

# CULTURAL AND TRADITIONAL PRACTICES FOR THE MANAGEMENT OF DIARRHEA IN CHILDREN UNDER 5 YEARS OF AGE IN SELECTED SUBURBS OF KHYBER PAKHTUNKHWA

Rabia Kareem, Sidra Irshad, Rabia Asad, Sadaf Alam

Submitted: June 05, 2016

Accepted: August 25, 2016

## Author Information

Dr. Rabia Kareem, Trainee Medical Officer, Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar, Khyber Pakhtunkhwa.

Dr. Sidra Irshad, Medical Officer, District Headquarters Hospital, Charsadda, Khyber Pakhtunkhwa. (Corresponding Author)  
Email: sidirshad@gmail.com.

Dr. Rabia Asad, Ex-House Officer, Khyber Teaching Hospital; currently in Manchester, UK.

Dr. Sadaf Alam, Trainee Medical Officer, Department of Pediatrics, Hayatabad Medical Complex, Peshawar, Khyber Pakhtunkhwa.

## ABSTRACT

**Introduction:** About two-thirds of the total annual deaths in Pakistan are currently among children under the age of five years, and diarrhea is considered to be one of the major contributors to these deaths. Diarrhea becomes very common after disasters like floods to which the Khyber Pakhtunkhwa (KP) province of Pakistan is quite prone. Hence, the present study was conducted to document the home management of diarrhea in children less than five years of age in the province.

**Materials & Methods:** This cross sectional descriptive study was conducted in three suburban areas of KP from April to June 2010. Subjects were the locals of three towns namely, Asadabad (Mardan), Tarnab (Charsadda), and Kuchian Kalay (Warsak Road, Peshawar), all of which have low standards of hygiene and sanitation. Data were collected from 100 households in these areas through convenience sampling and interviews of mothers. Questionnaires were pretested and translated in local languages and data were obtained after informed consent. SPSS version 17 was used for analysis of descriptive data.

**Results:** The majority (96%) of mothers were housewives, of which 36% had income less than Rs. 3000 per month. Laborer mothers accounted for 4% of families. Only 4% families had a monthly income over Rs. 10,000. Home remedies were used by 75% women interviewed, of which the most common were traditional / natural herbs. Such remedies were used by 34% of the 75% mothers with monthly income between Rs. 3001 and Rs. 5000, compared to 1% mothers out of the 4% who earned more than Rs. 10,000 per month. Rehydration therapy was adopted by 74% mothers when their children suffered from diarrhea. Frequency of hand washing before and after various activities ranged from 76% to 83%, with majority of mothers washing their hands before cooking meals for the families. More than half (53%) mothers changed the feeding practices of their children during diarrheal episodes. Most mothers knew about fever and vomiting as additional symptoms of diarrhea.

**Conclusions:** Majority of mothers, particularly those of lower socio-economic status, used a variety of traditional methods for the management of diarrhea, such as "Sperkai", "Anja" and "Alam". Most diarrhea patients were switched to soft foods and given green tea and ORS for fluid intake (rehydration). Knowledge of mothers about the dreadful complications of dehydration was extremely poor.

**Keywords:** Diarrhea; Dehydration; Child, preschool; Fluid therapy; Hand disinfection.

The authors declare no conflict of interest. All authors contributed substantially to the planning of research (RK, SI), questionnaire design (RB, RA), data collection (RK, SA), data analysis (SI, RA) and write-up (RK, SI) of the article and agreed to be accountable for all aspects of the work.

**Citation:** Kareem R, Irshad S, Asad R, Alam S. Cultural and traditional practices for the management of diarrhea in children under 5 years of age in selected suburbs of Khyber Pakhtunkhwa. J Rehman Med Inst. 2016 Jul-Sep;2(3):12-23.

## INTRODUCTION

"Diarrhea is the world's most effective weapon of mass destruction" - Rose George, journalist and author of *The Big Necessity: The Unmentionable World of Human Waste and Why it Matters*, an eye-opening report on the shocking realities of the world's sanitation crisis.<sup>1</sup> Diarrheal diseases are a leading cause of morbidity and mortality among young children

in low-income countries.<sup>2</sup> According to another study, nearly 2 million children die annually from diarrheal disease.<sup>3</sup>

According to UNICEF statistics of Pakistan,<sup>4</sup> mortality rate is 81/1000 live births for children under-five which is 431,658 deaths. Only 38% children under-five years of age

with diarrhea are receiving oral rehydration salts. UNICEF admits that the mortality rate for children under-five has declined since 1990.

Diarrhea is usually caused by one of a number of food- or water-borne pathogens.<sup>4,5</sup> Other factors are likely to contribute to the very high diarrhea morbidity and mortality rates, include poverty, female illiteracy, poor water supply and sanitation, poor hygiene practices, and inadequate health services.

UNICEF reported sanitary facilities of Pakistan;<sup>5</sup> according to them, 14% population use unimproved sanitation facilities, 9% share sanitary facilities, 13% practice open defecation, and 7% use unimproved drinking water sources.

