Pharmacophore

PREVALENCE OF ANTIBIOTIC USE FOR PEDIATRIC ACUTE VIRAL GASTROENTERITIS IN MEDINAH MEDICINE ALMUNWARAH, KSA

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ABSTRACT

Background: Acute gastroenteritis (AGE) influences stomach and gut and is one of the important popular troubles in infants and young children throughout the world. The causes of acute gastritis include medications as well as viruses such as rotavirus and enteric adenovirus. Rotavirus accounts for the many illnesses and is the most prevalent cause of acute diarrhea and also severe gastroenteritis in KSA (Kingdom of Saudi Arabia). **Aim**: This study aimed to investigate the prevalence of using antibiotics for acute viral gastroenteritis in the pediatrics population in AlmadinahAlmunawrah. **Method:** This was a prospective, quantitative, cross-sectional survey consisting of thirty questions. Responded questionnaire from 600 pediatric physicians of children under 6 years of age suffering from acute gastroenteritis in AlmadinahAlmonawarah. **Data sources**: Face to face questions from physicians.**Results:** demographic distribution of our study's data. 53.1% of patients were male. 54.5% of individuals were between 25-35 years. Family physicians and general physicians with 27.1% and 24.2%,respectivelywere the most constituents of the study specialty. Indications for treating acute viral gastroenteritis frequently. In 50.1% of individuals, the usage of antibiotics was to prevent secondary infection. From the viewpoint of the prevalence of the most common route preferred by the study individuals, oral and intravenous antibiotics were preferred by 51.9% and 28.7% of the participants, respectively. Treatment with antibiotics over a period of less than a week was prescribed in about 50.2% of the participants. Treatment over a period of 7-14 days was recorded by 39%. Summer was the most common season for viral infection endemics as stated by 64%. Winter was stated as the second most common season by 29.7%. Family physicians and general practitioners were mostly referred for the treatment of acute viral gastroenteritis (N= 134 and 120, respectively) followed by pediatric physicians (N=106). There was a statistically significant difference between specialties P-value (0.001). The universal indicator for prescription was to prevent secondary infection (50.1%). The second most common was "other". Therefore, there was a statistically significant difference between the answers (P-value =0.001). **Conclusion:** Acute gastroenteritis (AGE) is a common problem in the pediatric age group, especially in socioeconomic status countries. It may have bacterial or viral origin. Active treatment of diarrheal should always be considered, regardless of etiology. Empiric antibiotic therapy should be started soon after specimen collection in infants and children with severe conditions. In conclusion, it is very important to limit the use of unnecessaryantibiotics; there are situations in which drugs are mandate and life-saving.

Introduction

Acute gastroenteritis (AGE) influences stomach and gut and is one of the important and common troubles in infants and young childrenthroughout the world. Various factorscan damage the stomach lining. This disease is commonly caused by

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medications, viruses such as rotavirus and enteric adenovirus. The disease is self-limiting and there is no report regarding the efficacy of antibiotics in the treatment, however, antibiotics are given to children younger than 5 years old[1, 2].

Rotavirus is the main cause of acute diarrhea that leads to approximately 500,000 to 870,000 deaths in children <5 years of age, every year. The tremendous incidence of diseases caused by rotavirus underscores the urgent need for interventions such as vaccines to prevent childhood deaths in developing countries; however, the exact evidence of rotavirus-induced mortality is difficult to obtain[3].

Human rotavirus is a member of the Reoviridae family and is considered as the most important causative agent of severe gastroenteritis reported in 14% (8135/58,110) to 42% (520/1,242) of cases with diarrhea in KSA (Kingdom of Saudi Arabia). On the other hand, recent studies have shown that the incidence of diarrhea may be decreased. Ghazi et al., (2005) found that the incidence of rotavirus infections had decreased (10%) in Makkah city in 2005. Although a comparison study was made in Saudi Arabia by reviewing of 22 studies published from 1982 to 2003 and concluded that HRV remains the most common cause of diarrheal infection in infants and young children that leads to high morbidity in both developing and developed countries including Saudi Arabia [3].

The first step for managing any patient with diarrhea is to determine the severity of dehydration according to the estimated volume loss and the symptoms and signs noted on physical examination. Children are managed differently. Oral rehydration is recommended to alleviate mild dehydration, which often causes minimal to no signs or symptoms. A few complicated cases may require antimicrobial therapy because of the severity of the clinical signs [4].

The empirical use of antibiotics for acute infectious diarrhea, in general, has not been proved. Due to the fact that this infectious diarrhea is typically a self-limiting disease, regardless of its etiology, rehydration should be accomplished by oral rehydration salt solutions to ensure that electrolytes are also replenished. Despite the routine use of antimicrobial agents for the treatment of diarrhea, it may lead to increased antimicrobial resistance.[2, 4]

There are still no enough studies especially in Madinah, KSAon the measurement of the prevalence of using antibiotics among infants and children with acute viral gastroenteritis, which only needs rehydration and nutritional support.

Objectives:

The aim:

We aimed in this study to investigate the prevalence of using antibiotics for acute viral gastroenteritis in the pediatrics population in AlmadinahAlmunawrah.

The objectives:

1. To explore the factors that influence prescribing antibiotics for pediatrics' acute viral gastroenteritis.
2. To assess behavior and attitude toward using antibiotics among parents toward their children for the treatment of viral gastroenteritis.
3. To reduce the need for antibiotics, lower resistance, and improve antibiotics targeting among the pediatrics population in AlmadinahAlmunawrah.
4. To promote the appropriate use of antibiotics for pediatric patients.

Methodology

This was a prospective, quantitative cross-sectional survey consisted of thirty questions. Responded questionnaire from 600 pediatric physicians of children under 6 years of age suffering from acute gastroenteritis in AlmadinahAlmonawarah.

Data sources: Face to face questions from physicians.

Study design:

This was a prospective, quantitative cross-sectional survey.

