



What do pharmacists know about managing childhood diarrhea?: A cross-sectional study

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ABSTRACT

Childhood diarrhea is a prevalent disease in Indonesia. Therefore, pharmacists are required to possess extensive knowledge of the management and prevention of childhood diarrhea in order to provide suitable advice to patients. To connect with this situation, this study aimed to determine the level of pharmacists' knowledge regarding the management of childhood diarrhea therapy and its prevention. To achieve this aim, a descriptive observational study was employed. The sample in this study were pharmacists in pharmacies in the greater Malang area, Indonesia, who were selected by a convenience sampling technique. The instrument used in this study was a questionnaire on pharmacists' knowledge of managing and preventing childhood diarrhea. The collected data were analyzed descriptively. A total of 158 pharmacists participated in this study. Most respondents were female (84.81%) and aged between 26 and 35 (60.76%). Most respondents had been practicing in pharmacies for 1–5 years (39.87%), and the average weekly pharmacist practice hours were 25–35 (41.77%). Most respondents had poor knowledge (68.35%) of pediatric therapy management and prevention. Further research is needed to identify pharmacists' needs to optimize pharmacists' knowledge regarding the therapeutic management and prevention of diarrhea diseases in children.

INTRODUCTION

Diarrhea is a prevalent disease in Indonesia. In 2020, the prevalence of diarrhea among children under the age of 5 in Greater Malang was 44,389. Diarrhea is characterized by the passage of feces that have a mushy or liquid consistency, perhaps consisting only of water, and occurs more frequently than normal, typically three or more times in a day [1,2]. Diarrhea arises from bacterial contamination of food and drink, as well as from toxins produced by these bacteria. The occurrence of diarrhea is closely linked to the level of sanitation and hygiene in both individuals and communities. Additionally,

it can be triggered by psychosomatic disorders, allergies to specific foods or medications, abnormalities in the endocrine and metabolic systems, and deficiencies in vitamins [1].

Diarrhea can be categorized into two types: acute diarrhea and chronic diarrhea. Inadequate management and treatment of diarrhea can pose a significant issue. Improper handling of diarrhea results in dehydration as the body loses significant quantities of fluids, potassium, and electrolytes. Severe dehydration can result in debilitation, hypotension, and mortality, particularly in pediatric and neonatal populations [1,3]. Pharmacists are involved in several aspects of pharmaceutical preparations, such as quality control, safety, procurement, storage, distribution, and management of medications. They also provide prescription drug services and drug information services. The pharmacist's work includes not just a focus on drugs, but also a focus on the well-being and care of the patient. One of the roles of a pharmacist is to provide advice to patients

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concerning the disease they are experiencing. A pharmacist is required to possess a comprehensive understanding of the ailments encountered by patients, including conditions such as diarrhea in children. Pharmacists who possess extensive expertise in the management of diarrhea treatment in children are expected to offer patients suitable guidance. By seeking guidance from pharmacists, patients can enhance their comprehension of the therapeutic management and prevention of diarrhea in children, therefore diminishing the morbidity and mortality associated with this condition [4,5].

Research was undertaken in Shiraz, Iran, to assess the knowledge, attitudes, and behaviors of pharmacists at pharmacies regarding the recommended treatment for childhood diarrhea. This study demonstrates that pharmacists commonly administer antibiotics for the treatment of diarrhea in children due to their belief that bacteria are the underlying cause of this condition. Disseminating leaflets, conducting training on diarrhea disease management, and offering printouts on childhood diarrhea disease management can enhance pharmacists' understanding of diarrhea disease management and enhance their proficiency in delivering pharmaceutical services for treating diarrhea [6].

Additional research has been carried out in Pakistan, Ethiopia, Turkey, Nigeria, and Brazil to evaluate the performance of pharmacists in managing pediatric diarrhea in pharmacies through the utilization of patient simulation methodology. The study sought to ascertain the methods by which pharmacists obtain medication information, make therapy recommendations, and deliver drug information to pharmacies. The study found variations in pharmacy services for the treatment of childhood diarrhea, encompassing the retrieval of drug information, the choice of therapy recommendations, and the dispensation of drug information by pharmacists across various studies conducted in different countries. Pharmacists are encouraged to enhance their understanding of pediatric diarrhea care in order to deliver suitable pharmacological services [7–13].