World Health Organization (WHO) has shared certain facts about diarrheal disease.<sup>6</sup> According to WHO, the two most common etiological agent of diarrhea in low income countries are *Rotavirus* and *Escherichia coli*; *Cryptosporidium* and *Shigella* species may also be involved. WHO also mentions certain causes of diarrhea; these include water contamination with human feces, from septic tanks, sewage and latrines and microorganisms from animal feces.

According to a news in DAWN newspaper on December 31st, 2013,<sup>7</sup> Dr. Zulfiqar Bhutta, a researcher from Aga Khan University states that around 350,000 children die of diarrhea every year before they reach five years of age in five countries, of which Pakistan is one. He also mentions that death rate in Pakistan has stayed stagnant. Lack of improving sanitary measures, pure water supplies and health and hygiene measures are the leading cause of this stagnant rate.

Another study done by Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden<sup>8</sup> on diarrhea case management in low- and middle-income

countries mentions that many children in low- and middle-income countries do not receive proper treatment for diarrhea.

Only 37% children aged less than 5 years with diarrhea receive Oral Rehydration Therapy or increased fluids with continued feeding.<sup>9</sup>

Another study<sup>10</sup> done in Northern Areas of Pakistan on women's management of the household health environment in responding to childhood diarrhea showed that respondents were familiar with diarrhea control interventions carried out in the study site. Findings demonstrated the continuance of long-established cultural patterns of perception and behavior with regard to childhood diarrhea and the influence of socio-economic constraints to instituting new management practices. The study clearly showed the contribution of illiteracy on the part of the mother leading to diarrhea.

A study conducted in Balochistan<sup>11</sup> reported diarrhea as a common problem occurring in 36% of the under-five children, with higher incidence in rural areas as compared to major cities. Of those with recent diarrhea, 45% received an ORS packet solution or a salt solution/yogurt (ORT). It would appear that about half the children in Baluchistan do not receive a proper response for diarrhea.

According to a book, Environmental Health and Child Survival: Epidemiology, Economics, Experiences, written by World Bank, Washington DC (2005),<sup>12</sup> diarrhea contributes 88% for environmentally attributable fractions of child mortality, keeping malnutrition unchanged for Pakistan.

The same book mentions the estimated mortality in under-five children from environmental risk factors, 2005; according to their data which is based on WHO 2004, under-five child mortality is 96,200 in Pakistan as compared to 9,900 in Ghana. It was found

that among this figure for mortality, 84,656 were solely due to environmental risk factors (excluding malnutrition). This is in comparison to 8,712 for Ghana.

Similarly a study was carried out in Southern Punjab, Pakistan,<sup>13</sup> to outline the causes of childhood diarrhea as perceived by mothers and, especially, to assess perceptions of mothers on childhood diarrhea in relation to hygiene practices, drinking water and sanitation facilities. The study found that despite the mother's central role as caretaker one should not rely on the traditional mother-child relationship but also include the husband-wife relationship, and target other individuals involved in setting norms within the household or within the nearby community.

According to The American Journal of Tropical Medicine and Hygiene, diarrhea causes 16% child deaths in Pakistan.<sup>14</sup> They assessed patterns of healthcare use among caretakers of a sample of children less than five years of age in low-income peri-urban population of Karachi through a cross-sectional survey. Most (80%) of the caretakers sought care; less than 15% children were admitted or received oral rehydration solution. Less than half (40%) were aware about the use of oral rehydration solution for prevention of dehydration. Less than 30% sought care at special centers identified as centers for recruiting cases of diarrhea as planned diarrheal etiology case-control study. The journal mentions the need for standardized, affordable and well accessible treatment of diarrhea along with educating the general public about appropriate care in areas where diarrhea is more prevalent.

According to an article<sup>15</sup> written from Dow University of Health Sciences, Karachi, Pakistan (2014), very few mothers (less than 20%) knew about the causes of diarrhea. Only about 35- 50% mothers knew about signs like sunken eyes, thirst and dry hair as the signs of diarrhea. Most

of the mothers (80%) knew how to prepare ORS. Very few (less than 16%) knew how to prevent diarrhea. Health care seeking practices were practiced by less than 55% of the mothers, while 30% mothers also did self-medication.

A study about the awareness of mothers of children under-five years of age regarding the management of diarrhea was conducted in Haryana.<sup>16</sup> The following results were obtained: 10.4% were aware of the specific preventive measures of diarrhea, 42.9% knew the correct method of preparation of ORS, and 70.5% knew the correct method of administration.

A study conducted on maternal knowledge, attitude and practices towards diarrhea and oral rehydration therapy in rural Maharashtra<sup>17</sup> reported the following data: 68% knew the correct definition of diarrhea, 5.3% had awareness that diarrhea leads to dehydration, and 90.7% knew ORT and ORS were easily available to the majority. One-third of mothers were mixing ORS in the wrong fluid. It was concluded that maternal knowledge towards diarrhea and ORS was inadequate in the population studied and there was a big gap between 'Actual' and 'Desired' practices.

