Maternal knowledge, attitude, and practice regarding diarrhoea and waterborne diseases in rural districts of Karbala, Iraq

Saad Ibrahim Al-Ghabban,[1] Waseem Saad Al-Ghabban,[2] Sara Ibrahim Abd-Oun,[3] Huda Ammar Ubaid[4]

Abstract

Objective: To assess knowledge, attitude, and practice (KAP), of rural mothers in Karbala, Iraq towards prevention and home management of diarrhoeal diseases among their children, in relation to water sanitation and personal hygiene.

Methods: A cross-sectional study was conducted during the period from June to October 2016. Two hundred and five mothers of children under 5 years age living in two villages of Alhusainya district of Karbala were interviewed regarding their KAP on diarrhoea and waterborne diseases

Results: The overall mean score of the participants' KAP (out of 100) was 52.74 ± 9.69 with a range of 27.00- 81.00. The majority of the respondents, (n=159 (77.6%), had low KAP, and the mean score of attitude and practice (AP) was 56.98 ± 13.82 with a range of 12.50 - 93.75. More than half 116(56.6%) had weak AP. There was a significant association between the KAP score with that of AP. The KAP score and AP score were significantly lower in young mothers and those with lower education. One hundred seventeen (57%) participants claimed that television and radio were the main sources of their health information.

Conclusion: Mothers in rural areas in Karbala, especially the young and those with low education had low KAP and AP towards diarrhoea and waterborne diseases, and that there was a significant association between the two variables. Television and radio, and to a lesser extent the health centres were the main sources of knowledge.

Keywords: Knowledge, Attitude, Practice, Mothers, Diarrhoea, children under five, Waterborne Diseases.

(JPMA 71: S-59 [Suppl. 9]; 2021)

Introduction

Diarrhoeal disease is a leading cause of malnutrition and the second leading cause of death in children under five years age, killing around 525 000 children under five each year. Their transmission is linked to contaminated water and poor sanitation. Cases of cholera have remained high over the last few years and there is a close link between cholera transmission and inadequate access to clean water and sanitation facilities. A significant proportion of waterborne diseases (94%) can be prevented through safe drinking water and adequate sanitation and hygiene and is treatable.[1] Good clean sources of drinking water together with maternal knowledge and personal hygiene are strong predictors of lower morbidity of waterborne diseases.[2]

Resilience to waterborne disease risks can be increased with proper household water and sanitation practices including hand-washing with soap, safe preparation and storage of food, and safe disposal of the faeces of children in addition to health education, adapted to local culture and beliefs, regarding appropriate hygiene practices.

In Iraq, an average of 6 episodes of diarrhoea a year afflicted each child, and diarrhoeal diseases were among the major causes of under-five child mortality,[3] giving a percentage of 0.052% deaths in children under five.[4]

The provision of safe and clean water in sufficient amounts is one of the major problems of community health, leading to the propagation of multiple waterborne diseases.[5] The rural population, accounting for 30.1% of the Iraqis, are facing a serious drinking water scarcity, as less than 50% of households in rural areas have access to safe drinking water.[3]

In order to reduce the incidence of waterborne diseases in children, it is essential to improve the level of household hygiene, which depends to a large extent on the knowledge, attitude and practice (KAP) of the caregivers about these diseases.

It was concluded that one of the best ways for assessing KAP of the population are the KAP studies[6] on caregivers. Knowledge and hygiene practices relevant to waterborne diseases have been studied by different surveys in various countries providing important results.[2,6,7]

[1]College of Medicine, University of Al-Ameed, Karkala, [2]Department of Gynaecology and Obstetrics, Teaching Hospital, Health Directorate of Karkala, [3]Al-Imam Al-Hussain Medical City, Health Directorate of Karkala, [4]Al-Diwaniya Educational Medical City, Health Directorate of Al-Diwaniya, Iraq.

Correspondence: Saad Ibrahim Al-Ghabban.

Email: saad_alghabban@alameed.edu.iq

In Iraq in general and particularly in rural areas, mothers are the immediate health caregivers of their children. They are responsible for the hygiene of food and water required for drinking, washing, cooking, and cleaning, and therefore their KAP is more important compared to the other family members. For this reason, in previous KAP studies they were included as the study population. Some KAP studies regarding diarrhoeal diseases and oral rehydration solution (ORS), conducted in Iraq during recent years observed poor KAP,[8,9] while others concluded enough, moderate, or good levels in most participants.[10-12] The present study was conducted to assess the KAP of rural mothers in Karbala towards prevention and home management of diarrhoeal diseases in their children, related to water, sanitation and personal hygiene.

