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REGULAR ARTICLE

Prevalence, risk factors and treatment practices in diarrhoeal diseases in south India

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Abstract
Objectives This study was done to determine the risk factors, management practices and awareness about diarrhoea.
Methods It was a cross sectional study done in a semi urban and rural areas of South Canara district of India in February 2013. A total of 167 households (575 study population) chosen systematic randomly were visited and one adult member in each house was interviewed. The houses were also inspected to assess the living conditions.
Results Mean age of study population was 31.1 ± 20.2 years. The period prevalence of diarrhoea was 69 (12 %). Commonest associated symptoms in cases of diarrhoea were fever 30 (43.4 %) followed by abdominal cramps 29 (42 %). Nearly half of the cases with diarrhoea 34 (49.3 %) did not take any medications. Commonest treatment taken was allopathic medicines 26 (37.8 %) followed by home remedies 8 (22.9 %). Age ≤10 years ($p < 0.001$) was associated with risk of developing diarrhoea using binary logistic regression analysis. Among the 167 participants, awareness level about the disease was poor among 16 (9.6 %) and moderate among 149 (89.2 % participants). Awareness level was more among females ($p = 0.001$) and literate participants ($p = 0.013$). One hundred and sixteen (69.5 %) participants were not aware of any sign or symptom of dehydration other than loose stools. Majority of the participants 138 (82.6 %) preferred home remedies as the initial management of diarrhoea. Misconception about fluid restriction in diarrhoea was stated by 12(7.2 %) participants.
Conclusion Public education program on proper feeding and management practices is required to address the various issues identified and for containment of diarrhoea cases in future.

Keywords Awareness · Diarrhoea · Management · Prevalence · Risk factors

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Introduction

Every year over ten million cases and over 1000 deaths are reported due to diarrhoea in India [1]. Risk factors behind this innumerous number of cases are many but nearly 90 % are attributed to unsafe drinking water, inadequate sanitation and poor hygiene [2]. Mortality rates are further aggravated in developing countries due to the vicious cycle between malnourishment and infection, lack of sufficient health care services and transportation facilities. These issues has made the possibility of prompt and appropriate management of cases very unlikely [3].

Simple home based management using fluids available at home for rehydration is not being widely practiced. As per the National Family Health Survey-3 (NFHS) report more than half of the children with diarrhoea do not receive oral rehydration therapy (ORT) [4].

While many studies have been conducted earlier on prevalence of diarrhoea among under-fives, very limited literature is available targeting all age groups. Comprehensive assessment of its risk factor has also not been done before in this settings. This study was hence done to determine the prevalence, risk factors and management practices for diarrhoea among people of all ages residing in South Canara district of India. The study also assessed the awareness of people about signs and symptoms about dehydration/diarrhoea and their awareness about preventive measures.

Materials and methods

The present study was conducted in February 2013 in the field practice areas of a private medical college in Mangalore, Karnataka state.

Mangalore is a coastal city located in south western part of Karnataka state between Arabian Sea and Western Ghat mountain ranges.

The ethical clearance for this study was obtained from Institutional Ethics Committee, Kasturba Medical College, Mangalore. A sample size of 383 people was calculated using the formula $4p(1\text{-}p)/d^2$ where "p" is the expected period prevalence of diarrhoea taken as 31.7 % based on findings of a previous study [5] and "d" being relative precision taken as 15 % of p and at 95 % confidence intervals.

However the investigators covered a total of 575 study population residing in 167 households during the allotted study period.

These house were chosen by systematic random sampling. In this method, every 10th house (starting from the first house chosen simple randomly) in a randomly chosen lane was surveyed. In case the house was locked or members were ineligible for inclusion in this study or were non-consenting, the adjacent house was selected.