A study was undertaken by the Maseno University, School of Public Health and Community Development, Maseno, Kenya,<sup>18</sup> which reported that more than 70% of mothers decreased fluid intake during diarrhea episodes. The mothers perceived wheat flour, rice water and selected herbs as anti-diarrheal agents. During illness, 27.8% of the children were reported not to have been given fluids at all, 52.5% drunk much less and only 10.0% were reported to have drunk more than usual. A significant 89.6% withheld milk including breast milk with the notion that it enhanced diarrhea.

According to an article published in 2015<sup>19</sup> on risk correlates of diarrhea in children under-five

years of age in slums of Bankura, West Bengal, the prevalence of diarrhea was high in children under five years of age. The study emphasized effective education of the community about management, hazards and control of diarrhea to prevent and control their mentioned risk factors of diarrhea.

According to a systematic review and meta-analysis<sup>20</sup> conducted on assessing the impact of drinking water and sanitation on diarrheal disease in low- and middle-income settings, the exceptional use of sufficient access and supply of safe drinking water or use of prompt sanitation is still not adequate.

Keeping these facts in mind, it was felt important to assess and identify the cultural and traditional practices for the management of diarrhea in children under-five years of age from the selected suburbs (Mardan, Charsadda and Koochiyaan) of Khyber Pakhtunkhwa province of Pakistan. Diarrhea becomes very common after natural disasters such as floods which are frequent in the province.

This study is significant for a number of people. These include Public Health Officials, Clinicians and Pediatricians so that they can find the areas of intervention, and educate the people of these areas accordingly.

## **MATERIALS & METHODS**

This Observational (descriptive cross-sectional) study was carried in three suburban areas of Khyber Pakhtunkhwa (KP) on the locals of three towns namely Asadabad (Mardan), Tarnab (Charsadda), Kuchian kalay (Warsak Road, Peshawar).

Asadabad is a small village located in the suburb of Mardan, consisting of 50-60 families. Most of the people of this area depend on agriculture and use well water for drinking and cleaning purposes

but some also use tap water. There is no Basic Health Unit (BHU) in the vicinity.

Tarnab is a small village located in the suburb of Charsadda. It is a well irrigated area and most of the people of the area depend on agriculture for their living. There is also one BHU in the area. They use well water for drinking purpose but also the tap water from the municipal corporation. However, there is no proper system for sanitation which is probably a major cause of disease in the area.

Kuchian Kalay is located near Warsak Dam in the suburb of Peshawar. Most of the people of the area are farmers. There is one RHC and three clinics in the area. Some people use well water for drinking purposes but most of them use tap water.

The study period for collection of data was from April, 2010 to end of June 2010. A total of 100 families of these three areas were visited and interviewed through convenience sampling.

Questionnaires were designed in English and translated into Pashto (orally) for the interviews. Use of medical terminologies was avoided; a pilot survey was done before the actual study which included a questionnaire based interview with women who belonged to one of the areas of the study. The women were asked to identify any term, phrase or sentence which they could not understand. Such terms were replaced with alternates that were understood by them. The process was repeated one more time to ensure validity of the terms used. An informed consent was obtained from the head of the family before interviewing them. They were assured that all the data taken would be kept confidential.

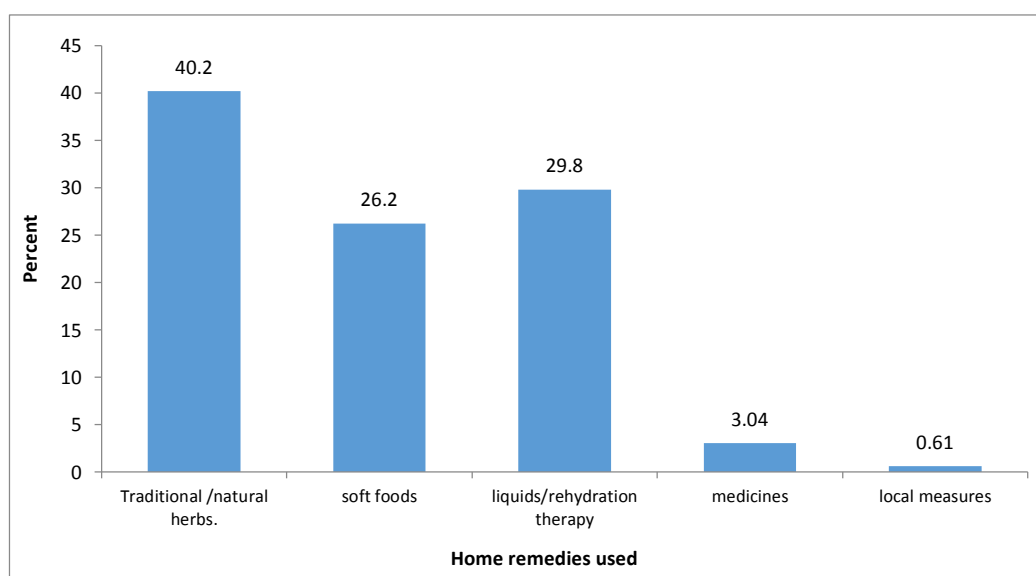
The data were entered in SPSS 17 and analyzed for descriptive statistics.