Subjects and Methods

This population-based cross-sectional study was carried out in Abu-Summana and Alhmodiya villages (total population of about 3000) in Alhusainya district at the northeast of Karbala Governorate in Iraq, during the period June to October 2016. Approval of the study was obtained from the Medical Research Bioethical committee at the College of Medicine in the University of Karbala.

The target population were the 350 families living in the two villages. Taking into consideration margin of error of 5% and a confidence level of 95%, the recommended sample size was 184 as calculated through an online Sample Size Calculator by Raosoft, Inc.[13] Twenty percent was added for possible errors and non-response. The study was conducted through home visits. Every other house was selected, and houses with no children were excluded. The study included 292 families having 254 children less than 5 years of age. After explaining the nature and objective of the study, an informed verbal consent was obtained from each participant. The mother responsible for cooking in houses containing more than one family was selected. From the 220 mothers selected, the response rate was 93.2% as 15 mothers refused to participate. Two hundred and five mothers were interviewed, concerning their KAP about prevention and treatment of diarrhoea and waterborne diseases. Each interview lasted for about half an hour.

A structured questionnaire, designed according to the Guideline for Conducting a KAP Study (2004)[14] consisting of five parts was used. (a) Seven questions on socio-demographic characteristics and housing condition including age, educational level, social status, number of families, total household members, and number of children less than 5 years, and number of rooms in the house. (b) Two questions on the source of drinking water and water used for cooking, washing, and cleaning. (c) Twelve, three-choice questions (Yes/No/Do not know) on knowledge about water hygiene, common waterborne diseases and their modes of transmission, prevention and first aid treatment methods, diarrhoea, dehydration, and oral rehydration therapy, with a total score between zero and 36. (d) Six, five-choice questions (Strongly Agree/Agree/No Idea/Disagree/Strongly Disagree) on attitude towards food and waterborne diseases, and five two choices questions (Yes/No) on practice regarding usage of safe water, hand washing with soap and water, use of ORS and liquid supplement in case of diarrhoeal disease. The total attitude and practice (AP) score between zero and 40, and (e) one question about the source of their health information,

Validation of the questionnaire was done through a pilot study involving 10 female medical teaching staff in the college and 10 mothers from relatives of the authors living in the same area. The results were analyzed, and minor modifications in the questionnaire were done accordingly. The results of the pilot study were not included in the main study.

For assessment of knowledge about definition of diarrhoea, and as defined by the WHO, the respondent answer as daily passage of three or more loose stools (or more frequent bowel motions than is normal was considered as the correct answer.[15] For categorizing the KAP the criteria used were similar to a study from Iran (2014).[6] Good knowledge was considered if the respondents answered $\geq$75% of the related questions correctly, moderate knowledge if they answered 60-74% of the questions correctly, and low knowledge, if they answered <60% of the questions correctly. A similar schedule was used for categorizing the AP as a positive attitude and good practice, Moderate AP, and negative attitude and weak practice if respondents correctly answered $\geq$75%, 60-74%, and <60% of the related questions respectively.

Statistical analysis of data was done using the Statistical Package for Social Sciences (SPSS) version 23. Results were expressed as means ± standard deviation. Chi-Square (X^2) was used to test the relationship between categorical variables. Parametric variables were analyzed using F-test. The analysis was at the 5% significance level ($P < 0.05$).

Results

The mean age of the participants was 36.15 ± 12.776 years (range 18-70), 187(91.2%) were married and 11(5.4%) and

Table-1: Distribution of the participants according to Knowledge, Attitude and Practice (KAP) & Attitude and Practice (AP) score category.

Score category	Frequency	Percent
KAP score category		
• High	5	2.4
• Moderate	41	20.0
• Low	159	77.6
AP score category		
• Good	28	13.7
• Moderate	61	29.8
• weak	116	56.6

Table-2: Association between Knowledge, Attitude and Practice (KAP) score with that of Attitude and Practice (AP).

KAP score	AP score			Total
	Positive attitude & good practice	Moderate attitude & practice	Negative attitude, & weak practice	
High KAP score	5	0	0	5
Moderate KAP score	17	23	1	41
Low KAP score	6	38	115	159
Total	28	61	116	205

*Chi-square (X^2) = 91.18; P< 0.01.