Community pharmacists play a crucial role in delivering necessary pharmaceutical services related to the therapeutic management of childhood diarrhea and its prevention, bearing in mind that patients receive medicines and pharmaceutical services from pharmacists in pharmacies. Pharmacists must have good knowledge because it provides recommendations and appropriate information about the therapeutic management of childhood diarrhea and its prevention [14,15]. No research has investigated pharmacists' knowledge of managing childhood diarrhea therapy and its prevention in Greater Malang, Indonesia pharmacies. Therefore, this study aims to determine pharmacists' knowledge of managing pediatric diarrhea therapy and its prevention in Greater Malang, Indonesia.

MATERIALS AND METHODS

Study design

To achieve this study, a prospective descriptive observational study was employed by a cross-sectional design. The samples were collected using a convenience sampling technique from pharmacists in pharmacies in the greater Malang area (Malang City, Malang Regency, and Batu City) who provided diarrhea medication information services to parents

of children with diarrhea who met the inclusion and exclusion criteria during the period May–June 2023.

Population and study sample

The population in this study were pharmacists in pharmacies in the greater Malang area who provided information services on diarrhea medicines to parents of children with diarrhea. The sample in this study was pharmacists providing pharmaceutical services in pharmacies in the greater Malang area who had experience in this field for self-medication and prescribing diarrhea medicines for children. The exclusion criteria included pharmacists working in hospitals, health centers, and beauty clinics and pharmacists unwilling to participate in the study. The sample size for this study was determined using the Slovin sample size formula, namely

$$n = \frac{N}{1 + N.e^2}$$

where N comes from the total population of pharmacists in Malang City ($N = 140$), Malang Regency ($N = 196$), and Batu City ($N = 20$), while the value of e (error tolerance limit or critical value) uses a value of 10%. From the sample calculation results, the minimum sample size is 78 respondents.

Research instrument

This study used a pharmacist knowledge questionnaire to provide information on childhood diarrhea medicines and their prevention compiled and developed by the researcher. The questionnaire referred to the literature on managing childhood diarrhea therapy developed by the Ministry of Health of the Republic of Indonesia and the World Health Organization [16,17]. The questionnaire also referred to previous studies by Karim *et al.* [18] Kanungo *et al.* [19] and Foroughinia *et al.* [17].

Before conducting the research, the researchers conducted validity and reliability tests on 30 non-sample respondents. Pearson product-moment was used to measure the validity of the research instrument, while Cronbach's alpha reliability coefficient was used to measure the instrument's reliability. The results of the validity test of this questionnaire were 20 questions on the pharmacist knowledge questionnaire related to providing information on children's diarrhea drugs and their prevention were declared valid with the Pearson correlation value was positive, and the correlation probability value [sig. (2-tailed)] \leq the significant level (α) 0.05. The reliability test results of this questionnaire were 20 questions on pharmacists' knowledge in providing information on childhood diarrhea medicines, and their prevention was declared reliable with a Cronbach's alpha value of 0.764.

The Pharmacists' Knowledge Questionnaire on the Provision of Drug Information on Childhood Diarrhoea and its Prevention, used in the form of closed-ended questions, consisted of 20 questions covering the classification of diarrhea, signs of dehydration, pharmacological therapy, non-pharmacological therapy, and prevention of childhood diarrhea, how to use drugs, drug rules, drug interactions, drug side effects, beyond the date of use, drug storage, monitoring and evaluation of treatment and drug information services for

childhood diarrhea. The questionnaire is scored 1 for correct answers and 0 for incorrect answers. This questionnaire also contains demographic data of the respondents, including age, sex, highest level of education, length of time working in the pharmacy, and average time spent in the pharmacy per day, which the respondents can complete.

Data analysis

The level of knowledge of pharmacists regarding the provision of drug information on childhood diarrhea and its prevention was determined using the total score from the questionnaire. The formula converted the total score into a percentage (%).

$$P = \frac{F}{N} \times 100\%$$

As the information, P is the percentage, F is the number of correct answers, and N is the number of questions. The results obtained can be categorized according to the level of knowledge, with a score of 76%–100% in the good category, 56%–75% in the fair category, and a score <56% in the poor category. The data are presented in tabular form.