## RESULTS

A total of 100 families were interviewed for the management of diarrhea cases of children under five years of age; demographic and diarrhea management data were obtained for all the families included in the study.

Majority (96%) of the mothers were housewives, 36% of whom earned less than PKR 3000 per month, and 4% families were run by mothers who were laborers. The monthly income of only 4% families was more than PKR 10,000.

Use of home remedies was very common; 75% women interviewed used some kind of home remedies. Amongst the home remedies, the most common were traditional/natural herbs (40.2%), followed by liquids/rehydration therapy (29.8%), and soft foods (26.2%); other approaches like medicines and local measures were adopted by a few mothers (3.04% and 0.61% respectively (Figure 1).



**Figure 1: Different types of home remedies used by mothers of children under-five years of age with diarrhea (n=75).**

Table 1 lists the details of different types of home remedies used by mothers for managing diarrhea of their children less than five years of age. The total frequencies are 174 because many mothers used two or more home remedies. The category of Traditional/natural herbs was most commonly used by mothers (65/174, 35.3%), out of which the traditional cures for diarrhea “Sperkai” and “Ispaghul” were used by 13.79% and 7.47% of mothers respectively. Soft foods were used by 53/174 (30.46%) mothers, out of which the use

of honey and custard were the most common at 5.47% each, closely followed by “Kheer” (5.17%), Custard (4.59%), and Banana (3.44%). Liquids/Rehydration therapy was adopted by 49/174 (28.165) mothers, out of which Green Tea was most common (13.7%), followed by “Nimkol” (2.87%), “Gurr Juice”, and cold Fruit Juice, each at 2.29%. Medicine (Flagyl only) was used by 5 (2.87%) of mothers only; other local measures included tying and massaging of abdomen were infrequent (0.57%).

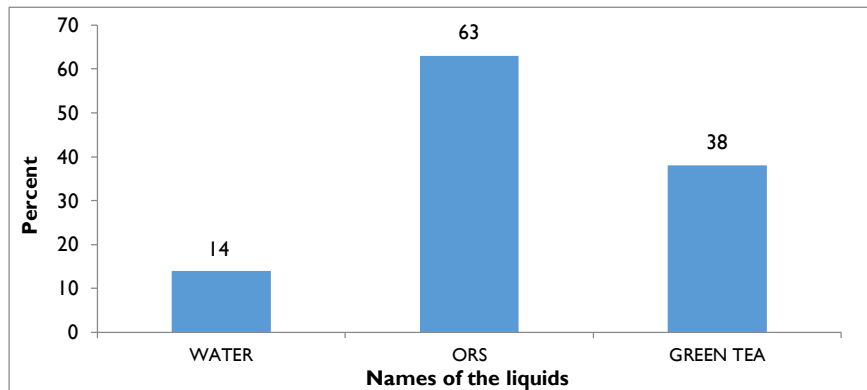
**Table 1: Varieties of home remedies used by mothers of children under-five years of age with diarrhea (n=75).**

HOME REMEDIES LIST	FREQUENCIES	PERCENTAGES
<b>TRADITIONAL/NATURAL HERBS</b>		
Sperkai	24	13.79
Ispaghool	13	7.47
Anja	5	2.87
Alam	4	2.29
Venale	4	2.29
Saunf	3	1.72
Pakai	3	1.72
Laspallai	3	1.72
Doda	2	1.14
Chundi (hakeem leaves)	1	0.57
Ispaghool in milk	1	0.57
Tor ilies	1	0.57
Sun-zefal	1	0.57
<b>SOFT FOODS</b>		
Honey	10	5.74
Rice	10	5.74
Kheer	9	5.17
Custard	8	4.59
Banana	6	3.44
Yogurt	3	1.72
Bread	3	1.72
Soft food	2	1.14
Biscuits	2	1.14
<b>LIQUIDS/REHYDRATION THERAPY</b>		
Green tea	24	13.7
Nimkol	5	2.87
Gurr juice	4	2.29
Juice (cold)	4	2.29
Dried pomegranate, crushed and dissolved in water	3	1.72
Boiled orange leaves	3	1.72
Lemon	2	1.14
Naranj (boiled)	2	1.14
Boil different leaves and then take the boiled water	2	1.14
<b>MEDICINE</b>		
Flagyl	5	2.87
<b>LOCAL MEASURES</b>		
Tie and massage on tummies	1	0.57

<b>Total</b>	<b>174</b>	<b>100</b>
--------------	------------	------------

Among the families interviewed, 74% mothers said that they did rehydration therapy when their children suffer from diarrhea. Figure 2 shows that, in these 74% mothers, 63%, 14% and 38% women used ORS, water and green tea,

respectively to rehydrate their children, with some mothers using more than one rehydration fluid; 95% consulted a doctor when their child suffered from diarrhea after trying home remedies.



