of respondents in the study.

This approach is documented in the literature by Szajewska, who highlights the positive effects of probiotics in infectious gastrointestinal diseases [7].

The literature shows that administering Lakcid L twice daily at a dose of 1.2 x 10^10 CFU (colony-forming units) for 5 days did not shorten the duration of diarrhoea compared to the placebo group, regardless of its aetiology. However, it was found to shorten the duration of rotavirus diarrhoea by an average of 38 hours [8].

In another question, respondents were asked to identify the most commonly used methods for preventing rotavirus infections. 63% of parents pointed to vaccinations, 57% to avoiding contact with infected individuals, and 54% to practising good hygiene. Only 19% mentioned the use of probiotics and breastfeeding.

Data on the impact of breastfeeding on immunity can be found in the literature. It has been shown that breastfeeding naturally increases resistance to rotavirus infections, as IgA antibodies that neutralise the virus are present in breast milk up to the ninth month of lactation. In a study by Rosinska, it was found that 44% of children hospitalised under the age of one year were breastfed. The result of this study is significantly lower [9].

In summary, the study confirmed the hypothesis that the overall level of parental knowledge about the course and management of infectious diarrhoea in children is unfortunately low.

The last, third hypothesis was – Sociodemographic factors differentiating the level of parental knowledge include: gender, age, education, place of residence.

In the next step, an analysis was conducted on the impact of independent variables such as gender, age, education, and place of residence on the level of knowledge about the course and management of infectious diarrhoea in children.

Among the 100 people surveyed, 12% were in the 18-20 age group, 24% in the 21-25 group, 36% in the 26-30 group, 20% in the 32-35 group, and 8% in the 36-40 group.

Among the 100 people surveyed by Leszczyńska [5], the largest group (46%) were respondents aged 31-40 years. The author marked different age ranges in her study, which makes it difficult to accurately compare the results, but even when the data from the last and penultimate range in this study are added together, it can be seen that the result is lower than that reported in the literature.

In conclusion, there is a significant linear correlation between knowledge and age ($p=0.0035$). Considering the age of the respondents, the results of the study indicate

that there is a significant linear correlation between these variables. This means that the older the parent, the greater their knowledge.

The analysis of this study did not reveal significant differences between the compared means in terms of the gender of the respondents (p=0.15607). This means that gender has not been proven to have a statistically significant influence on the parental knowledge and management of diarrhoea. However, it is important to note the large dominance of women in this study (71%), which requires caution in interpreting the conclusions. The literature lacks significant data on this topic.

Regarding parental education, the study revealed that parentswith higher education have significantly more knowledge than parents with primary education. Statistically significant differences in mean knowledge scores were found between parents with higher education (mean M=13.07) and those with primary education (M=10.14), (p=0.04219).

Among the surveyed parents, 66% lived in urban areas, and 34% in rural areas. To examine differences in knowledge based on place of residence, the mean scores of groups from rural and urban areas were compared using the Student's t-test for independent samples. In the case of place of residence, the study found that urban parents were significantly more knowledgeable than rural parents about the course and management of infectious diarrhoea in children (p= 0.04266).

When asked about where they obtained information on rotavirus infections, diarrhoea treatment, and prevention, 46% of respondents in this study cited the media and other parents. Only 19% obtained such information from a nurse, and 16% from a physician.

In the results of the study conducted by Kluj [6], the physician and the nurse were ranked third (30%) and fourth (27.5%) as sources of knowledge, respectively. In this study, they ranked fourth and fifth, showing worse results compared to the literature.

In a study by Leszczynska [5], as many as 71% of parents obtained their knowledge about vaccination mainly from a conversation with a physician and 43.5% from a nurse. At the same level (43.5%) was also the Internet. Compared to the results of this study, the figures are much lower, indicating that parents are less likely to discuss vaccination with medical staff. Considering the age of the parents surveyed, the findings of this study indicate that younger parents tend to gather more information from the Internet and the media (24%), while older parents prefer to ask other parents and friends for information (22.73%). Regardless of age, parents are least likely to reach out for information to their physician (7.46%) or nurse (5.97%). Considering respondents' education, this study showed that people with primary education most frequently obtained information from their friends and nurses (30%), while those with vocational education from other parents and from the media and the Internet (24.59%). Among those with secondary education, the Internet and media dominate (26.09%), while parents with higher education relied mostly on knowledge from other parents (23.73%). Nurses and physicians ranked low as sources of information, and among parents with pri-

mary education, they were not mentioned at all. Place of residence also differentiates parents regarding knowledge about rotavirus infections. Urban parents mainly rely on information from the media, while rural parents rely on knowledge from other parents. A big difference can be seen in the role of medical staff as a source of information. Significantly more rural parents obtain knowledge from physicians (14.29%) compared to urban parents (5.15%). Regarding nurses, 11.03% of urban parents cited them as a source, compared to 6.35% of rural parents. According to Faleńczyk [3], among 104 parents surveyed, the most reliable sources of vaccination knowledge were the physician (39%) and the nurse (20.3%). Only 3.5% of respondents indicated the Internet. This study reveals the complete opposite results.

## Conclusions

1. On the basis of the results obtained, the severity of the clinical symptoms of the disease on admission to hospital was established – the majority (78%) of children were classified in group II according to the Clinical Dehydration Scale, i.e. according to these guidelines, the child was mildly dehydrated. Thus, the child's weight loss ranged between 5-10%, skin elasticity was reduced, and the child was restless and thirsty.
2. After analysing the study results, it can be concluded that the level of parental knowledge about the course and management of infectious diarrhoea in children, as well as preventive measures in this regard, is low.
3. The study found that the age, education, and place of residence of the parents significantly influence their knowledge about the course, management, and prevention of infectious diarrhoea in children. It was found that the gender of the parents does not significantly affect their level of knowledge regarding the discussed condition.

## Recommendations for Professional Practice

To protect a child from contracting infectious diarrhoea, as part of preventive measures, it is important to remember to: protect the child from contact with sick individuals, not provide unboiled water for drinking, thoroughly wash fruits and vegetables, practise good hygiene, pay attention to the expiration date of food products, not leave cooked food at room temperature for more than two hours, not refreeze thawed food, maintain the refrigerator temperature below 5°C, change personal underwear daily, not use shared towels.

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Conflict of interest: NoneFunding: None

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C – data analysis and interpretation,
D – writing,
E – critical review of the paper,
F – approval of the final version of the paper

Date of receipt: 26 June 202
Date of acceptance: 1 July 2024