



## DRINKING WATER QUALITY AND ITS ASSOCIATION WITH DIARRHOEA AMONG UNDER FIVE CHILDREN IN A RURAL AREA OF CENTRAL INDIA

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**ABSTRACT** **Background-** Water is absolutely necessary for life. Apart from drinking, water is used in all aspects and maintenance of life. From the view point of public health and improvement of the quality of life, water should be provided in adequate volume. A large proportion of diseases are related to diarrhoea incidences and new diarrhoea cases are estimated at 4 billion annually especially among children under five years old.

**Methodology-** A community based cross-sectional study of the mothers or caregivers of under five children of selected villages was carried out. The sample size was calculated according to the proportionate population of under five children of that village. All the household having case or history of diarrhoea among under five children in last six months were noted. Water sample from each household were collected with proper hygiene procedure and tested in the departmental public health lab for bacteriological quality of drinking water.

**Conclusion-** Water quality is a growing concern and availability of safe drinking water still remains a much sought after commodity in the rural part of India. There can be no state of positive health and well being with-out safe water.

### KEYWORDS :

#### INTRODUCTION –

“All people, irrespective of their social and economic conditions, have the right to access the drinking water in quantities and of a quality equal to their basic needs”. (1) About half the world's population live in rural areas and are typically served by "small community water supplies", which are vulnerable to breakdown and contamination (6). According to the WHO/UNICEF Joint Monitoring Programme on Water Supply and Sanitation, globally an estimated 884 million people lack access to an improved water source(7). Out of these, 743 million live in rural areas. The greatest risk is the potential for an outbreak of infectious disease such as acute diarrhoeal illness. Diarrhoea in India estimates about 2 million episodes per year. Of the 6.6 million deaths among children aged 28 days to 5 year; deaths from diarrhoea are estimated to account for 1.87 million(10). An average Indian child less than 5 years of age will have 2-3 episodes of diarrhoea per year. The prevalence of recurrent diarrhoea in children under five living in a rural area of Maharashtra was 9.9% (12)

This study was done with the objective to assess the bacteriological quality of drinking water of household having under five children and its association with diarrhea among the under five children.

#### METHODOLOGY –

##### Study setting and Design –

A community based cross-sectional study was carried out in Seloo block of Wardha district which is the adopted village of the field practice area of Jawaharlal Nehru Medical College. All the villages, adopted by the college were included in the study.

##### Sample size and sampling method –

Prevalence of diarrhoea among under five considered in the study is 9.9% according to NFHS-IV. The p-value was considered as 0.05 of confidence interval of 95% and sample size was calculated on the basis of population proportion with specified absolute precision. The total number of under five children residing in these villages were enlisted from respective anganwadi centres. The proportion of the under five children in each village were calculated according to the proportionate population of that village. So by the formula  $[n = Z_{(1-\alpha/2)}^2 P(1-P)/d^2]$  the sample size was obtained to be 137 and taking round off, the sample size taken was 140. The study duration was from July 2015 to October 2017.

##### Data Collection Process –

The list of the under five children was obtained from respective anganwadi centre of each selected village, then names of all the under five children were enlisted alphabetically. After finalising the list of under five children of each village, the houses were identified with the help of anganwadi sevika. After reaching the house and introducing the primary investigator of the study, the rationale of this study was explained. Informed written consent was obtained and then the data collection was started. All the household having case or history of diarrhoea among under five children in last six months were noted. Water sample from each household were collected with proper hygiene procedure and was tested in the departmental public health lab for bacteriological quality of drinking water.

##### Statistical Analysis –

The data was collected using predesigned, pretested questionnaire and water samples were collected for testing of bacteriological quality. Data entered in Microsoft Office Excel and was analysed using Statistical Package for Social Science (SPSS) version 22.0.  $p < 0.005$  was considered as the level of significance. Sample were tested using double and single-strength McConkey broth purple to estimate the most probable number (MPN).