**Figure 2: Liquids used by mothers of children under-five years of age with diarrhea for rehydration therapy (n=74).**

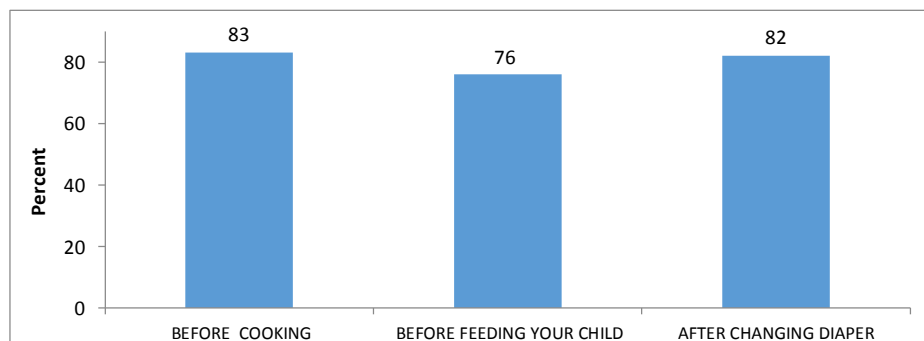
Table 2 shows the management of diarrheal diseases in relation to monthly income of the family. According to the study, 34% families out of 75% with income between 3,001 and 5,000 mostly depend on the home remedies for the

management of diarrhea. 1% Families out of 75%, who earn more than 10,000 per month rarely use home remedies for the management of their diarrheal diseases.

**Table 2: Socioeconomic status and use of home remedies**

Monthly income (PKR)	Use of home remedies
≤ 3,000	31%
3,001-5,000	34%
5,001-10,000	09%
> 10,000	01%
<b>Total</b>	<b>75%</b>

Figure 3 shows the frequency of hand washing by mothers before and after various

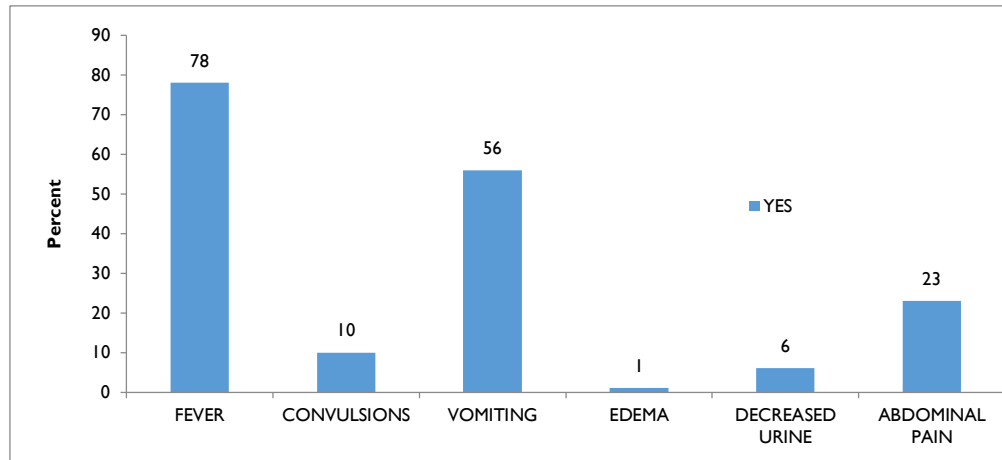


activities. It ranged from 76% to 83%; majority of mothers washed their hands before cooking meals for their families.

**Figure 3: Hand washing practices among mothers of children under-five years of age with diarrhea (n=100).**

More than half (53%) of mothers changed the feeding practices of their children during diarrheal episodes. Figure 4 shows the results for awareness of mothers regarding the symptoms

of management of diarrheal disease. Most of the people knew about fever (78%) and vomiting (56%).



**Figure 4: Awareness of mothers of children under-five years of age with diarrhea regarding symptoms associated with diarrhea (n=100).**

## DISCUSSION

A total of one hundred families were interviewed and complete demographic data were obtained regarding the cultural and traditional practices used for the management of diarrhea in the selected suburbs of Khyber Pakhtunkhwa (Koochian Kalay, Asadabad and Tarnab). Most of the mothers interviewed were housewives (96%) and were uneducated. Majority of the families had monthly income between Three Thousand (Rs.3000) to Five Thousand (Rs.5000)

It was found out that traditional/natural herbs, soft foods, liquids, rehydration therapy, medicines and local measures were used in the population under study. The most commonly used herb was Celery (Sperkai or Ajwain in the local language) which helps in relieving the motility of intestines.

