Everything is not on track in management of diarrhoea in under-five children: Evidence from rural area of India

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Abstract

Context: Diarrhea is one of the leading causes of death and morbidity in under-five children. Effective management can significantly influence survival of children with diarrhea. Objectives: This study was carried out to assess extent of diarrhea, its source of treatment, and type of therapy. Settings and Design: This snapshot study was conducted in rural setting of India. Methods and Material: This study was conducted on 217 under-five children selected through multistage sampling procedure. Statistical analysis used: Statistical association of diarrhea with age and gender of children was established by computing Chi-square. Results: Period prevalence (Recall period 2 weeks of visit) of diarrhea in rural under-five children was 35.9% (95%C.I. 29.3–42.2%). Highest prevalence in age group 0–12 months (47.8%) and lowest in 49–59 months (18.2%). Number of episode per child is 1.08. Diarrhea was watery in 69.4%. Quacks were treatment provider for 36.4% cases. In 17.6% episodes, no treatment was taken. Only 9.4% episodes were treated in government facilities. For the treatment of diarrhea, antibiotic was used in 71.8% cases, ORS use was 33.3% cases, and zinc was used 21.8% of diarrhea episodes. Conclusions: Diarrhea is a significant problem in under-five children from a rural area of India. In spite of existence of National Program for Control of Diarrheal Diseases (NPCDD) since four decades, management of diarrhea is not on track. Focusing on primary care provision to under-five children can help in bringing the management of diarrhea on track.

Keywords: Diarrhea, dysentery, ORS, primary care, under-five children, zinc

Introduction

It is envisaged in UN Sustainable Development goals to reduce mortality in under-five children less than 25 per 1,000 live births. Further attempts should be made to end avoidable deaths in this group.[1] There are 1.26 million deaths in children every year because of diarrhea which is ranked as second leading cause of deaths in under-five children.[2] Diarrhea is commonest in countries with poor environmental conditions. Even in developed countries it is an important reason for outpatient consultations and indoor admissions. Several factors (viz., socioeconomic, environmental, political, nutritional, and programmatic) make prevention and treatment of diarrhea a challenging task.[3] Management of diarrhea is not confined to correction of electrolyte imbalances and dehydration. It should take into account considerable growth retardation in children mainly because of feeding problems. Post-acute phase mortality because of diarrhea needs a multipronged strategy. WHO targets to drop diarrhea to less than 1 in 1,000 by 2025.[4] An estimated 1.7 billion episodes of diarrhea created health systems costs of about 7 billion US dollars. If the total episodes of diarrhea are translated into number of episodes per child per year, it approximates to 2.9 episodes per child per year.[5] According to Family and Health Survey (NFHS) done in 2015–16, 52% urban and 44% rural seek treatment in private sector. According to National Sample survey done in 2014, the average treatment cost is 88$ and 340$ in public and private sector in rural area and 120$ and 507$ for public and private sector in urban area, respectively.[6]
Diarrhea is described as the passing of loose/liquid stools. Passage of ≥3 loose or watery stools within a day characterizes diarrhea. Decrease in the consistency of the stool from normal is also considered as diarrhea.[1] During diarrhea, presence of blood in stool calls for judicious use of antimicrobials. Indiscriminate and irrational use of anti-microbials is quite prevalent in different settings and contributing to the rising anti-microbial resistance. Primary care physician commonly deals with under-five children and diarrhea is significant problem in this age group, thus primary care has important role to play. With this background, this study was undertaken (A) to find out the extent of diarrhea in under-five children and (B) to assess current status of management of diarrhoea in under-five children.

Subjects and Methods

This is an observational, community-based cross-sectional study. The study subjects were 0–59 months children from rural area of India. This study was conducted in Chiraigaon Community Development (C.D.) Block of Varanasi Uttar Pradesh, India. Sample size was calculated by taking the prevalence (P) of diarrhea as 15% in rural under-five children of Uttar Pradesh India,[2] permissible level of error (L) of 5% (Absolute), and non-response of 10%. By using the formula for Sample-size \( N = \frac{Z^2 \cdot P \cdot (1-P)}{L^2} \), and taking \( Z = 1.96 \) the sample-size worked out to be 217.