Study sample:

Responded questionnaire from 600 pediatric physicians of children under 6 years of age suffering from acute gastroenteritis in AlmadinahAlmonawarah.

Inclusion criteria:

The sample represents physicians who treat children under 6 years of age with acute gastroenteritis.

Exclusion criteria:

Other health care providers from different specialties.

Study tools:

For assessing the prevalence of using antibiotics for pediatric acute viral gastroenteritis in all Madinah Almunwarah, KSA, a well-structured questionnaire was developed by the researchers to ease the computation of the score of knowledge. The questionnaire consists of thirty questions covering socio-demographic data, descriptive data, and questions assessing the knowledge of seasonal spreading of the disease, reasons and extent of prescribing antibiotics, awareness of families about of the antibiotics use, relation between the specialty & prescribing antibiotics for viral, relation between the years of experience & prescribing antibiotics for viral AGE, prevalence of antibiotics use in viral AGE, relation between the number of cases and prescribing antibiotics for viral AGE, relation between the age group and higher incidence of prescribing antibiotics in viral AGE, and relation between the cause of viral AGE and antibiotics.

Data sources:

Face to face questions from physicians.

Procedure:

The study was approved by the Research Ethics Committee of Taibah University.

Dependent variable:

Overuse of antibiotics on children.

Independent variable:

Age of children.

Study outcomes and measurements:

Extent awareness of parents regarding the overuse of antibiotics in cases of viral gastroenteritis in pediatrics.

Data analysis

Data were collected using a questionnaire and data entry, and the analysis of the results was done using the Statistical Package for Social Sciences (SPSS) ver.21 for Windows. Descriptive statistics such as mean and standard deviation (SD) for continuous variables and the frequency and percentage for categorical variables were determined. Inferential statistics were then followed using parametric and non-parametric tests for univariate analysis. The level of significance was set at $p < 0.05$.

Result

Table (1): demographic distribution of our study's data. 53.1% of patients were male. 54.5% of individuals were 25-35 years old. Family physicians and general physicians were the most constituents of the study specialty in 27.1% and 24.2% respectively. 33.3% of the physicians had 1-5 years of experience. Not specified institutions were presented in 51.1% in our study followed by Primary health care, which was the institution of that physician by 22%.

Table (2): pediatric age group that study individuals dealt with. Children between 2-11 years were presented in 72.3%, 39.6% of newborn patients were treated. 56.2% of infants were treated. Adolescents were treated by 50.7% of our study individuals. The number of examined cases per week in 51.7% of the study individuals was 0-5 cases per week. 35.4% of them examined 6-10 pediatric cases per week.6.9% examined 10-20 cases per week.Those who examined more than 20 children per week were 6.1%. Investigating the cause of treatment of gastroenteritis showed that prescribing antibiotics was added in 51.1% if the cases developed complications. The second cause of prescribing antibiotics was a longstanding period in 29.7% of cases. Unspecified causes were represented in 28.7% of cases Stool checkup was the most indication for which antibiotics were prescribed in 34.1% of cases. Blood checkup was the most prevalent after stool checkup in 24.6% of cases. In 21.4% of cases, the presence of blood in stool was the cause of prescribing antibiotics. The temperature was the cause of prescribing antibiotics in 17.8% of the cases. In 63.4% of cases, a different kind of antibiotic was prescribed due to the patient's condition and severity. The patient's age was the second factor in prescribing antibiotics in 22.2% of patients. No identified cause was observed in 7.5% of the cases while unidentifiable causes were registered in 6.9% of cases.

Figure (1): Bar chart of the cause of gastroenteritis treatment showed that in 51.1% of the cases, antibiotics were prescribed if they developed complications.In 29.7% of the cases,the second antibiotic prescribing was a longstanding period. Unspecified causes were represented in 28.7% of the cases.

Table (3) shows the treatment of acute viral gastroenteritis frequency. In 50.1% of individuals, the usage of antibiotics was to prevent secondary infection. Misleading thinking about a good practice was recorded by 9.9% of individuals. The usual routine of prescription was recorded by 3.4%. Un-identifiable causes were recorded in 32.3% of cases.

Table 1: demographic distribution

	N	%
Gender		
Female	232	46.9
Male	263	53.1
Age		
25-35 years	270	54.5
35-40 years	95	19.2
40-45 years	61	12.3
45-50 years	39	7.9
above 50 years	30	6.1
Specialty		
ER physician	38	7.7
Family physician	134	27.1
General practitioner	120	24.2
Pediatric physician	106	21.4

	N	%
Other	97	19.6
Years of experience:		
Less than one year	100	20.2
More than one and less than 5 years	165	33.3
More than 5 and less than 10 years	98	19.8
More than 10 and less than 15 years	65	13.1
More than 15 years	67	13.5
Institution		
AHUD	12	2.4
NGH	47	9.5
MCH	65	13.1
Medical service at Taibah university	9	1.8
PHC	109	22.0
Other	253	51.1

Table 2: pediatric age group, number of cases per week, investigating the cause of the treatment of gastroenteritis, stool checkup was the most reason for prescribing antibiotics, the reason for using a different type of antibiotic