##### Observation and Results –

**Table 1:- Socio demographic characteristics of the household**

Characteristics	Frequency	Percentage
Occupation of the head of the family	Farmer	47.9
	Daily wage labourer	29.3
	Govt .Service	4.3
	Others	18.6
Type of house	Kacchha house	10.0
	Pakka house	49.3
	Kacchha –pakka	40.7
Type of Family	Nuclear family	55.7
	Joint family	44.3
Kitchen	Separate	37.1
	Not separate	62.9

Religion	Hindu	95	67.9
	Buddhist	44	31.4
	Muslim	1	0.7

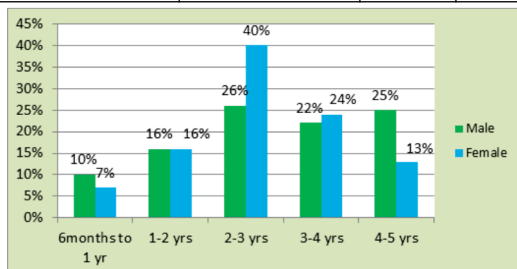


Figure 1:- Age and sex wise distribution of under five children

Table 2 – Source of drinking water

Source of drinking water	Number	Percentage
Public tap/stand pipe	80	57.1
Tubewell/Borewell	28	20.0
Protected dug well	9	6.4
Piped water into dwelling	8	5.7
Piped water into yard	7	5.0
More than one source	6	4.3
Unprotected dug well	2	1.4

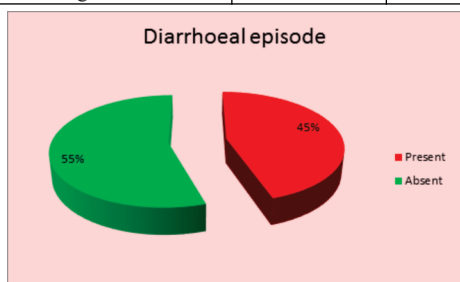


Figure 2:- Period prevalence of diarrhoea among under five children during the study duration

Table 3:- Association between the source of drinking water with episode of diarrhoea

Source of drinking water	Episode of diarrhoea		Total
	Yes	No	
Public tap/stand pipe	43 53.8%	37 46.2%	80 100%
Tubewell/Borewell	9 32.1%	19 67.9%	28 100%
Protected dug well	1 11.1%	8 88.9%	9 100%
Piped water into dwelling	1 12.5%	7 87.5%	8 100%
Piped water into yard	2 28.6%	5 71.4%	7 100%
More than one source	5 83.3%	1 16.7%	6 100%
Unprotected dug well	2 100%	0 0%	2 100%
Total	63 45%	77 55%	140 100%

Table 3:- Presumptive Coliform Count and its association with diarrhoea

Grade of water quality	Episode of diarrhoea	
	Yes	No
Excellent/Satisfactory	8 12.6%	31 40.25%
Suspicious/Unsatisfactory	55 87.30%	46 59.74%
Total	63 100%	77 100%

**DISCUSSION–**

In this study, maximum study participant were of age group 21-25 years followed by 26-30 year group. Most of them studied up to

secondary school (52.9%) which counts to 8-10 years of education. This finding was in accordance with the DLHS-4 data which states that the currently married women with 10 or more year of schooling were 56.2% in the rural area of Wardha district.

The major source of drinking water among the study population was public taps (57.1%). This was lower compared to DLHS-4. Similar result was found in the study by Venkatesh Reddy B et al (54) titled “Water and sanitation hygiene practices for under five children among household of Sugali tribe of Chittoor district Andhra Pradesh” where out of 500 households identified, the major source of drinking water among the study population was public taps.

Out of all under five children who had diarrhoea 87.30% water sample was suspicious or unsatisfactory. The association between presumptive bacteriological count and diarrhoeal episode among under five was statistically highly significant (p-value<0.001) indicating that, more the unaccepted quality of water more will be the cases of under five diarrhoea.

Majority (57.1%) household take their drinking water from public tap but it was found that almost 63% sample was unaccepted to drink according to the presumptive coliform count. The association between the source of drinking water and diarrhoea was statistically significant with p-value 0.002.

**CONCLUSION –**

Water quality is a growing concern and availability of safe drinking water still remains a much sought after commodity in the rural part of India. There can be no state of positive health and well being without safe water. The study depicts the source of drinking water and their bacteriological quality. Going forward, improving our understanding of the relationship between water quality and diarrhoeal diseases will require incorporating more specificity in both exposure and response variables, innovation to improve specificity in exploring water-diarrhoeal relationships.