The total study population comprised of 298 people from 89 houses in Jeppinamogaru (semi-urban area) and 277 people from 78 houses in Ullal (rural area). Written informed consent was taken from each participants after explaining to them the nature and purpose of the study. Investigators interviewed any one adult member (aged above 18 years) per household. The interview was in the local language Kannada using a semi-structured interview schedule. The content and language validation of the questionnaire was done by experts. The interview schedule was earlier pre tested by doing a pilot study in a group of 10 non-randomly chosen individuals who were subsequently not included in this study. All the 167 participants who took part in this study were enquired about history of diarrhoea among any of their household members during the past 1 month. Details of management practices were also enquired from each participant. These details were later verified from medical reports if available with participants. Questions on preventive practices of diarrhoea such as methods of water purification and storage, food storage practices, waste disposal, and personal hygiene were enquired. In addition to this, questions to assess awareness about diarrhoeal disease manifestations and management were enquired from each participant. These questions were pertaining to awareness about signs and symptoms of dehydration, awareness about homemade ORS, its ingredients and method of preparation, awareness about readymade ORS and its method of preparation, awareness about home available fluids to be taken in diarrhoea and about food substances and drinks to be avoided in diarrhoea. The housing conditions were later inspected by the investigators with permission from respondents.

Diarrhoea was defined as passage of at least three loose stools in 24 h. Acute diarrhoea was defined as that which lasts lesser than 14 days [3].

Well water was used in the context of water obtained from shallow wells only. Disinfection of well water was

considered regular if disinfected at least once in 3 months by any of the recommended methods.

Socio economic classification was assessed based on Modified Kuppuswamy's classification of 2007. Questions pertaining to awareness based on their importance were given self-assigned weighted scores. Cumulative scores 0–3 was considered as poor, between 4 to 10 as average and 11 to 12 as good awareness level among participants.

Similarly questions pertaining to environmental risk factors for diarrhoea such as those on source, storage and purification of drinking water, storage of food, waste disposal and placement of animals, based on their relevance with risk of developing diarrhoea, were given self-assigned weighted scores. Cumulative scores 0–8 was considered as unsatisfactory and more than 8 as satisfactory living conditions in the household.

Data was entered and analyzed using using Statistical Package for Social Sciences software package (SPSS Inc., Chicago, IL) version 16.0. Chi-Square test and Binary logistic regression analysis was used to test association and $p \leq 0.05$ was taken as statistically significant association.

Results

Mean age of the population covered in this study was 31.1 ± 20.2 years. (Table 1) Out of 575 study population, 69 (12 %) suffered from diarrhoea during the past 1 month. Among them, 58 (84.1 %) had single episode of diarrhoea followed by 4 (5.8 %) with 2 episodes and the rest had between 3 and 7 episodes during that 1 month period. Mean number of episodes was 1.4 ± 1.2.

Out of the 69 cases reported, 26 (37.7 %) suffered from diarrhoea for a duration of 1 day, 18 (26.1 %) each had a duration of 2 days and 3–4 days and the rest had diarrhoea extending from 5 to 10 days. Mean duration of diarrhoea was for 2.5 ± 1.8 days. All these were acute cases of diarrhoea.

The commonest associated complaints in cases of diarrhoea were fever 30 (43.4 %) followed by abdominal cramps 29 (42 %). Vomiting and jaundice was reported each in 17 (24.6 %) cases and nausea without vomiting in 10 (14.4 %) cases. Nearly half of the cases with diarrhoea 34 (49.3 %) did not take any medications. Commonest treatment taken was allopathic drugs 26 (37.8 %) followed by home remedies 8 (22.9 %). One patient had taken ayurvedic medicines. Commonest place for seeking treatment was private clinic 26 (74.3 %) followed by private hospitals 3 (8.6 %). One case each took treatment from sub centre and district hospital. Self-medication was practiced in 4 (11.4 %) cases. Diarrhoea cases were seen among 34 (32.7 %) out of 104 children aged ≤10 years compared to 35 (7.4 %) out of 471 people aged more than 10 years in the study settings ($p < 0.001$). Males constituted 37 (53.6 %) of the total diarrhoea cases. No association of diarrhoea was seen with gender ($p = 0.383$), socio economic status ($p = 0.809$), place of residence ($p = 0.222$), education of head of household ($p = 0.362$) and occupation of head of household ($p = 0.866$) in the study population. (Table 2).

Of the total 167 households surveyed, the living conditions were unsatisfactory among 14 (8.4 %) households. Houses with insanitary/unsatisfactory environment ($p = 0.004$) and people residing in these houses ($p = 0.034$) had significantly greater proportion who suffered with diarrhoea. (Table 3).