Table-3: Distribution of the participants according to socio-demographic variables.

Variable	N	Percent	KAP score	F	Sig.	Practice Score	F	Sig.
Age				4.627	P<0.05		3.973	P<0.05
less than 20	10	4.9	44.90			45.00		
20-29	71	34.6	52.51			56.43		
30-39	40	19.5	54.03			59.38		
40-49	49	23.9	56.04			60.84		
50 and more	35	17.1	49.34			53.39		
Marital status				0.598	P>0.05		1.220	P>0.05
Married	187	91.2	53.37			58.20		
Widowed	11	5.4	52.91			55.11		
Divorced	7	3.4	52.86			59.82		
Education				8.335	P<0.01		6.283	P<0.01
< Primary school	31	15.1	47.32			50.40		
Primary school	14	6.8	51.93			53.13		
Secondary school	44	21.5	49.80			53.84		
Institute & University	116	56.6	55.40			60.40		
No. of families in one house				2.876	P>0.05		1.949	P>0.05
1	139	67.8	52.21			57.10		
2	51	24.9	54.40			56.74		
3	12	5.9	55.17			60.94		
≥ 4	3	1.5	39.33			39.58		
No. of children <5 years in 1 house				1.378	P>0.05		1.176	P>0.05
0	79	38.5	51.72			55.78		
1	61	29.8	53.39			57.99		
2	30	14.6	55.60			60.63		
3	21	10.2	52.81			56.55		
≥ 4	14	6.8	49.36			52.23		
Households members				2.587	P>0.05		1.310	P>0.05
≤ 5	72	35.1	51.62			56.77		
6-10	118	57.6	52.79			56.41		
> 10	15	7.3	57.80			62.50		
No. of rooms				1.951	P>0.05		1.074	P>0.05
1	11	5.4	45.81			48.86		
2	11	5.4	50.36			53.98		
3	21	10.2	53.86			60.71		
4	84	41.0	52.69			57.44		
5	40	19.5	53.70			57.03		
6	24	11.7	51.08			54.95		
7	13	6.3	59.08			60.58		
8	1	.5	54.00			62.50		
Total	205	100.0	52.74			56.98		

Table-4: Distribution of mothers according to knowledge regarding diarrhoea & dehydration.

Knowledge about	Wrong answer or "don't know"		Correct answers									
			One		Two		Three		Four		Five	
	N	%	N	%	N	%	N	%	N	%	N	%
Causes of diarrhoea	16	7.8	86	42.0	81	39.5	14	6.8	8	3.9		
Treatment of diarrhoea	5	2.4	152	74.1	47	22.9	1	0.5				
Prevention of diarrhoea	10	4.9	52	25.4	74	36.1	53	25.9	14	6.8	2	1.0
Signs of dehydration	17	8.3	8	3.9	15	7.3	113	55.1	41	20.0	11	5.4
Treatment of dehydration	5	2.4	140	68.3	58	28.3	2	1.0				

Table-5: Distribution of the study subjects according to their answers related to knowledge regarding cholera.

Knowledge about	Wrong answer or "don't know"		Correct answers									
			One		Two		Three		Four		Five	
	N	%	N	%	N	%	N	%	N	%	N	%
Symptoms & signs of Cholera	14	6.8	34	16.6	130	63.4	27	13.2	-	-	-	-
Treatment of cholera	7	3.4	18.5	90.2	13	6.3	-	-	-	-	-	-
Prevention of cholera	44	21.5	159	1	0.5	1	0.5	-	-	-	-	-

7(3.4%) were widowed and divorced respectively. One hundred two (49.8%) had Institute and university education. Most of the mothers 159(77.6%) were housewives. Private labourers and government employees constituted 24(11.7%) and 22(10.7%) participants respectively.

The number of families occupying one house ranged from 1 to 5 (median=1), living in homes with 1-8 rooms (median of 4), Household members ranged 1-17 (median=6), and the number of children < 5 years per house ranged from 1-6 (median=1)

Faucets water constituted 83.9% of the sources of drinking water, the other sources being reverse osmosis (RO) water and bottled water from the market (11.7% and 4.4% respectively). Boiling, filtration, and chlorination were additional treatment measures for drinking water practiced by 33(16.1%) of the subjects alone or as a combination.