	N	%
Pediatric age groups, you're dealing with		
Newborn with 0-29 days of age	196	39.6
Infants & toddlers with 1-23 months of age	278	56.2
Children with 2-11 years of age	358	72.3
Adolescents with 12-18 years of age	251	50.7
How many cases of pediatric viral gastroenteritis do you treat per week?		
0-5 cases.	256	51.7
6-10 cases.	175	35.4
10-20 cases.	34	6.9
More than 20 cases.	30	6.1
When do you treat cases with viral gastroenteritis using antibiotics?		
For all cases of gastroenteritis.	25	5.1
For cases that are presented to the emergency room.	45	9.1
For cases that are admitted to the hospital.	108	21.8
For cases that develop a complication	253	51.1
For cases that exceed the usual period of the disease.	147	29.7
If the patient's parents ask for antibiotics.	18	3.6
Other	142	28.7
In your idea, prescribing or not prescribing antibiotics depends on which factors?		
Temperature	88	17.8
Blood in stool	106	21.4
Blood checkup	122	24.6
Stool checkup	169	34.1
Other	10	2.0
If you use different types of antibiotics, why?		
None	37	7.5
According to the patient's age	110	22.2
According to the patient's condition & the disease severity.	314	63.4
Other	34	6.9
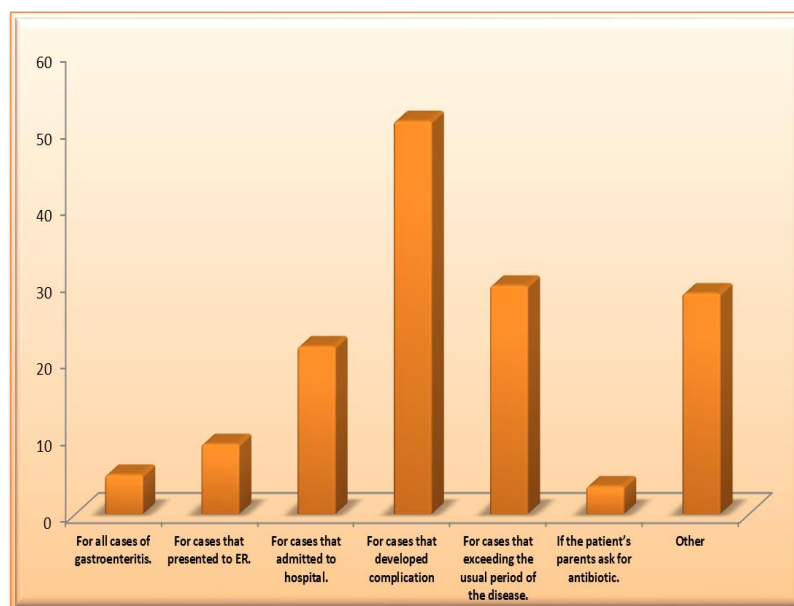
Figure 1: Bar chart of the cause of the treatment of gastroenteritis using antibiotics

Table 3: The cause of treating acute viral gastroenteritis using antibiotics, the prevalence of the most common route preferred by the study individuals, duration of antibiotic therapy prescribed by the study individuals, the seasonal break out of viral gastroenteritis, the necessity for hospitalization among the study individuals, reason for hospitalization

	N	%
Why do you often treat viral gastroenteritis with antibiotics?		
To satisfy the patient's parents.	21	4.2
To prevent secondary infection.	248	50.1
Because you think this is better according to your experience.	49	9.9
This is the usual routine in your institution.	17	3.4
Other	160	32.3
How to administer the antibiotics?		
None	33	6.7
Via IM	24	4.8
Via IV	142	28.7
Orally	257	51.9
Other	39	7.9
What is the duration of the antibiotic-therapy course?		
None	33	6.7
Less than one week	250	50.5
7 to 14 days	193	39.0
Three weeks	9	1.8
30 days	8	1.6
More than one month	2	0.4
In which season do you think viral gastroenteritis increase?		
I don't know	26	5.3
Summer	317	64.0
Winter	147	29.7
Other	5	1.0
Do you think that most of the cases of viral gastroenteritis need to be admitted to the hospital?		
No	325	65.7
Yes	170	34.3
If the answer is yes, what are the reasons?		
Severe dehydration	89	52.4
Severe vomiting or diarrhea	54	31.8
Non-response to medication	19	11.2
Other	8	4.7

The prevalence of the most common route preferred by the study individuals

Oral antibiotics were the preferred route in 51.9% of the individuals followed by intravenous (28.7%) and intramuscular (4.8%) routes.

The duration of the antibiotics course in study individuals. Antibiotics less than a week were prescribed in about 50.2%. Duration from 7-14 days was recorded by 39%. Long-term antibiotics were prescribed by 1.8%.

Questioning about the seasonal break out of viral gastroenteritis as stated by the study individuals

Summer was the most common season for viral infection endemic infection as stated by 64% of the individuals. Winter was stated as the second most common season in 29.7%. 5.3% of physicians stated that they do not know about this item.

Questioning about the necessity for hospital admission among the study individuals

65.7% of the study individuals answered 'no' and 34.3% of them said 'yes'.

Reason for hospital admission in case of ''yes'' answer

Most study individuals stated that dehydration is the priority for admission in 52.4%. Vomiting or diarrhea was the reason for 31.3% of individuals. An unresponsive treatment plan was the reason for admission in 11.2% of the individuals' answers.

Table 4: The study individuals' opinions about the need for treatment by antibiotics, extent of medical, changing antibiotics treatment, extent of patients' or parents' awareness, explain about the prescription of antibiotics, the effect of being relative to patients and possibility to change treatment, relatives' inquiry and insist about giving antibiotics in viral gastroenteritis. Family 'accepted' treatment regime without antibiotics. Improvement in cases that are taken antibiotics.

	N	%
Do you think that most of the cases need to be treated by antibiotics?		
No	442	89.3
Yes	53	10.7
What does your antibiotic prescription depend on?		
Age of the patient	58	11.7
worsening of symptoms	171	34.5
investigation	238	48.1
Other	28	5.7
Has your treatment of viral gastroenteritis cases by antibiotics changed over the past few years after studies that have shown the risk of using them or is it still the same?		
Yes, changed	295	59.6
No, Still the same	157	31.7
Other	43	8.7
Through your experience with the cases of viral gastroenteritis, what is the extent of the patients' or their parents' "awareness" about the importance of not taking antibiotics except for necessity?		
High	61	12.3
Average	256	51.7
Low	178	36.0
Do you have difficulty explaining to the patient's parents or the patient him/herself about the importance of not prescribing antibiotics unless it is necessary?		
No	239	48.3
Yes	256	51.7
In case that one of your relatives or your family has viral gastroenteritis, does this affect the way of your treatment?		
No	393	79.4
Yes	102	20.6
In case that one of your relatives or your family has viral gastroenteritis, and he/she insists that you give him/her an antibiotic, what is your behavior?		
	N	%
You will give him/her the appropriate antibiotics	56	11.3
You will explain to him/her the seriousness of antibiotics in cases where they are not needed	377	76.2
You will oversee the case and decide whether to give him/her or not	152	30.7
How is the acceptance of the patient's family to the treatment without antibiotics in these cases?		
Very accepted	43	8.7
Accepted	320	64.6
Rejected	114	23.0
Very rejected	18	3.6
Is there any improvement in cases who take antibiotics compared to others?		
No	283	57.2
Yes	212	42.8

Table (4): 10.7% of the study participants answered 'yes' and 89.3% said 'no' to the admission of antibiotics in the treatment of acute viral gastroenteritis.