The source of drinking water was municipal water supply in 73 (43.7 %), sanitary well in 35 (20.9 %), bore well in 29 (17.4 %), both piped water supply and sanitary well in 15 (9 %) and insanitary well in 15 (9 %) houses. The proportion of houses with diarrhoea 4 (26.7 %) was more where source of drinking water was insanitary well

Table 1 Socio demographic distribution of study population

Characteristics	No.	Percentage
Age group (years)		
0–1	13	2.3
1–10	91	15.8
11–20	106	18.5
21–30	93	16.2
31–40	101	17.6
41–50	71	12.3
51–60	45	7.8
61–70	34	5.9
71–80	14	2.4
>80	7	1.2
Gender		
Males	280	48.7
Females	295	51.3
Religion		
Hindus	296	51.5
Muslims	240	41.7
Christians	39	6.8
Socio economic status		
Upper	12	2.1
Upper middle	123	21.4
Lower middle	272	47.3
Lower	168	29.2
Place		
Semi urban	298	51.8
Rural	277	48.2
Total	575	100.0

Table 2 Association between socio demographic variables and history of diarrhoea over the past 1 month in the study population

Socio-demographic variables	Population with diarrhoea (%)	Population without diarrhoea (%)	Total
Age group (years)			
≤10	34 (32.7)	70 (67.3)	104
>10	35 (7.4)	436 (92.6)	471
			$\chi^2 = 51.5$, $df = 1$, $p < 0.001$
Gender			
Males	37 (13.2)	243 (86.8)	280
Females	32 (10.8)	263 (89.2)	295
			$\chi^2 = 0.762$, $df = 1$, $p = 0.383$
Education of head of household ($n = 167$)			
Up to high school	11 (9.7)	102 (90.3)	113
PUC and above	3 (5.6)	51 (94.4)	54
			$\chi^2 = 0.831$, $df = 1$, $p = 0.362$
Occupation of head of household ($n = 167$)			
Unemployed/unskilled/semi-skilled	3 (7.3)	38 (92.7)	41
Skilled/clerical job/farmer/shop owner	10 (9.2)	99 (90.8)	109
Semi-professional/professional	1 (5.9)	16 (94.1)	17
			$\chi^2 = 0.288$, $df = 2$, $p = 0.866$
Socio economic status			
Upper/middle	17 (12.6)	118 (87.4)	135
Lower	52 (11.8)	388 (88.2)	440
			$\chi^2 = 0.05$, $df = 1$, $p = 0.809$
Place of residence			
Semi urban	31 (10.4)	267 (89.6)	298
Rural	38 (13.7)	239 (86.3)	277
			$\chi^2 = 1.495$, $df = 1$, $p = 0.222$
Total	69	506	575

compared to other houses 10 (6.6 %) using other sources of drinking water ($p = 0.007$). Out of 65 houses using well water as the source of drinking, maximum proportion of diarrhoea cases were reported in houses 2 (18.2 %) not disinfecting the well compared to other houses 7 (13 %) disinfecting the well ($p = 0.689$).

The various water purification methods practiced in houses were boiling of water 132 (79 %), ultra violet based methods 11 (6.6 %), candle filter 3 (1.8 %), and combination of methods 4 (2.4 %). No household water purification methods were practiced in 17 (10.2 %) houses.

Diarrhoea cases were seen in greater proportion of houses not practicing water purification methods 5 (29.4 %) compared to houses practicing water purification methods 9 (6 %) ($p = 0.001$). Out of 136 houses where water was purified by boiling, diarrhoea was reported in greater proportion of houses 5 (8.3 %) where water was not boiled adequately, compared to houses 3 (3.9 %) where it was boiled adequately ($p = 0.28$). (Table 3).

No association of type of water storage practices in houses, such as using uncovered or covered vessels, narrow or wide mouthed vessels was observed with occurrence of diarrhoea ($p = 0.802$). There was also no of association of diarrhoea with the method of drawing water from the storage units ($p = 0.593$).

No association of diarrhoea with eating pattern (vegetarian or non-vegetarian food habits) ($p = 0.45$), pattern of storing left over food at the end of the day (in the fridge or outside) ($p = 0.772$) or with increased frequency of eating food prepared outside ($p = 0.119$) was observed among households.