Faucet water constituted 178(86.8%) sources used for washing, cleaning and cooking. The remaining used private well water for washing and cleaning, and RO water for cooking in addition 21(10.3%) and 19 (7.3%) respectively.

The overall mean KAP score of the participants (out of 100) was 52.74± 9.69 with a range of 27.00- 81.00 and a median of 41.38 as the majority of the respondents, 159 (77.6%) had low KAP. The overall mean AP score of the participants was 56.98 ± 13.82 with a range of 12.5-93.7 and more than half of the respondents 116 (56.6%) had weak AP. The distribution of the study subjects according to the different categories of KAP and AP scores is shown in Table-1.

There was a significant association between the KAP score with that of AP (P< 0.01) as shown in Table-2.

The KAP score and AP score were significantly lower in younger mothers and those with lower educational levels (P< 0.01). The minimal KAP score and AP score were observed in < 20 years old participants (44.90 ± 9.98, and (45.00 ±16.351 respectively) and in mothers with less than primary school education (47.32 ± 8.93 and 50.40 ± 12.60 respectively). The KAP score and AP score were not significantly different in respondents from crowded houses as indicated by the number of families, household members, number of children, or number of rooms per house. The KAP score and AP score of respondents within the different categories of their socio-demographic characteristics are shown in Table-3.

Television and radio were the main sources of knowledge in 117(57.1%) participants, medical staff 60(29.3%) especially for information about ORS, and family members 28(13.6%) were other sources. There was no significant difference in the KAP score and AP score.

Fourteen (6.8%) respondents did not know the characteristics of safe drinking water, 17 (8.3%) had no idea about waterborne diseases such as cholera, and 4(2%) did not wash their hands with soap and water regularly for an unknown reason. Almost all, 203(99%), claimed that they had knowledge on cholera and 194(94.6%) knew that contaminated water or food is the source of cholera. The distribution of the mothers according to the variables related to knowledge regarding diarrhoea and dehydration, and to the variables

related to knowledge regarding cholera are shown in Tables-4 and 5 respectively.

Discussion

Although the highest percentage of mothers, similar to Musihb and Gaduu's study in Baghdad (2015), were housewives; their average level of education was higher with a lesser percentage of those who were illiterate.[9] This could be attributed to the fact that their study subjects were mothers of sick under-five children in paediatric hospitals which raises the possibility of the association of low maternal KAP and childhood morbidity from diarrhoeal diseases. Despite the higher percentage of housewives than that of Alghadeer et al. (2001) in Saudia Arabia, the average KAP of the study subjects was inadequate in both indicating higher KAP among housewives in this study,[16] Ansari, Ibrahim et al. (2013) in Nepal and Kier and Dai (2018) in South Sudan reported that more than 50% of the mothers were not educated, our study subjects had a higher average education.[17,18]

Faucets water constituted 83.9% of the sources of drinking water used; this is similar to the results of Mpazi and Mnyika's study in Tanzania (2005) but is much higher than that reported by Agbere, et al (1997) in Togo which was 52%.[19,20]

The low inadequate level of maternal KAP observed in this study is consistent with other studies conducted in developing countries,[21,22] and in similar studies conducted in Iraq in recent years, in Duhok, Baghdad, and Babylon.[8,9,23] However, it is inconsistent with the study of Mohammed, Sabry et al. (2018) in Baghdad who reported good knowledge of the participant mothers from Baghdad, the target population was not clearly mentioned, and therefore no acceptable explanation can be offered.[10] Al Kazzaz in his study in Baghdad (2019) among mothers of children under 5 years age with diarrhoea, attending 5 primary health centres in Rusafa reported a moderate level of knowledge, probably because the study subjects were from the urban community in Baghdad with a higher level of education.[11] Al-Abadi et al. In Karbala (2019) reported enough maternal knowledge probably because the study population were mothers attending the teaching hospital in the center of Karbala.[12]

Many studies in different developing countries reported good maternal knowledge towards waterborne disease e.g. Bertrand and Walmus (1983), in Colombia, Mpazi and Mnyika (2005) in Tanzania, and Bham et al. (2015) in Pakistan.[20,24,25] The high adequate Knowledge which was observed in those studies that were hospital-based is expected as they were including attendees with higher awareness of health problems and the necessity of seeking medical care, in contrast to the population-based studies like in this study. The mean KAP score is higher than that reported by Cheraghi, Okhovat et al. in their survey study in Iran during 2013.[6]