People also gave importance to liquids consumption for rehydration of the infant and gave importance to the use of green tea. Traditional uses of green tea include treating flatulence, regulating body temperature and blood sugars, promoting digestion and improving mental processes.<sup>21</sup>

Polyphenols in green tea are thought to produce its anti-diarrheal effects.<sup>22</sup>

An interesting practice in the population under study was that Pomegranate's skin was dried and crushed and then dissolved in water and the infant was made to drink this mixture. This practice is of no significance in the management of diarrhea. Limited research is available on this practice. However it has been found that drinking too much of pomegranate juice may be constipating.<sup>23</sup>



According to the department of food science and technology, Govt. College for Women Gandhi Nagar, Jammu, Jammu and Kashmir, India concluded in their results on "Foods used as ethno-medicine in Jammu", that "It is desirable to use traditional foods as medicines, which our grandmothers also practiced. The latest researches have proven the importance of many of these traditional foods".<sup>24</sup>

A study was conducted on recognizing the danger signs and health seeking behavior of mothers in childhood illness in Peshawar, Pakistan.<sup>25</sup> The study showed that out of 450 cases taken from Pediatric OPD of the three tertiary care hospitals of Peshawar, diarrhea prevailed in 264(59%), the more susceptible age being from 1 to 24 months (88%). Low house hold income and no or occasional hand wash before feeding their children, no or partial immunization and mother illiteracy were the primary factors responsible for the aforementioned results. In all the factors mentioned in the study, the frequency of low house hold income was the highest (86%) and immunization being the lowest.

When it comes to treating or preventing diarrhea, diet is an important factor to consider. Recovery from the ailment generally involves avoiding certain foods and eating foods that are easy to digest (such as bananas, plain rice, and toast). It was encouraging to know that the mothers included in the current study switched to soft foods, with rice being most frequently used.

A study conducted in Brazilia<sup>26</sup> on the risk and prognostic factors for diarrheal diseases concluded that poor feeding practices accounted for both an increased risk and a worse prognosis. During the first two years of life, interrupting breastfeeding just prior to the onset of the episode resulted in a 6-fold increase in the risk of developing dehydrating diarrhea.

According to an article on qualitative study of community perceptions about childhood diarrhea and its management in Assosa District, West Ethiopia,<sup>27</sup> most of the participants recognized childhood diarrhea as one of the major public health issues. Diverse misperceptions existed about the causes of diarrhea. The indigenous ethnic groups used traditional treatment for their children, although homemade management of diarrhea was practiced as well. The study emphasized the importance of appropriate diarrhea control and prevention programs development by considering the local culture and resources.

According to a series of studies conducted on assessing the global burden of childhood pneumonia and diarrhea published in *The Lancet*,<sup>28</sup> it was summarized that a high proportion (72%) of deaths occur due to diarrhea in the very first two years of life. The studies also figured out under-nutrition, suboptimum breastfeeding, and zinc deficiency as the factors for diarrhea. It also emphasized the importance of action against the control of diarrhea globally and at country level to speed up its reduction.

Hand-washing with soap is one of the most cost effective public health interventions to prevent diarrheal related diseases and death.<sup>29</sup>

The information obtained from the present study was that they frequently washed their hands before various important activities such as feeding their infants or before cooking.

Feeding practices of a child during diarrhea are very important and it monitors the recovery and the prevention of complications of diarrhea. The study showed that more than half of the interviewed families changed the diet of the child during diarrheal episodes. The diet was changed to soft foods and more liquids were added. But some mothers also restricted the diet during

diarrhea; mothers of the community did not have adequate knowledge about infant feeding during diarrhea and its various aspects.

The awareness of mothers regarding the symptoms of diarrhea varied greatly. The symptoms which were more common were known by most of them such as fever and vomiting, while the symptoms of dehydration such as convulsions, edema and decreased urine were known by very few.

According to a study done in Multan, Pakistan,<sup>30</sup> on knowledge, attitude and practices of mothers about malnutrition and diarrheal diseases, the baseline knowledge of mothers about diarrheal diseases was not adequate probably due to low literacy rate.

According to a study conducted in Karachi, Pakistan<sup>31</sup> on recognizing the danger signs and health seeking behavior of mothers in childhood illness, it was concluded that the health seeking behavior of mothers was satisfactory, but they are less knowledgeable about the danger signs and illness of their children. The study recommended spreading some urgent awareness by the authorities to increase the basic knowledge about the danger signs of child diseases in Pakistan.

## CONCLUSION

The study found out that majority of the mothers used a variety of traditional methods for the management of diarrhea, out of which “Sperkai”, “Anja” and “Alam” were used by the majority.

Majority of the mothers correctly switched to soft foods and also focused on the use of green tea and ORS for fluid intake (rehydration).

Mothers of low socioeconomic conditions mostly relied on traditional methods for diarrhea management in comparison to families who were economically well.