Selection of study villages was done adopting multistage sampling method: (A) Out of eight blocks of Varanasi, Chiraigaon CD block was randomly selected as the study block; (B) In this step, stratification of all 134 villages of Chiraigaon was done in 3 strata on the basis of their distance from block headquarter as within 5 km, 5–10 km, and >10 km. One village from each strata was selected by stratified random sampling. The selected villages were Bariyasanpur, Pahadiya, and Rajmahiya; and (C) In the selected villages, total enumeration of under-five children was done serving as sampling-frame and the study subjects were selected by adopting simple random sampling. With predesigned and pretested proforma, information to the occurrence of diarrhea on the day of visit or within last 2 weeks from the day of visit was noted. Information regarding diarrhea, nature of diarrhea, its severity, source of treatment, and type of therapy was collected.

Ethical Committee of Institute of Medical Sciences at Banaras Hindu University, Varanasi, India provided ethical clearance and consent of parents taken using Bilingual (English and Hindi version) Consent Form. Data entry and analysis was done using SPSS 23-trial-version. Prevalence of diarrhea and 95% confidence interval were computed. Statistical association of diarrhoea with age and gender of children was established by computing Chi-square. Yes approval of Ethical committee was obtained on 3.01.2018. Ethical Committee of Institute of Medical Sciences at Banaras Hindu University, Varanasi, India provided ethical clearance and consent of parents taken using Bilingual (English and Hindi version).

Results

As much as 47.8%, 43.9%, and 21.9% children belonging to age group 0–12, 13–24, 25–36 months had diarrhea in previous 2-weeks; corresponding value for children having age group 37–48 and 49–59 months were 38.7% and 18.2%, respectively. There existed significant \( (P = 0.013) \) association between age and period prevalence of diarrhea in children included in study [Table 1]. Out of 217 children, 78 (35.9%) had diarrhea in the previous 2 weeks. Thus, period prevalence of diarrhea (with recall less than 2 weeks) in the study subjects was 35.9% (95% C.I. 29.3–42.2%). Period prevalence of diarrhea for male and female children was 37.2% and 34.4% [Table 2].

Frequency of stool in diarrheal episodes were 3–4 in 35.3%, 5–6 in 38.8%, and ≥7 in 25.9% subjects [Table 3]. There were 78 children with diarrhoea in period of 2 weeks and total number of diarrheal episodes were 85. Thus, number of episodes per child was 1.08. Out of 85 diarrheal episodes, 69.4% were watery whereas blood or/mucous were present in 19 (22.4%) episodes. Seven (8.2%) diarrheal episodes had increased in frequency of stools without any change in consistency of stool [Table 4].

In all 36.4% diarrheal episodes, quacks were treatment provider and 17.6% episodes received no treatment. Government facilities (PHC, CHC) were source of treatment for 9.4% diarrheal episodes. For treatment purpose of 17.6% diarrheal episodes, medical shops were directly consulted. Private practitioners were the treatment provider for 18.9% diarrheal episodes [Figure 1].
Table 1: Age-wise period-prevalence (recall <2 weeks) of diarrhea

| Age-group in month | Diarrhoea-status | Total |
|--------------------|------------------|-------|
|                    | Present | Absent | No. | %     |
| 0-12               | 22      | 47.8   | 24  | 52.2  |
| 13-24              | 29      | 43.9   | 37  | 56.1  |
| 25-36              | 11      | 21.2   | 41  | 78.8  |
| 37-48              | 12      | 38.7   | 19  | 61.3  |
| 49-59              | 4       | 18.2   | 18  | 81.2  |
| Total              | 78      | 35.9   | 139 | 64.1  | 217  |

χ²=12.711, df=4, P=0.05 (0.013)

Table 2: Gender wise period prevalence (recall <2 weeks) of diarrhea

| Gender          | Diarrhoea-status | Total |
|-----------------|------------------|-------|
|                 | Present | Absent | No. | %     |
| Male            | 45      | 37.2   | 76  | 62.8  |
| Female          | 33      | 34.4   | 63  | 65.6  |
| Total           | 78      | 35.9   | 139 | 64.1  | 217  |

χ²=8.104, df=1, P=0.05 (0.668)

Table 3: Distribution of diarrhoeal episodes according to frequency of stool

| Frequency of stool | No. | %     |
|-------------------|-----|-------|
| 3-4               | 30  | 35.3  |
| 5-6               | 33  | 38.8  |
| ≥7                | 22  | 25.9  |
| Total             | 85  | 100.0 |

Table 4: Distribution of episodes of diarrhoea according to consistency of stool

| Types of stool                  | No. | %     |
|---------------------------------|-----|-------|
| Textural stool consistency as normal | 7   | 8.2   |
| Loose watery                    | 59  | 69.4  |
| Blood in stool                  | 7   | 8.2   |
| Mucous in stool                 | 10  | 11.8  |
| Blood and mucous                | 2   | 2.4   |
| Total                           | 85  | 100.0 |

Figure 1: Distribution of diarrhoeal episode according to the place of treatment.