This low inadequate level necessitates, as Alwan A. Documented in 2004, better effective health education programme for mothers on home care of their children through better health services.[3]

The significant correlation between knowledge, attitude and practice is consistent with the findings of previous studies in developing countries.[17,18] It indicates that increasing education of mothers could improve their hygienic practice towards their children thereby decreasing the prevalence of waterborne diseases and their consequences. For the improvement of behaviour of care providers in rural communities, it is essential, as was concluded by Akter and Ali (2014), to improve their knowledge and awareness about the effect of the environment on health-related issues.[7] In addition, Merga and Alemayehu (2015) concluded that for the reduction of diarrhoea in children under-five, good mothers' knowledge is required.[2]

As majority of the mothers were housewives, they had more time to obtain health information from the electronic media, and consequently putting it into practice to decrease the prevalence of morbidity and mortality from diarrhoeal diseases. Luby, Halder et al. in Bangladesh (2011) proved that reduction in diarrhoea among children could be achieved by simple hand washing, even with water alone.[26] In another study in Bangladesh (2014), Akter T concluded that high level of knowledge and awareness facilitate the hygiene behaviour of the mothers.[7]

The absence of significant difference in the mean KAP scores among respondents with various main sources of obtaining knowledge, can be attributed to the fact, that all of them mentioned more than one source.

Conclusion

Rural mothers in Karkala, especially the young and those with low education had low, inadequate KAP and AP towards diarrhoea and waterborne diseases, with a significant association between the two variables. Television and to a lesser extent the medical staff in health centrers were the main source of knowledge.

Health education is mandatory to increase the level of knowledge in order to reach the desired practice to decrease morbidity and mortality from waterborne

diseases. Television programmes are a good source for disseminating health information.

Acknowledgement: We extend our gratitude to all the population in the Alhusainya district for their kind support especially the household members involved in the study.

Disclaimer: None.

Conflict of Interest: None.

Funding Disclosure: None.