Mothers paid attention to the fact as to wash their hands before feeding their children. As, it is self-reported, the authenticity is doubted.

Mothers knew about the common accompanying symptoms of diarrhea such as fever, abdominal pain and vomiting while the dreadful complications of dehydration are hardly known about.

## RECOMMENDATIONS

It is necessary to educate the mothers about rehydration therapies and its importance and the signs and symptoms of diarrhea.

Mother/guardian should take care of their hygiene and of children who are under-five years of age, especially taking care that they wash their hands before and after feeding.

Families who cannot afford the expenses should be provided with ORS packets. They should also know how to prepare ORS at home.

Mothers need to be educated about harmful traditional methods / practices.

Further research is needed to find out the beneficence of the traditional herbs in diarrhea.

---

## REFERENCES

1. PATH (corporate author). Diarrheal diseases: Solutions to Defeat a Global Killer. PATH publications: Seattle, WA, USA. 2009 May. [web document] Available from: [https://www.path.org/publications/files/IMM\\_solutions\\_global\\_killer\\_pp1-14.pdf](https://www.path.org/publications/files/IMM_solutions_global_killer_pp1-14.pdf)
2. Gascon J, Vargas M, Schellenberg D, Urassa H, Casals C, Kahigwa E, et al. Diarrhea in Children under 5 Years of Age from Ifakara, Tanzania: a Case-Control Study. J Clin Microbiol. [serial on the internet] 2000 Dec;38:4459-62. Available from: <http://jcm.asm.org/content/38/12/4459.full.pdf+html>.

3. Stephen P, Agboatwalla M, Painter J, Altaf A, Billhimer WL, Hoekstra A. Effect of intensive handwashing promotion on childhood diarrhea in high-risk communities in Pakistan. A randomized controlled trial. *JAMA*. 2004 June 2;291(21):2547-54. Available from: <http://jama.ama-assn.org/cgi/content/full/291/21/2547>.
4. UNICEF Data: Monitoring the Situation of Children and Women. Internet. 2015. Available from: <https://data.unicef.org/country/pak/#>.
5. UNICEF. UNICEF Data: Monitoring the Situation of Children and Women. Pakistan. [Webpage]. Accessed August 10, 2016. Available from: <https://data.unicef.org/country/pak/>.
6. World Health Organization. Diarrhoeal disease. Fact sheet. Internet. Updated May 2017. Available from: <http://www.who.int/mediacentre/factsheets/fs330/en/>.
7. The Newspaper's Staff Reporter. Pakistan among top five diarrhea death victims [Internet]. 2013 [cited December 31, 2013]. Available from: <https://www.dawn.com/news/1077426>.
8. Forsberg BC, Petzold MG, Tomson G, Allebeck P. Diarrhea case management in low- and middle-income countries - an unfinished agenda. *Bull World Health Org*. 2007 Jan;85(1):42-8.
9. Howley L. Country Team Action Plan. Islamic Republic of Pakistan Group-2. [Online PPT Presentation]. 2007. Available from: <http://slideplayer.com/slide/4100390/>.
10. Halvorson SJ. Women's management of the household health environment: responding to childhood diarrhea in the Northern Areas, Pakistan. *Health & Place*. 2004 March;10(1):43-58. Available from: <http://www.sciencedirect.com/science/article/pii/S1353829203000182>.
11. Government of Balochistan. Young child health and nutrition. Balochistan MICS 2004. Available from: <http://www.balochistan.gov.pk/mics/MICS-4-Web/4-5-Results-Child%20Health%20&%20Nutrition.pdf>.
12. Anjali A, Mikko KP. Estimating the environmental health burden and costs at the country level. (Chapter 5). In: *Environmental Health and Child Survival | Epidemiology, Economics, Experiences*. The International Bank for Reconstruction and Development / The World Bank: Washington DC, USA. 2008. pp. 61-81. [Internet]. Available from: <http://documents.worldbank.org/curated/en/512861468313533832/Environmental-health-and-child-survival-epidemiology-economics-experiences>.
13. Neilsen M, Hoogvorst A, Konradsen F, Mudasser M, van der Hoek W. Childhood diarrhea and hygiene: Mothers' perceptions and practices in the Punjab, Pakistan. Working Paper 25. Colombo, Sri Lanka: International Water Management Institute. 2001. Available from: [http://www.iwmi.cgiar.org/Publications/Working\\_Papers/working/WOR25.pdf](http://www.iwmi.cgiar.org/Publications/Working_Papers/working/WOR25.pdf).
14. Quadri F, Nasrin D, Khan A, Bokhari T, Tikmani SS, Nisar MI, et al. Health care use patterns for diarrhea in children in low-income periurban communities of Karachi, Pakistan. *AJTMH* [Internet]. 2013;89(1\_Suppl):49-55. Available from: <http://www.ajtmh.org/content/journals/10.4269/ajtmh.12-0757>.
15. Mumtaz Y, Zafar M, Mumtaz Z. Knowledge attitude and practices of mothers about diarrhea in children under 5 years. *J Dow Uni Health Sci* 2014;8(1):3-6. Available from: <http://www.jduhs.com/index.php/jduhs/article/view/101177>.
16. Kaur A, Chowdhury S, Kumar R. Mothers' Beliefs and Practices Regarding Prevention and Management of Diarrheal Diseases. *Indian Pediatrics*. 1994 Jan;31(1):55-7. Available from: <http://www.indianpediatrics.net/jan1994/55.pdf>.
17. Datta V, John R, Singh VP, Chaturvedi P. Maternal knowledge, attitude and practices towards diarrhea and oral rehydration therapy in rural Maharashtra. *The Indian Journal of Pediatrics*. 2001 Dec;68(11):1035-7.
18. Othero DM, Orago ASS, Groenewegen T, Kaseje DO, Otengah PA. Home management of diarrhea among underfives in a rural community in Kenya: household perceptions and practices. East