Diarrhoea was seen in a greater proportion of houses 2 (22.2 %) were hand washing before having food was not practiced regularly ($p = 0.124$). Houses where waste was disposed by open dumping or in open pits had greater proportion 5 (12.5 %) of diarrhoea ($p = 0.558$). Diarrhoea cases were seen more in houses 2 (13.3 %) using bore hole latrines ($p = 0.468$). (Table 3).

Hand washing with soap after going to toilet was significantly associated with reduced presence of diarrhoea among households ($p < 0.001$). (Table 3) No significant difference in proportion of diarrhoea cases was

Table 3 Association between risk factors with presence of diarrhoea cases in households of study population

Living conditions	Population with diarrhoea	Population without diarrhoea	Total
Unsatisfactory	9 (22.5)	31 (77.5)	40
Satisfactory	60 (11.2)	475 (88.8)	535
			$\chi^2 = 4.5$, $df = 1$, $p = 0.034$
Total	69	506	575
Living conditions	Households with diarrhoea (%)	Households without diarrhea (%)	Total
Unsatisfactory	4 (28.6)	10 (71.4)	14
Satisfactory	10 (6.5)	143 (93.5)	153
			$\chi^2 = 8.11$, df = 1, p = 0.004
Source of drinking water			
Insanitary well	4 (26.7)	11 (73.3)	15
Other sources	10 (6.6)	142 (93.4)	152
			$\chi^2 = 7.17$, $df = 1$, $p = 0.007$
Water purification methods			
Not practicing	5 (29.4)	12 (70.6)	17
Practicing	9 (6.0)	141 (94.0)	150
			$\chi^2 = 10.9$, $df = 1$, $p = 0.001$
Hand washing before food			
Always	12 (7.6)	146 (92.4)	158
Not regularly	2 (22.2)	7 (77.8)	9
			$\chi^2 = 2.37$, $df = 1$, $p = 0.124$
Hand washing after defecation			
Always	12 (7.3)	152 (92.7)	164
Not regularly	2 (66.7)	1 (33.3)	3
			$\chi^2 = 13.5$, $df = 1$, $p < 0.001$
Method of waste disposal			
Open dumping or in open pits	5 (12.5)	35 (87.5)	40
Burning	1 (7.7)	12 (92.3)	13
Covered bins	8 (7)	106 (93)	114
			$\chi^2 = 1.17$, $df = 2$, $p = 0.558$
Sewage disposal			
Sanitary latrine	12 (7.9)	140 (92.1)	152
Bore hole latrine	2 (13.3)	13 (86.7)	15
			$\chi^2 = 0.526$, $df = 1$, $p = 0.468$
Total	14	153	167
Disinfection of well water	Households with diarrhoea (%)	Households without diarrhea (%)	
Not being done	2 (18.2)	9 (81.8)	11
Done irregularly	6 (15)	34 (85)	40
Done regularly	1 (7.1)	13 (92.9)	14
			$\chi^2 = 0.745$, $df = 2$, $p = 0.689$
Total	9	56	65
Duration of boiling drinking water	Households with diarrhoea (%)	Households without diarrhea (%)	
Ten or more minutes	3 (3.9)	73 (96.1)	76
Less than 10 min	5 (8.3)	55 (91.7)	60
			$\chi^2 = 1.17$, $df = 1$, $p = 0.28$
Total	8	128	136

Table 4 Binary logistic regression analysis of age groups and living conditions/practices with risk of development of diarrhoea in study population (n=575)

Characteristics	Unadjusted OR	95 % CI for Unadjusted OR		*p* value	Adjusted OR	95 % CI for Adjusted OR		*p* value
		Lower	Upper			Lower	Upper	
Age groups	6.051	3.543	10.333	<0.001	5.86	3.411	10.067	<0.001
Source of drinking water	5.164	1.391	19.172	0.007	1.658	0.761	3.612	0.203
Water purification methods	6.528	1.885	22.602	0.001	0.782	0.28	2.187	0.64
Hand washing after defaecation	25.333	2.14	49.907	<0.001	0.101	0.007	1.543	0.099

observed in houses with cattle shed ($p = 0.762$) or poultry farm ($p = 0.385$) compared to houses without these features.

Binary logistic regression analysis showed significant association of age less than or equal to 10 years with risk of developing diarrhoea in the study population (AOR = 5.86, $p < 0.001$). (Table 4).