The extent of medical description in our study depended on the investigation as stated by 48.1% of the participants. 34.5% of the participants regarded worsening of symptoms can lead to the change of the antibiotics. The age of patients was a factor as stated by 11.7% and Un-identified causes were stated by 5.7%.

Questioning about changing antibiotics treatment according to recent studies showed risks of introducing antibiotics in acute viral gastroenteritis. 59.6% of the participants said 'yes' and 31.7% said 'no' regarding the change of mind after studies and 8.7% of participants said 'other'.

The extent of patients' or their parents' awareness about the antibiotics in acute viral gastroenteritis

51.7% of the participants said 'average', 36% said 'low', and 12.3% said 'high' awareness. 51.7% of the participants faced difficulty to explain why the prescription of antibiotics in acute viral infection is prohibited. 48.3% of the study participants said 'no' difficulty.

20.6% of the participants said 'yes' to an answer about the effect of being relative to patients and the possibility to change physicians' minds. 79.4% of the study participants said 'no' to that question.

Questioning about the relatives' inquiry and insist about giving antibiotics in viral gastroenteritis

76.2% of participants said they will explain to the relative about the seriousness of antibiotics. 30.7% of them said they will oversee the case again, and 11.3% said they will give an appropriate antibiotic.

64.6% of the participants said that the patient's family 'accept' the treatment regime without antibiotics, 23% suggested rejection to such plan of treatment, 8.7% said they will be very acceptable, and 3.6% thought that family will disagree with such regime.

57.2% of the study participants said that the admission of antibiotics in acute viral infection was not associated with the shortening of disease state and 42.8% observed improvement in the patients' condition after the addition of antibiotics.

Table 5: The relation between the specialty and answer to the question:"How much do you treat cases of pediatric viral gastroenteritis per week?" Family physicians and general practitioners were the target of the treatment of acute viral gastroenteritis (N= 134 and 120, respectively), followed by pediatric physicians (N=106). There was a statistically significant difference between the specialties (P-value <0.001).

How many cases of pediatric viral gastroenteritis do you treat per week?		Specialty					Total
		ER physician	Family physician	General practitioner	Pediatric physician	Other	
0-5 cases	N	13	68	59	51	65	256
	%	34.2%	50.7%	49.2%	48.1%	67.0%	51.7%
6-10 cases	N	17	58	39	36	25	175
	%	44.7%	43.3%	32.5%	34.0%	25.8%	35.4%
10-20 cases	N	4	4	16	7	3	34
	%	10.5%	3.0%	13.3%	6.6%	3.1%	6.9%
More than 20 cases	N	4	4	6	12	4	30
	%	10.5%	3.0%	5.0%	11.3%	4.1%	6.1%
Total	N	38	134	120	106	97	495
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chi-square	X^2	34.234					
	P-value	0.001*					

Figure (2): Bar chart of the relation between the specialty and answer to the question:"how much do you treat cases of pediatric viral gastroenteritis per week?" Family physicians and general practitioners were the target of the treatment of acute viral gastroenteritis (N= 134 and 120, respectively), followed by pediatric physicians (N=106). There was a statistically significant difference between the specialties (P-value <0.001).
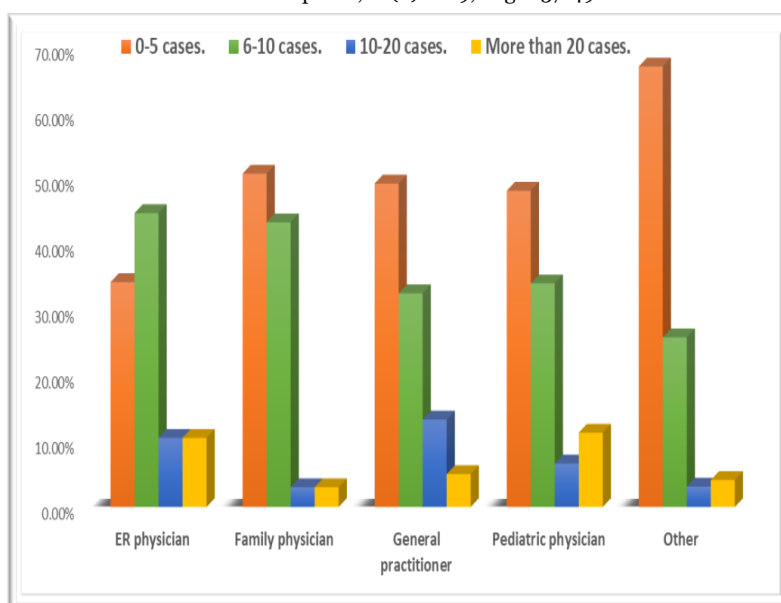
Figure 2: Relation between the specialty and "how much do you treat cases of pediatric viral gastroenteritis?"

Table 6: The relation between the specialty and answer to the question:"Why do you often treat viral gastroenteritis with antibiotics?". The most common cause of the prescription was to prevent secondary infection (50.1%). The second most common was "other". There was a statistically significant difference between the specialties' answers.