References

1. World Health Organization (WHO). Drinking-water. [Online] 2019 [Cited 2021 April 07]. Available from URL: https://www.who.int/news-room/fact-sheets/detail/drinking-water
2. Merga N, Alemayehu T. Knowledge, perception, and management skills of mothers with under-five children about diarrhoeal disease in indigenous and resettlement communities in Assosa District, Western Ethiopia. J Health Popul Nutr 2015;33:20-30.
3. Alwan A. Health in Iraq, The Current Situation, Our Vision for the Future and Areas of Work, 2nd ed. Baghdad, Iraq: Al-Adib Press; 2004.
4. WHO. Distribution of causes of death among children aged < 5 years (%). [Online] 2018 [Cited 2021 August 19]. Available from URL: https://www.who.int/data/gho/data/indicators/indicator-details/GHO/distribution-of-causes-of-death-among-children-aged-5-years-(-)
5. Levison MM, Elliott SJ, Karanja DM, Schuster-Wallace CJ, Harrington DW. You cannot prevent a disease; you only treat diseases when they occur: knowledge, attitudes and practices to water-health in a rural Kenyan community. East Afr J Public Health 2011;8:103-11.
6. Cheraghi Z, Okhovat B, Doosti Irani A, Talaei M, Ahmadnezhad E, Gooya MM, et al. Knowledge, Attitude, and Practice regarding Food, and Waterborne Outbreak after Massive Diarrhea Outbreak in Yazd Province, Iran, Summer 2013. Int Sch Res Notices 2014;2014:e403058. doi: 10.1155/2014/403058.
7. Akter T, Ali A. Factors influencing knowledge and practice of hygiene in Water, Sanitation and Hygiene (WASH) programme areas of Bangladesh Rural Advancement Committee. Rural Remote Health 2014;14:e2628. Doi: 10.22605/RRH2628
8. Al Joborae SFF, Al Joborae FFM, Al-Jubbawi SFAH, Abid Ali IRA. Knowledge of the Mothers toward Sanitation and Hygiene in relation to Childhood Gastroenteritis in Babylon Province. Indian J Forensic Med Toxicol 2020;14:1803-8. DOI: 10.37506/ijfmt.v14i4.11805
9. Musihb ZS, Gaduu IA. Screening Program for Mothers Knowledge toward Risk Factors Gastroenteritis among Children under 5-years in Pediatric Hospitals in Baghdad City. IOSR Journal of Nursing and Health Science 2015;4:43-8. DOI: 10.9790/1959-04544348.
10. Mohammed SI, Sabry A, Sabry DT, Mohammed BH. Knowledge And Malpractices In Pediatrics Diarrhea Management By Iraqi Mothers. Asian J Pharm Clin Res 2018;11:503-7.
11. Al Kazzaz HH. Knowledge of mothers towards their children below 5 years of age for oral rehydration in Al Rusafa health directorate- Baghdad 2019. Eur J Mol Clin Med 2021;8:1579-85.
12. Al. Abadi MFK, Al. Razaq Hujail SA, Shaimaa Mahdi H. Assessment of Mothers' Knowledge, Attitude, and Practice about Oral Rehydration Solution in Treatment of Diarrhea in Karbala. Karbala J Med 2019;12:2203-11.
13. Raosoft, Inc. Sample Size Calculator. [Online] 2021 [Cited 2021 August 20]. Available from URL: http://www.raosoft.com/samplesize.html
14. Kaliyaperumal K. Guideline for Conducting a Knowledge, Attitude and Practice (KAP) Study. AECS Illumination 2004;4:7-9.
15. World Health Organization (WHO). Diarrhoeal disease. [Online] 2017 [Cited 2021 April 07]. Available from URL: https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease
16. Alghadeer S, Syed W, Alhossan A, Alrabiah Z, Babelghaith SD, Al Arifi MN, et al. Assessment of Saudi Mother's Knowledge and Attitudes towards Childhood Diarrhea and Its Management. Int J Environ Res Public Health 2021;18:e3982. doi: 10.3390/ijerph18083982.
17. Ansari M, Ibrahim MIM, Shankar PR. Mothers' Knowledge, Attitude and Practice Regarding Diarrhea and its Management in Morang Nepal: An Interventional Study. Trop J Pharm Res 2012;11:847-54. Doi: 10.4314/tjpr.v11i5.19
18. Kier PPD, Dai Y. Mothers' knowledge, attitudes and practices on preventing diarrhoea in Juba, South Sudan. South Sudan Med J 2018;11:60-4.
19. Agbèrè AR, Akogo K, Matti KN, Agbobli-Apétsianyi E, Jibidar A, Tatagan-Agbi K, et al. Knowledge, attitude and practice of mothers fighting against diarrhea in Kpalimé (south Togo) based on a hospital survey. Arch Pediatr 1997;4:e1022. doi: 10.1016/s0929-693x(97)86106-4.
20. Mpazi VM, Mnyika KS. Knowledge, attitudes and practices regrading cholera outbreaks in ilala municipality of Dar Es Salaam Region, Tanznia. East Afr J Public Health 2005;2:6-11.
21. Adeleke AI, Mhlaba T. Maternal Knowledge, Attitudes and Practices towards Prevention and Management of Child Diarrhoea in Urban and Rural Maseru, Lesotho. Int J Trop Dis Health 2019;36:1-20. DOI: 10.9734/ijtdh/2019/v36i230140
22. Dhingra D, Dabas A, Anand T, Pinnamaneni R. Maternal knowledge, attitude and practices during childhood diarrhoea. Trop Doct 2018;48:298-300. doi: 10.1177/0049475518787425.
23. Al-Atrushi AM, Saeed SY, Yahya SM. Knowledge, attitude and practice of mothers towards oral rehydration therapy in Duhok. Isra Med J 2012;4:132-8.
24. Bertrand WE, Walmus BF. Maternal knowledge, attitudes and practice as predictors of diarrhoeal disease in young children. Int J Epidemiol 1983;12:205-10. doi: 10.1093/ije/12.2.205.
25. Bham SQ, Shah MA, Saeed F. Knowledge, Attitude and Practice (KAP) of Mothers on the use of Oral Rehydration Salt (ORS) in Children with Diarrhoea: A Cross-Sectional Survey Conducted at Dar-ul-Sehat Hospital, Karachi. Ann Abbasi Shaheed Hosp Karachi Med Dent Coll 2015;20:126-31.
26. Luby SP, Halder AK, Huda T, Unicomb L, Johnston RB. The effect of handwashing at recommended times with water alone and with soap on child diarrhea in rural Bangladesh: an observational study. PLoS Med 2011;8:e1001052. doi: 10.1371/journal.pmed.1001052.