Out of the 167 participants interviewed in this study, awareness level about the disease was poor among 16 (9.6 %), moderate among 149 (89.2 %) and good among 2 (1.2 %) participants. Awareness level was better among greater proportion of females 120 (94.5 %) compared to males 31 (77.5 %) ($p = 0.001$). (Table 5).

Among the participants, 20 (12 %) were illiterate, 18 (10.8 %) were educated till primary school, 40 (23.9 %) till middle school, 61 (36.5 %) till high school and 28 (16.8 %) up to PUC and above. Awareness level was more among greater proportion of literate participants [136 (92.5 %)] compared to illiterate participants [15 (75 %)] ($p = 0.013$). (Table 5).

One hundred and sixteen (69.5 %) participants were not aware of even a single sign or symptom of dehydration other than loose stools. The signs or symptoms of dehydration known to participants were thirst 25 (15 %), sunken eyes 10 (6 %), cold extremities 8 (4.8 %), dryness of tongue 7 (4.2 %), reduced urine output 7 (4.2 %), and drowsiness 6 (3.6 %).

In this study, 98 (58.7 %) participants were aware of packet ORS and its preparation method. (Table 6) The factors found to be associated with better knowledge of ORS among participants was age ($p = 0.015$), socio economic status ($p < 0.001$), occupational status ($p = 0.02$) and educational status ($p = 0.03$). (Table 7).

Majority of the participants 138 (82.6 %) preferred home remedies as the initial treatment for diarrhoea. Only 29 (17.4 %) participants preferred packet ORS as an initial remedy. Following the initial remedies, only 52 (31.1 %) participants said that they would consult a doctor. With respect to system of medicine for treatment of diarrhoea, 138 (82.6 %) participants preferred allopathy, 20 (12 %) ayurveda, 7 (4.2 %) home remedies and 2 (1.2 %) homeopathy.

Seventy (41.9 %) participants were not aware of home available fluids and 69 (41.3 %) were not aware of packet ORS in the management of diarrhoea. Twelve (7.2 %) participants perceived misconceptions that fluids must be restricted during episodes of diarrhoea. (Table 6).

Discussion

The monthly prevalence rate of diarrhoea reported in this study was 12 % which was more than the monthly prevalence rate of 5.1 % reported in a study done in USA [6].

The period prevalence of diarrhoea among the fifty eight under-fives in this study population was found to be 37.9 %. In other studies it ranged from 22.5 to 44.5 % [7–9]. However a study done in a developed country like USA reported the period prevalence to be 8.8 % among the under-fives which was lower than our observations [6]. This difference could be as a result of different environmental conditions prevailing in different parts of the world.

A study conducted in Gujarat, India [10] reported that the proportion of diarrhoea cases was most among infants (81.9 %) which was similar to our findings observed in 53.8 % infants. Maximum proportion of cases of diarrhoea among infants may be due to introduction of unhygienically prepared supplementary foods. Moreover risk of placing contaminated fingers and fomites in the mouth is greatly increased due to physiological phenomenon like teething and crawling which begins at this age [9].

The prevalence of diarrhoea was found to significantly decrease with increasing age of the population as supported by the findings of other studies [6, 11]. This meant that poor immunity among paediatric population invariably due to under nutrition increases susceptibility to develop diarrhoea. However a study done in Vietnam found the risk of diarrhoea significantly more in the age group 55 years or more and least in the age group 15–34 years which was different from our observations [12]. The greater exposure to waste water among people of higher age groups in the former study could be the reason behind this observation.

Also in the study done in USA, fever followed by vomiting was the commonest associated symptom in

Table 5 Association of socio demographic variables with awareness level about diarrhoea among study participants