Why do you often treat viral gastroenteritis with antibiotics?		Specialty					Total
		ER physician	Family physician	General practitioner	Pediatric physician	Other	
To satisfy the patient's parents.	N	3	4	9	3	2	21
	%	7.9%	3.0%	7.5%	2.8%	2.1%	4.2%
To prevent secondary infection.	N	10	77	72	29	60	248
	%	26.3%	57.5%	60.0%	27.4%	61.9%	50.1%
Because you think this is better according to your experience.	N	12	11	12	8	6	49
	%	31.6%	8.2%	10.0%	7.5%	6.2%	9.9%
This is the usual routine in your institution.	N	4	3	1	2	7	17
	%	10.5%	2.2%	.8%	1.9%	7.2%	3.4%
Other	N	9	39	26	64	22	160
	%	23.7%	29.1%	21.7%	60.4%	22.7%	32.3%
Total	N	38	134	120	106	97	495
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chi-square	X^2	85.609					
	P-value	<0.001*					

Figure (3): Bar chart of the relation between specialty and answer to the question: (Why do you often treat viral gastroenteritis with antibiotics?). The most common cause for prescription was to prevent secondary infection (50.1%). The second most common was 'other". There was a statistically significant difference between the specialties and the answers.
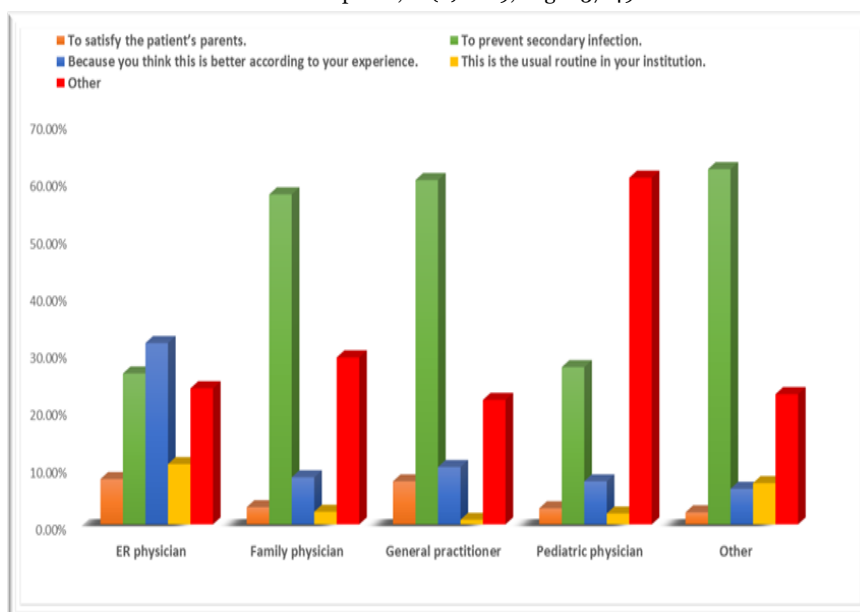
Figure 3: Bar chart the relation between specialty and the cause of antibiotic prescription

Table 7: The answers to the question: "Why do you often treat viral gastroenteritis with antibiotics?"

| Why do you often treat viral gastroenteritis with antibiotics?		Institution						
		AHUD	NGH	MCH	Medical service at Taibah University	PHC	Other	Total
To satisfy the patient's parents.	N	2	1	3	2	5	8	21
	%	16.7%	2.1%	4.6%	22.2%	4.6%	3.2%	4.2%
To prevent secondary infections.	N	6	17	26	2	54	143	248
	%	50.0%	36.2%	40.0%	22.2%	49.5%	56.5%	50.1%
Because you think this is better according to your experience.	N	1	13	18	0	8	9	49
	%	8.3%	27.7%	27.7%	0.0%	7.3%	3.6%	9.9%
This is the usual routine in your institution.	N	1	0	4	1	2	9	17
	%	8.3%	0.0%	6.2%	11.1%	1.8%	3.6%	3.4%
Other	N	2	16	14	4	40	84	160
	%	16.7%	34.0%	21.5%	44.4%	36.7%	33.2%	32.3%
Total	N	12	47	65	9	109	253	495
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Chi-square	X^2	66.471						
	P-value	<0.001*						
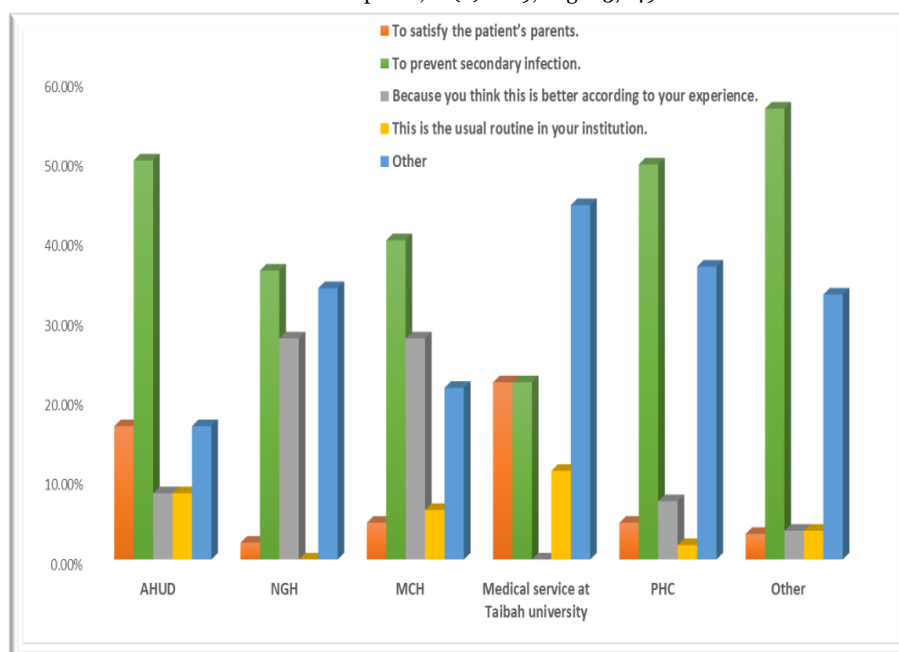
Figure 4: Bar chart measuring the admission of antibiotics and institutions in which our study participants belonging to.