Table 1. Respondents' demographic data.

Demographic data	N (%)
Age	
17–25 years old	9 (5.70%)
26–35 years old	96 (60.76%)
36–45 years old	37 (23.42%)
46–55 years old	13 (8.23%)
56–65 years old	3 (1.90%)
Gender	
Male	24 (15.19%)
Female	134 (84.81%)
Education level	
Pharmacist	136 (86.08%)
Pharmacist and undergraduate	22 (13.92%)
Number of years of practice in the community pharmacy	
<1 year	15 (9.49%)
1–5 years	63 (39.87%)
5–10 years	49 (31.01%)
>10 years	31 (19.62%)
Average pharmacist working hours per week	
>25 hours	35 (22.15%)
25–35 hours	66 (41.77%)
35–40 hours	17 (10.76%)
>40 hours	40 (25.32%)

Table 2. Pharmacist questionnaire related to the management of pediatric diarrhea therapy and its prevention.

No	Question	Total respondents with the correct answer n (%)
1	An increase in the frequency of bowel movements of more than three times a day for 10 days can be classified as chronic diarrhea in children.	25 (15,82%)
2	Children with diarrhea and moderate dehydration usually have three symptoms: sunken eyes, restlessness, and a prolonged return of turgor.	25 (15,82%)
3	Combined zinc and ORS therapy is only recommended for children with diarrhea and moderate dehydration symptoms.	49 (31,01%)
4	Kaolin pectin is more recommended as a treatment for pediatric diarrhea than zinc	105 (66,46%)
5	Not all children with diarrhea require probiotic therapy.	99 (62,66%)
6	Single oral rehydration solution therapy is recommended for children with diarrhea	35 (22,15%)
7	Antibiotics should be recommended in children who have diarrhea with a frequency of defecation more than three times a day for 3 days with a liquid consistency.	103 (65,19%)
8	ORS is therapeutic for pediatric diarrhea patients without dehydration symptoms	59 (37,34%)
9	Children with diarrhea are advised to consume apples	71 (44,94%)
10	Use two sachets of ORS dissolved in 200 ml of water for children with diarrhea.	64 (40,51%)
11	The rules for using zinc tablets in children aged ten months are 1x a day, one tablet (20 mg)	85 (53,80%)
12	The rules for using ORS in children aged 3 years who have diarrhea are 3x a day, one sachet as long as the child has diarrhea.	74 (46,84%)
13	The rules for using zinc tablets in children aged 5 years are 1x a day, one tablet (20 mg)	58 (36,71%)
14	ORS and zinc can be taken simultaneously in children with diarrhea.	46 (29,11%)
15	Traditional medicine or herbal medicine to treat children's diarrhea has minimal side effects compared to chemical drugs.	44 (27,85%)
16	ORS dissolved in mineral water can be consumed within 48 hours.	56 (35,44%)
17	Zinc syrup that has been used should be stored in the refrigerator	60 (37,97%)
18	Children with diarrhea without dehydration who are thirsty and eat very little can be advised to be taken to the nearest health center/health facility.	66 (41,77%)
19	Collecting information on drug allergies for diarrhea cases is unnecessary because diarrhea drugs do not cause allergies.	64 (40,51%)
20	Educating the patient's family in cases of pediatric diarrhea by the pharmacist, namely indications and how to use diarrhea drugs.	7 (4,43%)

Table 3. Categories of pharmacists' knowledge level related to the therapeutic management of childhood diarrhea and its prevention.

Level of knowledge	n (%)
Good	8 (5,07)
Fair	42 (26,58)
Poor	108 (68,25)

RESULTS

Characteristics of the research respondents

There were 158 respondents in this study. The data on the characteristics of the respondents showed that there were more female respondents (84.81%) than male respondents. The respondents involved in this study were mainly 26–35 years old (60.76%). The education of the respondents was dominated by pharmacists (86.08%). Most respondents had been practicing in pharmacies for 1–5 years (39.87%), and the average weekly pharmacist practice hours was 25–35 (41.77%). (Table 1).