Characteristics	Poor awareness (%)	Moderate to good awareness (%)	Total
Age group (years)			
≤20	2 (25)	6 (75)	8
21–30	3 (7.9)	35 (92.1)	38
31–40	1 (2.4)	40 (97.6)	41
41–50	2 (7.1)	26 (92.8)	28
51–60	5 (22.7)	17 (77.2)	22
61–70	2 (8.7)	21 (91.3)	23
>70	1 (14.2)	6 (85.7)	7
			$\chi^2 = 9.52$, $df = 6$, $p = 0.147$
Gender			
Males	9 (22.5)	31 (77.5)	40
Females	7 (5.5)	120 (94.5)	127
			$\chi^2 = 10.1$, $df = 1$, $p = 0.001$
Religion			
Hindu	7 (7.8)	82 (92.2)	89
Christian	2 (18.2)	9 (81.8)	11
Muslim	7 (10.5)	60 (89.5)	67
			$\chi^2 = 1.3$, $df = 2$, $p = 0.522$
Education			
Illiterate	5 (25)	15 (75)	20
Literate	11 (7.5)	136 (92.5)	147
			$\chi^2 = 6.24$, $df = 1$, $p = 0.013$
Occupation			
Unemployed	1 (4.7)	20 (95.3)	21
Unskilled	1 (14.3)	6 (85.7)	7
Semi-skilled	4 (21)	15 (79)	19
Skilled	1 (6.3)	15 (93.7)	16
Semiprofessional/professional/businessman	1 (20)	4 (80)	5
Student	1 (20)	4 (80)	5
Housewives	7 (7.4)	87 (92.6)	94
			$\chi^2 = 5.58$, $df = 6$, $p = 0.472$
Socioeconomic status			
Upper	1 (0)	3 (100)	4
Middle	10 (8.3)	110 (91.7)	120
Lower	5 (11.6)	38 (88.4)	43
			$\chi^2 = 1.52$, $df = 2$, $p = 0.467$
Place			
Semi urban	7 (7.8)	82 (92.2)	89
Rural	9 (11.5)	69 (88.5)	78
			$\chi^2 = 0.647$, $df = 1$, $p = 0.421$
Total	16	151	167

diarrhoea cases [6]. In another study done in China, abdominal cramps was the commonest associated symptom [13]. These observations were similar to our findings.

The present study found that about 50 % cases with diarrhoea did not take any medications. Similarly NFHS-3 reported that 40 % of proportion of under-fives did not seek medical treatment for diarrhoea [4]. This meant that people are not aware of the complications and life threatening consequences of prolonged dehydration.

Table 6 Awareness about management of diarrhoea among study participants ($n = 167$)

	No	Percentage
Awareness about homemade ORS and its preparation		
Present	59	35.3
Absent	108	64.7
Awareness about packet ORS and its preparation		
Present	98	58.7
Absent	69	41.3
Awareness about home available fluids[a]		
Rice water	56	33.5
Fruit juice	43	25.7
Lemon juice	34	20.4
Butter milk	4	2.4
Arrow root powder	34	20.4
Black tea	31	18.6
Not aware	70	41.9
Awareness regarding food substances to be avoided[a]		
Spicy food	37	22.2
Oily food	8	4.8
Beverages	8	4.8
Soft drinks	8	4.8
Sugar water	6	3.6
Misconceptions on food restrictions	15	9.0
Not aware	103	61.7
Misconception regarding fluid restriction		
Present	12	7.2
Absent	155	92.8

[a] Multiple response question

Among those who had taken treatment, allopathic medicines were preferred and the commonest place for seeking treatment was private clinics. Only 2 cases approached government sector for treatment. In the UNICEF ten-district survey [14], 79 % of mothers sought treatment from private medical sector for management of diarrhoea in their children. From this it is quite evident that there is an over dependence on private sector. As medical expenses are more and more expensive in this sector the financial burden on families will be tremendous during course of treatment. In spite of the same facilities being offered free of cost in the government sector and offered at the door steps by health workers, they are not being utilized well by people.

In this study, point of use water treatment methods was found to be effective in reducing diarrhoea rather than the source of water which was in accordance with the observations of a systematic review by Fewtrell L et al. [15].

Overall, poor living conditions was significantly associated with diarrhoea among study population. This emphasizes the role of improvement in environmental factors for containment of diarrhoea.

Poor awareness about disease was seen in only 9.6 % cases in comparison to 20–46 % noted in previous studies [9, 16]. This is probably due to the good literacy status in the settings.

The awareness about ORS, which is suggested to be the single most effective strategy to prevent diarrhoeal deaths, among participants in this study was lesser than 73 % awareness among people reported by NFHS-3 survey [4] and 71 % observed in a study done in Delhi, India [17]. Awareness about home available fluids in the study done at Aligarh, India was 38.7 % which was better than the awareness reported by our participants [9]. This meant that although overall awareness was satisfactory but when it pertained to certain important strategies to manage diarrhoea, awareness was found lacking. These aspects needs to be focussed upon in future health educational activities in the settings.