Discussion

Acute gastroenteritis is more common in infants with the highest incidence in older infants. Fever and vomiting are the most common associated symptoms. Acute gastroenteritis infections may have bacterial, viral or parasitic origins in children [5, 6]. The effective treatment of acute gastroenteritis is made by probiotics [7]. Antibiotic therapy is not required in most children, treatment of acute diarrheal illnesses must include rehydration, which is the key treatment that can be achieved by oral electrolyte solutions or intravenous fluids. However, as seen in our questionnaire, a large proportion of physicians prescribed antibiotics[8, 9]. The routine use of antimicrobial agents to treat diarrhea wastes drug resources and may lead to increased antimicrobial resistance in severely sick children and those who have chronic conditions [10, 11]. Guidelines provoked the danger of prescribing antibiotics in acute viral infections [12, 13]. Even when a bacterial cause is suspected accompanied by the appearances of particular clinical signs, antimicrobial therapy is not usually prescribed in children because most cases of acute diarrhea are self-limited and are not improved by antimicrobial agents. Moreover, more children with bacterial enteritis have negative stool cultures and, oppositely, it is not common to detect and diagnose various bacterial and viral pathogens, making it difficult to diagnose a particular microorganism [14, 15]. Nevertheless, empirical and specific antimicrobial therapy can be considered in certain situations. Knowledge of local patterns of resistance is crucial to reduce the number of treatment failures in children[12, 16]. Bacterial diseases cause more than 80% of the traveler's diarrhea. Fresh stool obtained was tested for bacterial pathogens and rotavirus. The presence of *Shigella*, *Campylobacter jejuni*, enteropathogenic*Escherichia coli* (identified by stereotyping), *Aeromonas*, and *vibrio*was determined by standard microbiologic methods[17, 18]. According to the treatment regime of AGE, antibiotic therapy is not essential for acute diarrhea in children, rather, rehydration is the key therapy and the symptoms are usually eliminated without particular treatment. The examination for the etiology of gastroenteritis is not generally necessary[19, 20]. Caution should be exercised when antimicrobial therapy is necessary [5, 15]. World Health Organization (WHO) recommended guidelines in which oral rehydration therapy with early refeeding was the preferred treatment for dehydration in cases with AGE. Antimotility agents should be avoided in patients with bloody diarrhea, but loperamide/simethicone may improve symptoms in patients with watery diarrhea and when host immune status is compromised for any reason including severe malnutrition, chronic disease, etc[11, 20]. Antimicrobial therapy may be stopped for a moderate-to-severe traveler's diarrhea or diarrhea accompanied by fever and/or bloody stools and diarrhea along with another acute infection demand particular antimicrobial treatment. Comparable references are supplied at a local level, but supporting evidence is low or unavailable [17, 21]. In contrast antibiotics may produce gastroenteritis symptoms that mimic AGE. Resistance to antibiotics is an emerging dilemma [22]. In poor countries, the resistance among pathogens is prevalent, less restricted, and less supervised [9, 23, 24]. In developing countries, enteric pathogens have developed resistance to virtually all antibiotics that are routinely used in the treatment of diarrhea [16, 23]. Antibiotic therapy for dysentery etiology, epidemiology, and the treatment of diarrheal diseases caused for many years that "may require" antibiotic therapy. Enteric diseases caused by pathogens (viruses, bacteria, or protozoa) for which antibiotics are likely to have limited efficacy or even dangerous (e.g. Salmonellae and Campylobacter) [25, 26] are generally self-limiting. In all cases, zinc deficiency is associated with chronic diarrhea, which induces cellular damage as a free radical. The use of oral rehydration solutions (ORS) is an important part of the treatment of diarrhea, especially early in infancy and for patients with cholera. In the treatment of patients with diarrhea, longer symptoms and hyperthermia are

associated with the prescription of antibiotics[27]. In many studies, the type of physicians was associated strictly with the unnecessary prescription of antibiotics[8, 28, 29]. The antibiotics were prescribed for 23% of children only, while doctors in the government sector prescribed antibiotics for 51% of children with diarrhea [30, 31]. However, in 10% of children, antibiotics were inappropriately prescribed because of the probable bacterial pathogen[30, 31]. For considering antibiotic treatment, clinical features, host-related and setting-related conditions, and etiology should be considered[32, 33]. In the treatment of diarrhea, stool output is calculated as the sum of the weights of the watery and loose stools (diarrheic stools) divided by the bodyweight at baseline [34, 35]. Rehydration is the main therapy for AGE, and active management of diarrhea with diosmectite or probiotics should be respected, out of etiology [36, 37]. There are three distinct groups of standards that could be accurately considered: clinical conditions, host-related agents, and settings [26]. Young infants, children with chronic conditions, and those in a toxic state or with signs of systemic infection should be considered at risk of systemic infections, and oral or parenteral antibiotic therapy may be indicated. If mild symptoms are present and close observation is feasible, it may be better to wait for microbiological results. Antibiotic treatment in specific settings is also indicated if spreading is an issue. The traveler's diarrhea may require antibiotic treatment. The choice of specific antibiotics may be based on etiology and local resistance patterns [38]. In conclusion, it is a great significance to restrict the utility of not needed antibiotics; there are situations for which drugs are mandate and life-saving. However, its utilization must be supported by evidence-based medicine.

Conclusion

Acute gastroenteritis (AGE) is a common problem in the pediatric age group, especially in low socioeconomic status countries. It may have a bacterial, viral or parasitic origin. Active treatment of diarrhea should always be considered, independent of etiology. Empiric antibiotic therapy should be started soon after specimen collection in infants and children in severe conditions as antibiotic therapy is not routine except in proven cases of bacterial origin. This study highlighted the need for development and implementation of relevant, diagnosis-specific antibiotic prescribing guidelines for pediatric patients. There is a need for the development of evidence-based treatment protocols for common clinical conditions to rationalize the use of antibiotics.