Pharmacists' knowledge related to the management of pediatric diarrhea therapy and its prevention

This study used a questionnaire instrument of pharmacist knowledge related to managing childhood diarrhea therapy and its prevention. This questionnaire was to determine the level of knowledge of respondents on the management of pediatric diarrhea therapy and its prevention. The questionnaire was tested for validity and reliability before being used in this study. The respondents' knowledge level can be seen based on the results of the answers to the questionnaires that respondents filled in (Table 2).

The respondents' responses to the questionnaire given by the researcher can be seen in Supplement 1. In the table, it can be seen that most respondents answered correctly to the questions that had been given. Most respondents answered incorrectly on questions 1, 2, 3, 6, 14, 15, and 20. Many respondents did not understand the classification of childhood diarrhea, dehydration, recommendations for childhood dehydration therapy, how to use childhood diarrhea drugs, side effects, and education by pharmacists related to childhood diarrhea.

The score for the pharmacist's knowledge questionnaire on managing and preventing diarrhea in children is 1 for a correct answer and 0 for an incorrect answer. The calculation is then made by adding the correct answers, dividing by all the questions [20], and multiplying by 100%. Table 3 shows that most respondents had a low level of knowledge (68.35%). Only 5.07% of the respondents had a good level of knowledge, and 26.58% had sufficient knowledge.

DISCUSSION

An observational study was undertaken to assess the competence of pharmacists in treating childhood diarrhea and its prevention. The study employed descriptive analysis. One way to assess pharmacists' understanding of treating children's diarrhea and its prevention is by administering questionnaires to gather data from respondents. Validating and ensuring the dependability of research equipment is crucial in

a study to provide accurate and consistent results [20,21]. Prior studies undertaken in Shiraz, Iran, and Vietnam have devised questionnaires as measuring instruments to assess pharmacists' proficiency in handling pediatric diarrhea therapies [6,22].

The majority of respondents in this study were women aged between 26 and 35. An individual's cognitive talents are considered to be at their peak when they reach the age range of 26–35, which is commonly referred to as the productive age. An individual's cognitive abilities and mental processes might be impacted by their age. As pharmacist ages, their thinking gets more advanced [23,24]. The results of this study are similar to research conducted in Vietnam, where most of the respondents were female and had an age classified as productive age [22].

The majority of the respondents possessed the most recent educational background in the field of pharmacy. The ultimate amount of schooling can have a significant impact on the respondents' level of knowledge. An individual with a better degree of education and a more elevated position will possess a more extensive understanding and perspective as a result of their exposure to various environments and their easy access to information. This, in turn, will impact their cognitive abilities [25]. In this study, most respondents worked for 1–5 years. The longer the working period, the more experience and knowledge are acquired. The average working hours of the respondents, the majority, are 25–35 hours/week. The more hours an employee works, the higher the productivity and performance [26]. Pharmacists get more knowledge by working longer hours, as pharmacies serve as training institutions for them [27].

Pharmacists play a crucial role in offering both medication-based and non-medication-based therapy suggestions for minor ailments, such as diarrhea in toddlers. Patients in several developing nations opt to seek advice from pharmacists on their ailments, as well as recommendations for both pharmacological and non-pharmacological treatments. Patients can get medications and non-pharmacological treatments without the need for an in-person consultation with a physician [28,29]. In Indonesia, a pharmacist can recommend medicines for children with diarrhea if they are OTC medicines. A study of pharmacists' recommendations for children with acute diarrhea was conducted in Surabaya, Indonesia. Most pharmacists (92.62%) recommended medicines with or without other recommendations. However, 26.19% of pharmacists gave recommendations in the form of referral to a doctor. A total of 13.09% of pharmacists recommended the correct medicine, a combination of ORS and zinc [30]. Pharmacists need appropriate knowledge about managing childhood diarrhea and its prevention to recommend pharmacological and non-pharmacological therapies. To determine pharmacists' knowledge of childhood diarrhea management and prevention, the researchers used a questionnaire research tool with research indicators consisting of the categories of childhood diarrhea, dehydration, pharmacological therapy, non-pharmacological therapy, how to use medicines, rules for using medicines, drug interactions, side effects of medicines, after the date of use, storage of medicines, monitoring, and evaluation of treatment and drug information services for childhood diarrhea.