- African Journal of Public Health. 2008 Dec;5(3):142-6.
19. Gupta A, Sarker G, Rout AJ, Mondal T, Pal R. Risk correlates of diarrhea in children under 5 years of age in slums of Bankura, West Bengal [Internet]. 2015. [cited 2015 Jan-Mar]; doi: 10.4103/0974-777X.150887; 7(1): 23-9. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4338445/>.
  20. Wolf J, Prüss-Ustün A, Cumming O, Bartram J, Bonjour S, Cairncross S, et al. Systematic review: Assessing the impact of drinking water and sanitation on diarrheal disease in low- and middle-income settings: systematic review and meta-regression [Internet]. 2014. [cited 8 May 2014];19(8):928-42. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/tmi.12331/full>.
  21. Takada M. Tea drinking prevents hyperlipidemia by reducing triglyceride and total and low cholesterol but increasing high density cholesterol. [Poster Presentation 30th Congress of the ESPEN]. Clinical Nutrition Supplements. 2008;3(Suppl. 1):34. Available from: [http://www.clinicalnutrition.com/article/S1744-1161\(08\)70075-9/pdf](http://www.clinicalnutrition.com/article/S1744-1161(08)70075-9/pdf).
  22. Ware M. Green tea: Health benefits, side effects, and research. Medical News Today. [webpage]. Updated 2017 Mar 28. Available from: <http://www.medicalnewstoday.com/articles/269538.php>.
  23. Graedon J, Graedon T. Best choices from the people's pharmacy. New York, USA: Graedon Enterprises Inc. 2008. p. 289.
  24. Aggarwal H, Kotwal N. Foods Used as Ethno-medicine in Jammu. Ethno-Med. 2009;3(1):65-8.
  25. Shazma, Naz S, ul-Haq N, Shah A, Jahan S. Frequency of diarrhea and its risk factors among children under five years in three teaching hospitals of Peshawar, Pakistan. IJIRD. [Online] 2016 Oct;5(12):8-11. Available from: <http://www.ijird.com/index.php/ijird/article/viewFile/103968/74256>.
  26. Fuchs SC, Victora CG. Risk and prognostic factors for diarrheal disease in Brazilian infants: a special case-control design application. Cadernos de Saude Publica (Reports in Public Health). 2002 May-Jun;18(3):773-82. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0102-311X2002000300021](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2002000300021).
  27. Yalew E. A qualitative study of community perceptions about childhood diarrhea and its management in Assosa District, West Ethiopia BMC Public Health. [Internet]. 2014;14:975. Available from: <https://bmcpublihealth.biomedcentral.com/articles/10.1186/1471-2458-14-975#Sec16>.
  28. Walker CLF, Rudan P, Liu L, Nair H, Theodoratou E, Bhutta ZA, et al. Global burden of childhood pneumonia and diarrhea [Internet]. 2013 [cited 20–26 April 2013];381(9875):1405-16. Available from: <http://www.sciencedirect.com/science/article/pii/S0140673613602226#>.
  29. Unilever. Patient education | Hand washing with soap. [Webpage]. 2017. Available from: <http://www.unileverhealth.co.za/patient-education/detail/education-hand-washing-with-soap>.
  30. Rabbani W, Bukhari SKA, Quddusi SMAI, Abbas SN. Awareness of malnutrition and diarrheal diseases among mothers in Multan region. Pak Paed J. 2006 Jan;30(3):131-5. Available from: <http://www.pakmedinet.com/printit.php?id=10380&choice=a>.
  31. ul-Haq A, Durrani HM, Kumar R, Durrani SM. Recognizing the danger signs and health seeking behavior of mothers in childhood illness in Karachi, Pakistan. Universal Journal of Public Health. [Internet]. 2015;3(2):49-54. doi: 10.13189/ujph.2015.030201. Available at: [http://www.hrpub.org/journals/article\\_info.php?id=2334](http://www.hrpub.org/journals/article_info.php?id=2334).
-