References

1. Howidi M, Al Kaabi N, El Khoury AC, Brandtmüller A, Nagy L, Richer E, Haddadin W, Miqdady MS. Burden of acute gastroenteritis among children younger than 5 years of age–a survey among parents in the United Arab Emirates. BMC pediatrics. 2012 Dec;12(1):74.
2. Diniz-Santos DR, Silva LR, Silva N. Antibiotics for the empirical treatment of acute infectious diarrhea in children. Brazilian Journal of Infectious Diseases. 2006 Jun;10(3):217-27.
3. Tayeb HT, Balkhy HH, Aljuhani SM, Elbanyan E, Alalola S, Alshaalan M. Increased prevalence of rotavirus among children associated gastroenteritis in Riyadh Saudi Arabia. Virology journal. 2011 Dec;8(1):548.
4. Bresee JS, Duggan C, Glass RI, King CK. Managing acute gastroenteritis among children; oral rehydration, maintenance, and nutritional therapy. 2003.
5. Freedman SB, Williamson-Urquhart S, Schuh S, Sherman PM, Farion KJ, Gouin S, Willan AR, Goeree R, Johnson DW, Black K, Schnadower D. Impact of emergency department probiotic treatment of pediatric gastroenteritis: study protocol for the PROGUT (Probiotic Regimen for Outpatient Gastroenteritis Utility of Treatment) randomized controlled trial. Trials. 2014 Dec;15(1):170..
6. Aabenhus R, Hansen MP, Siersma V, Bjerrum L. Clinical indications for antibiotic use in Danish general practice: results from a nationwide electronic prescription database. Scandinavian journal of primary health care. 2017 Apr 3;35(2):162-9.
7. Alhusain, R. M. Evaluation of the Inhibitory Effect of Functional Fermented Milk Containing Different Probiotic Cultures on Salivary Mutans Streptococci Count in Experimental rats: A Randomized Control Animal Study.2017; 6(1):202-212.
8. Pathak A, Mahadik K, Dhaneria SP, Sharma A, Eriksson B, Lundborg CS. Surveillance of antibiotic consumption using the "focus of infection" approach in 2 hospitals in Ujjain, India. PLoS One. 2012 Jun 8;7(6):e38641.
9. Chinchilla-López P, Cruz-Ramón V, Ramírez-Pérez O, Méndez-Sánchez N. Gastroenteritis in an adult female revealing hemolytic uremic syndrome: Case report. World journal of gastroenterology. 2018 Feb 14;24(6):763.
10. Sharma M, Damlin A, Pathak A, Lundborg CS. Antibiotic prescribing among pediatric inpatients with potential infections in two private sector hospitals in Central India. PLoS One. 2015 Nov 5;10(11):e0142317.
11. Elfving K, Shakely D, Andersson M, Baltzell K, Ali AS, Bachelard M, Falk KI, Ljung A, Msellem MI, Omar RS, Parola P. Acute uncomplicated febrile illness in children aged 2-59 months in Zanzibar–Aetiologies, antibiotic treatment and outcome. PLoS One. 2016 Jan 28;11(1):e0146054.

12. Brander RL, Walson JL, John-Stewart GC, Naulikha JM, Ndonye J, Kipkemoi N, Rwigi D, Singa BO, Pavlinac PB. Correlates of multi-drug non-susceptibility in enteric bacteria isolated from Kenyan children with acute diarrhea. PLoS neglected tropical diseases. 2017 Oct 2;11(10):e0005974.

13. Rogawski ET, Westreich D, Becker-Dreps S, Adair LS, Sandler RS, Sarkar R, Kattula D, Ward HD, Meshnick SR, Kang G. The effect of early life antibiotic exposures on diarrheal rates among young children in Vellore, India. The Pediatric infectious disease journal. 2015 Jun;34(6):583.

14. Pernica JM, Steenhoff AP, Mokomane M, Moorad B, Lechiile K, Smieja M, Mazhani L, Cheng J, Kelly MS, Loeb M, Stordal K. Rapid enteric testing to permit targeted antimicrobial therapy, with and without Lactobacillus reuteri probiotics, for paediatric acute diarrhoeal disease in Botswana: A pilot, randomized, factorial, controlled trial. PloS one. 2017 Oct 9;12(10):e0185177.

15. Iwata K, Fukuchi T, Hirai M, Yoshimura K, Kanatani Y. Prevalence of inappropriate antibiotic prescriptions after the great east Japan earthquake, 2011. Medicine. 2017 Apr;96(15).

16. Ahiabu MA, Tersbøl BP, Biritwum R, Bygbjerg IC, Magnussen P. A retrospective audit of antibiotic prescriptions in primary health-care facilities in Eastern Region, Ghana. Health policy and planning. 2015 Jun 4;31(2):250-8.

17. Bruzzese, E., Giannattasio, A., Guarino, A. Antibiotic treatment of acute gastroenteritis in children. F1000Research; 2018; 7:193. Available from: https://f1000research.com/articles/7-193/v1

18. de Bont EG, Alink M, Falkenberg FC, Dinant GJ, Cals JW. Patient information leaflets to reduce antibiotic use and reconsultation rates in general practice: a systematic review. BMJ open. 2015 Jun 1;5(6):e007612.

19. Hay AD, Sterne JA, Hood K, Little P, Delaney B, Hollingworth W, Wootton M, Howe R, MacGowan A, Lawton M, Busby J. Improving the diagnosis and treatment of urinary tract infection in young children in primary care: results from the DUTY Prospective Diagnostic Cohort Study. The Annals of Family Medicine. 2016 Jul 1;14(4):325-36.