To recommend pharmacological and non-pharmacological treatments for childhood diarrhea,

pharmacists must be able to distinguish between different types of diarrhea. Diarrhea can be divided into acute diarrhea and chronic diarrhea, depending on the duration of the diarrhea. Acute diarrhea is diarrhea that lasts less than 14 days. Persistent diarrhea or chronic diarrhea is diarrhea that lasts more than 14 days [1]. In this study, 15.82% of respondents knew about the different types of diarrhea based on the duration of diarrhea. Diarrhea that is not adequately treated can lead to dehydration and death [31]. A study executed in Ibadan, Nigeria, revealed that a significant number of parents lack knowledge of the appropriate management of dehydration in children suffering from diarrhea [32]. The role of pharmacists is needed to provide information on dehydration in children with diarrhea. In this study, 15.82% of respondents knew the signs and symptoms of dehydration in children with diarrhea, and 31.01% of respondents knew about the therapy used to treat dehydration according to the symptoms of dehydration in children with diarrhea. According to the World Health Organisation (WHO), children's diarrhea may be classified into three levels of dehydration: diarrhea without dehydration, diarrhea with mild to moderate dehydration, and diarrhea with severe dehydration. The signs, symptoms, and treatment suggestions for dehydration are customized based on the severity of dehydration [16]. Inappropriate treatment can worsen a patient's condition and lead to death. Research conducted in Thailand found that about 2% of respondents obtained information about the signs and symptoms of dehydration in patients. Few pharmacists still pay attention to the signs of dehydration in patients [33].

The WHO and the Ministry of Health of the Republic of Indonesia advocate the use of oral rehydration solution (ORS) and zinc as the main treatment for diarrhea in children [16,17]. This study showed that not all respondents understood the pharmacological treatment of diarrhea in children. The limited number of respondents who knew that ORS and zinc were the primary therapy for childhood diarrhea was also found in another study in the eastern region of Surabaya City, Indonesia [30]. Research in Germany found that only 1 out of 84 respondents gave ORS to treat diarrhea in children [34]. Another study in India found that no respondents recommended combining ORS and zinc [35].

Probiotics can be recommended to treat children's diarrhea to prevent antibiotic-associated diarrhea and persistent diarrhea [36,37]. In persistent diarrhea, probiotics can reduce the duration of diarrhea, and in acute diarrhea in children, probiotics can reduce the duration of diarrhea to only 24.76 hours [38]. In this study, almost half of the respondents knew about using probiotics in pediatric diarrhea. Most respondents in this study knew that kaolin-pectin is more recommended than zinc for treating diarrhea in children. The use of adsorbents as a therapy for childhood diarrhea was not recommended. Using adsorbents to treat diarrhea can lead to intestinal folding or strangulation complications. When this occurs, surgery is required [1,39]. Research conducted in the eastern region of Surabaya City, Indonesia, found that 2 out of 40 respondents recommended kaolin-pectin alone, and 11 out of 40 recommended a combination of kaolin-pectin with other diarrhea therapies [30].

Pharmacists have the responsibility of giving therapeutic suggestions based on patients' complaints, offering guidance on the condition and its treatment, and ensuring that patients get the best possible therapeutic results by recognizing issues linked to medication. In order for pharmacists to provide suitable advice, they are required to possess extensive knowledge of drug utilization, drug legislation, and drug adverse effects, extending beyond the expiration date and proper storage of medications. A study done in Telangana and Ethiopia revealed that the majority of women with children under the age of five lacked knowledge regarding the proper usage of medications, including the preparation of ORS, the appropriate dosage of ORS for consumption, and the process of preparing ORS at home [40,41]. Pharmacists have a role to play in improving parental knowledge of medicines. In this study, almost half of the respondents had good knowledge about using medicines and the rules for using them. One of the drug-related problems that can occur is drug interaction. Drug interaction is a change in the effect of a drug due to the presence of other drugs when given simultaneously so that the effectiveness or toxicity of other drugs is changed [42]. In this study, 29.11% of respondents knew about drug interactions in childhood diarrhea. The problem of drug interactions should be a concern for health professionals, especially pharmacists. Therefore, the identification of drug interactions is carried out to prevent the risk of morbidity and mortality in the treatment of patients and is expected to increase the knowledge and awareness of pharmacists to monitor drug interactions to improve the quality of life of patients [43].