Out of 78 subjects experiencing diarrhea, 23 (12.8%) had prescription at the time of survey. Out of 78 subjects experiencing diarrhea in 56 (71.8%) cases antibiotic was used. Twenty six (33.3%) cases were given oral rehydration salt solution in the event of diarrhea [Figure 2]. ORS was administered for less than 3 days in 16 (61.5%), 3–4 days in 7 (26.92%), and 5 days in 3 (11.5%) subjects. Out of 78 subjects with diarrheal, 14 (17.9%) and 3 (3.8%) received zinc for <7 and 7–14 days, respectively. In all, 17 (21.8%) subjects were given zinc therapy during diarrhea [Table 5].

Discussion

Recognizing the impact of diarrhea on child's survival and optimum growth and development, considerable efforts have been made under-program to reduce extent of diarrhea. The significant inputs in this direction were to create awareness among rural population about importance of safe water and measures to improve access to safe water sanitation. However, finding of this study clearly reflects that diarrhea is a significant problem in <5 children of rural Varanasi. This is substantiated by the fact that seven out of 20 children had diarrhea in the previous 2 weeks. In comparison to present observation, studies from South India[13] and outside India[14] at Sudan, Africa, Doba-Woreda, Ethiopia[15] and at Yaya Gulele,[11] have reported lower figures than the present study. However, a study from West India has reported higher prevalence of diarrhea in comparison to current study.[16] Variation in occurrence of diarrhea maybe because of difference in study design, time of survey, and access of preventive and promotive services as well as geographical and climatic condition. In this study, nearly half-subjects in age group of 0–12 months had diarrhea in the previous 2 weeks, whereas prevalence period of diarrhea was least in children in 5th year of life. It is interesting to note that gender wise differences in extent of diarrhea do not prevail in study area. In one out of 10 episodes, frequency of diarrhea was more than 7.

Nearly in 7 out of 10 diarrheal episodes, children experienced watery diarrhea. Watery diarrhea is generally caused by viruses where use of antibiotics is not necessary. However, results presented in the study reveal irrational use of antibiotics. Furthermore, ORT in general and ORS use in particular during diarrhea have not been up-to the mark. One out of three cases were given ORS which is very less compared to one out of two as per NFHS 4 for India and 13 out of 20 as per study conducted in South India.[17] Associated conditions (viz., vomiting and fever) may further retard use of ORS. In present study, zinc use one out of five has been slightly more than NFHS data.[9] Despite of emphasis on zinc therapy during diarrhea, use of zinc has been far from satisfactory. Adequate zinc supplementation for 14 days prevailed in less than 1 out of 20 children which is similar to zinc supplementation in Doba-Woreda, Ethiopia.[13]

In present study, antibiotics use prevailed in seven out of 10 cases consistent with the study conducted in Ethiopia[18] and contrary to this, three out of four subjects from a study conducted in Bangladesh.
had antibiotic or drugs other than WHO recommendation. Injudicious and inappropriate use of antibiotics for infectious diseases has created threat of antibiotic resistance.

As far as utilization of health facilities is concerned, contribution of Public health system (viz., PHCs and CHCs) and their subcenters has been only in one out of 10 cases in the study area and nearly in 3 out of 4 cases treatment has been provided by non-governmental facilities which includes Quacks, private sector, and medical shops. Contrary to this, six out of 10 cases went for treatment of diarrhea in under-five children from a healthcare provider. Utilization of public services in childhood diarrheal illness are not up-to the mark, majority of the people preferred private sector for easy access as they out-number the other sectors and timely availability.

This study amply highlights that not only prevalence of diarrhea in rural under-five children is high but also management of diarrhea is not on the track despite of existence of NPCDD for several decades. Scaling-up of compliance with ORS and use of zinc for 14 days in community is needed for efficient diarrhoea management through primary care and is the need of hour.

**Conclusion**

Diarrhea is a significant problem in under-five children from a rural area of India. In spite existence of National Program for Control of Diarrheal Diseases since 4 decades, management of diarrhea is not on track. Focusing on primary care provision to under-five children can help in bringing the management of diarrhea on track.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Key Messages**

This study was carried out on a representative and statistically valid sample of rural under-five children amply highlights that in spite of several measures pertaining to safe water, sanitation, and behavioral modification, diarrhea remains a significant public health problem. Further management of diarrhea is not on track in spite existence of National Program for Control of Diarrheal Diseases (NPCDD) for several decades.

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**Conflicts of interest**

There are no conflicts of interest.

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