20. Elshout G, van Ierland Y, Bohnen AM, de Wilde M, Moll HA, Oostenbrink R, Berger MY. Alarming signs and symptoms in febrile children in primary care: an observational cohort study in the Netherlands. PloS one. 2014 Feb 19;9(2):e88114.

21. Chan SS, Ng KC, Lyon DJ, Cheung WL, Cheng AF, Rainer TH. Acute bacterial gastroenteritis: a study of adult patients with positive stool cultures treated in the emergency department. Emergency Medicine Journal. 2003 Jul 1;20(4):335-8. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1726145&tool=pmcentrez&rendertype=abstract

22. Lokhasudhan G, Nasim I. Knowledge, attitude, and practice survey on usage of antibiotics among dental practitioners in southern region of India. J Adv Pharm Edu Res. 2017;7:160-2.

23. Das JK, Ali A, Salam RA, Bhutta ZA. Antibiotics for the treatment of Cholera, Shigella and Cryptosporidiumin children. BMC public health. 2013 Sep 1;13(S3):S10. Available from: http://www.biomedcentral.com/1471-2458/13/S3/S10

24. AlOsaimi KM, Kambal AM, AlOtaibi FM, AL-Anazi AB, AlMotairi AR, AlGhamdi WM, Altujjar AR. Factors Affecting Physicians' Choice of Antibiotics for Treatment of Community Acquired Urinary Tract Infections and Their Correlation with Antimicrobial Susceptibility Test Results in King Khalid University Hospital during 2013-2014. International Journal of Pharmaceutical Research & Allied Sciences. 2018 Jan 1;7(1).

25. Pathak D, Pathak A, Marrone G, Diwan V, Lundborg CS. Adherence to treatment guidelines for acute diarrhoea in children up to 12 years in Ujjain, India-a cross-sectional prescription analysis. BMC infectious diseases. 2011 Dec;11(1):32. Available from: http://www.biomedcentral.com/1471-2334/11/32

26. Zhou Y, Zhu X, Hou H, Lu Y, Yu J, Mao L, Mao L, Sun Z. Characteristics of diarrheagenic Escherichia coli among children under 5 years of age with acute diarrhea: a hospital based study. BMC infectious diseases. 2018 Dec;18(1):63.

27. Lim JK, Kim TH, Kilgore PE, Aiello AE, Choi BM, Lee KC, Yoo KH, Song YH, Kim YK. The association between influenza treatment and hospitalization-associated outcomes among korean children with laboratory-confirmed influenza. Journal of Korean medical science. 2014 Apr 1;29(4):485-93.

28. McFarland LV, Ozen M, Dinleyici EC, Goh S. Comparison of pediatric and adult antibiotic-associated diarrhea and Clostridium difficile infections. World journal of gastroenterology. 2016 Mar 21;22(11):3078.

29. Onakpoya IJ, Walker AS, Tan PS, Spencer EA, Gbinigie OA, Cook J, Llewelyn MJ, Butler CC. Overview of systematic reviews assessing the evidence for shorter versus longer duration antibiotic treatment for bacterial infections in secondary care. PloS one. 2018 Mar 28;13(3):e0194858.

30. Fleming-Dutra KE, Mangione-Smith R, Hicks LA. How to prescribe fewer unnecessary antibiotics: talking points that work with patients and their families. American family physician. 2016 Aug 1;94(3):200. Available from: http://www.ncbi.nlm.nih.gov/pubmed/27479620

31. Vecchio AL, Liguoro I, Bruzzese D, Scotto R, Parola L, Gargantini G, Guarino A. Adherence to guidelines for management of children hospitalized for acute diarrhea. The Pediatric infectious disease journal. 2014 Nov 1;33(11):1103-8. Available from: https://insights.ovid.com/crossref?an=00006454-201411000-00001

32. Talan DA, Saltzman DJ, Mower WR, Krishnadasan A, Jude CM, Amii R, DeUgarte DA, Wu JX, Pathmarajah K, Morim A, Moran GJ. Antibiotics-first versus surgery for appendicitis: a US pilot randomized controlled trial

allowing outpatient antibiotic management. Annals of emergency medicine. 2017 Jul 1;70(1):1-11. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0196064416309246

33. Rogawski ET, Meshnick SR, Becker-Dreps S, Adair LS, Sandler RS, Sarkar R, Kattula D, Ward HD, Kang G, Westreich DJ. Reduction in diarrhoeal rates through interventions that prevent unnecessary antibiotic exposure early in life in an observational birth cohort. J Epidemiol Community Health. 2016 May 1;70(5):500-5. Available from: http://jech.bmj.com/lookup/doi/10.1136/jech-2015-206635

34. Talbot-Smith A, Heyworth J. Antibiotic use, gastroenteritis and respiratory illness in South Australian children. Epidemiology & Infection. 2002 Dec;129(3):507-13. Available from: https://acces.bibl.ulaval.ca/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=104730689&lang=fr&site=ehost-live

35. Ab Rahman N, Teng CL, Sivasampu S. Antibiotic prescribing in public and private practice: a cross-sectional study in primary care clinics in Malaysia. BMC infectious diseases. 2016 Dec;16(1):208. Available from: http://dx.doi.org/10.1186/s12879-016-1530

36. Fritsche TR, Biedenbach DJ, Jones RN. Antimicrobial activity of prulifloxacin tested against a worldwide collection of gastroenteritis-producing pathogens, including those causing traveler'sdiarrhea. Antimicrobial agents and chemotherapy. 2009 Mar 1;53(3):1221-4.

37. JavidAsil, Sh. Investigating the Production of Probiotic Beverages based on Wheat. World Journal of Environmental Biosciences, 2018; 7(4), 41-44.

38. Kim HS, Park BK, koo Kim S, Han SB, Lee JW, Lee DG, Chung NG, Cho B, Jeong DC, Kang JH. Clinical characteristics and outcomes of Pseudomonas aeruginosa bacteremia in febrile neutropenic children and adolescents with the impact of antibiotic resistance: a retrospective study. BMC infectious diseases. 2017 Dec;17(1):500.