Knowledge is fundamental for understanding and explaining an individual's conduct. Pharmacists' role in managing pediatric diarrhea is identifying patients, obtaining drug information, providing education, recommending referral to other health professionals if the child's condition worsens, and monitoring treatment [44]. Pharmacists need to have a strong understanding of how to manage therapy for pediatric diarrheal diseases. This expertise allows them to gather pharmacological information, choose the most suitable treatment for the patient's condition, and offer appropriate patient education. In this study, most respondents had inadequate knowledge (68.35%) regarding managing pediatric diarrhea therapy and its prevention. The difference in the knowledge level categories indicates that pharmacists' knowledge level regarding managing pediatric diarrhea therapy and its prevention is uneven. This may be due to low awareness and practice in managing pediatric diarrhea therapy and its prevention and a working environment that does not allow pharmacists to update their knowledge [22,45].

Pharmacists are expected to have a good general knowledge of managing and preventing childhood diarrhea. In Indonesia, similar to other developed and developing countries, a considerable number of patients seek the advice of pharmacists in pharmacies about the treatment of childhood diarrhea. This is often done as an initial measure before seeking medical assistance from a doctor or other healthcare establishments. Community pharmacists play a crucial role in managing and preventing childhood diarrhea by offering knowledge on its management and prevention, hence reducing the risk of complications. Community pharmacists are expected to have more knowledge about the definition of

diarrhea in children, categorization of diarrhea in children, dehydration in diarrhea in children, pharmacological and non-pharmacological therapies, including promoting the administration of ORS therapy in children with diarrhea, and the management of diarrhea in children according to the guidelines of the WHO and the Ministry of Health of the Republic of Indonesia [15].

The results of this study are more appropriately seen as a need for further interventions to optimize the role of pharmacists in providing recommendations for managing childhood diarrhea therapy and its prevention. The existence of guidelines and protocols on managing health problems, especially managing childhood diarrhea treatment and its prevention, issued by the WHO and the Ministry of Health of the Republic of Indonesia, can improve pharmacists' knowledge and accuracy in providing recommendations for childhood diarrhea treatment. Pharmacists' knowledge of childhood diarrhea management and prevention can also be improved by providing training, workshops, and seminars on childhood diarrhea management and prevention. The government, specifically the Ministry of Health of the Republic of Indonesia and the Indonesian Pharmacists Association, should actively promote the re-education of pharmacists on the therapeutic management and prevention of childhood diarrhea. This will enhance pharmacists' familiarity with the therapeutic guidelines and increase their knowledge on the subject [22,46].

This study has several limitations; the pharmacists who participated completed the research questionnaire online, and there was no physical contact between the respondents and the researchers. However, in this study, the researcher believes that pharmacists completed the questionnaire because the research questionnaire link was only distributed to pharmacists who practice in pharmacies in the greater Malang area. Another limitation is that some pharmacists who do not practice in pharmacies participated in this study. Pharmacist respondents who did not meet the inclusion criteria set by the researcher were not used as research respondents. Despite the limitations, this study provides insight into community pharmacists' knowledge regarding managing children's diarrhea diseases and their prevention.

CONCLUSION

The majority of the respondents exhibited insufficient understanding regarding the management and prevention of pediatric diarrhea therapy. A follow-up study is required to conduct exploratory research to determine the attitudes and behaviors of pharmacists about the treatment and prevention of pediatric diarrhea therapy.

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AUTHOR CONTRIBUTIONS

All authors made substantial contributions to the conception and design, data collection, or analysis and

interpretation of data; participated in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and accepted responsibility for all aspects of the work.

CONFLICTS OF INTEREST

The authors report no financial or any other conflicts of interest in this work.

ETHICAL APPROVALS

The study protocol was approved by the Research Ethic Committee, Faculty of Medicine, Brawijaya University Malang, Indonesia with approval number 225/EC/KEPK/10/2022.

DATA AVAILABILITY

All data generated and analyzed are included in this research article.

PUBLISHER'S NOTE

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