Health care providers particularly male and female health workers can play a lead role in educating people about the early signs of dehydration, an aspect which was not known to majority of participants in this study. They need to bridge the gaps in knowledge and practices by activities like demonstration of ORS preparation in the community. Misconceptions like excess intake of fluids aggravates diarrhoea leading to the mistaken belief of fluid restriction as observed in this study needs to be corrected. Similar observations made in another study at Tamilnadu, India emphasizes the importance of correct/appropriate feeding practices during diarrhoea [7].

From the above observations we conclude that the 1 month period prevalence of diarrhoea in the study area was 12 %. More than one-third of cases were found in the age group of 0–5 years. Nearly half of the cases with diarrhoea did not take any medications. Unsatisfactory living conditions related to water source, water purification methods and sanitation along with age $\leq$10 years was found to be significantly associated with presence of diarrhoea in households. Most participants (89.2 %) had average awareness about diarrhoea and its management. Awareness level was significantly more among well-educated participants and females. Majority of the participants (82.6 %) preferred home remedies as the initial treatment for diarrhoea. Interpersonal communication using portable information education and communication materials like flip charts can be used to expedite exchange of information between health workers and people. Demonstration of methodology of hygienic hand wash, preparation of packet and homemade ORS are other actionable measures to be taken. Removing misconceptions of the people and advising them to begin suitable home-prepared rehydration fluids immediately on the onset of diarrhoea

Table 7 Association of socio demographic variables with awareness about readymade oral rehydration solution and its preparation among study participants

Socio demographic variables	Aware (%)	Not aware (%)	Total
Age group			
≤20	2 (25)	6 (75)	8
21–30	22 (57.9)	16 (42.1)	38
31–40	24 (58.5)	17 (41.5)	41
41–50	22 (78.6)	6 (21.4)	28
51–60	11 (50)	11 (50)	22
61–70	16 (69.6)	7 (30.4)	23
>70	1	6	7
			$\chi^2 = 15.8$, $df = 6$, $p = 0.015$
Gender			
Males	20 (51.3)	19(48.7)	39
Females	78 (60.9)	50(39.1)	128
			$\chi^2 = 1.149$, $df = 1$, $p = 0.284$
Education			
Illiterate	6 (35.3)	11 (64.7)	17
Primary school	8 (53.3)	7 (46.7)	15
Middle school	27 (62.8)	16 (37.2)	43
High school	34 (53.1)	30 (46.9)	64
PUC	8 (66.7)	4 (33.3)	12
Graduate/post graduate	12 (92.3)	1 (7.7)	13
Professionals	3 (100)	0 (0)	3
			$\chi^2 = 13.6$, $df = 6$, $p = 0.03$
Occupation			
Unemployed	12 (57.1)	9 (42.9)	21
Unskilled	3 (42.9)	4 (57.1)	7
Semi-skilled	4 (21.1)	15 (78.9)	19
Skilled	11 (68.8)	5 (31.2)	16
Clerical/businessman	1 (100)	0 (0)	1
House wives	62 (65.3)	33 (34.7)	95
Students	2 (40)	3 (60)	5
Semi professional	1 (100)	0 (0)	1
Professionals	2 (100)	0 (0)	2
			$\chi^2 = 17.7$, $df = 8$, $p = 0.02$
Socioeconomic status			
Upper	3 (100)	0 (0)	3
Upper middle	27 (71.1)	11 (28.9)	38
Lower middle	55 (66.3)	28 (33.7)	83
Lower	13 (30.2)	30 (69.8)	43
			$\chi^2 = 20.833$, $df = 3$, $p < 0.001$
Total	98	69	167

need to be emphasized in different cultures and settings. This along with addressing the various risk factors of diarrhoea identified in this study will go a long way in containment of incidence of diarrhoea in the settings. Adoption of good practices in the management of diarrhoea would enable achievement of the Millennium Development Goal of reduction in mortality rates of under-fives by two-thirds between 1990 and 2015.

Limitations

The survey was conducted during working hours hence the awareness level of heads of household mostly could not be assessed as most of them were not available.

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Compliance with ethical standards

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