

Research Article

Factors associated with zinc prescription practice among children with diarrhea who visited public health facilities in Addis Ababa, Ethiopia: A cross sectional study

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Abstract

Background: Diarrhea and nutrient deficiency worsen each other, and zinc is recommended to be included in clinical management of diarrhea. Therefore, this investigation was done to assess zinc prescription practice to children with diarrhea, identify factors associated with zinc prescription, and assess caregivers' zinc's perceived cost and willingness to pay for.

Methods: A health institution based cross-sectional study was done. Caretakers of 609 children with diarrhea attending health centers in Addis Ababa were included. Logistic regression was applied to identify variables associated with zinc prescription.

Results: Zinc was prescribed to 62.1% of children. About 74.9% of the caregivers were willing to pay for zinc. Previous use of zinc (AOR = 2.3; 95% CI: 1.34-4.01), exposure to zinc related message (AOR = 2.6, 95% CI: 1.53-4.60) and willingness to pay for zinc (AOR = 6.9; 95% CI: 3.84-12.66) were associated with zinc prescription.

Conclusion: Zinc was not administered to considerable proportion of children with diarrhea. Previous use of zinc, exposure to zinc related message and willingness to pay for positively contributed to zinc prescription. Health care workers shall be encouraged on zinc prescription. Intervention to increase willingness to pay for zinc and zinc benefit communication shall be strengthened in parallel with operational researches.

Introduction

According to World Health Organization's (WHO) diarrhea is defined as passage of frequent watery or loose stool at least 3 times in 24 hours [1]. The disease is multifactorial and affects considerable number of children. Globally, every year about 1.7 million diarrheal cases and 525, 000 deaths are estimated [2]. Rotavirus has been recognized as a common infectious agent, and it has been addressed through the provision of vaccine to children through the routine immunization program. Though prevention and treatment modalities are there to manage diarrheal cases, it continued significantly

to contribute for underfive children mortality. About 22% of mortality among under-five children was attributed to diarrhea [3]. Ethiopia is one of the top five countries accounted for high burden of under-five diarrheal deaths [4].

Zinc is a micro-mineral with a range of health benefits [5]. It is one of the public health important micronutrients [6]. Animal source foods, sea animal based flesh foods and legume crops are food items that can serve as good sources of zinc [7]. Land locked countries like Ethiopia are not naturally favored for sea foods. In the country the consumption of animal source foods is far lower than developed countries

More Information

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[8]. It is also documented that small proportions of Ethiopian children consumed animal source foods [9-11]. Unless household level implementable food processing techniques like soaking, germination and fermentation are well practiced, bioavailability of micronutrients in grains including legumes/pulse crops was confirmed to be low for that they contain antinutritional factors [12]. But pulse/legume crop processing practices were recommended for further study [13] and they were under promotion [14,15]. Evidence also figured out that complementary foods in Ethiopia were short of providing zinc to the level that growing children require [16].

Illness and nutrition status affect each other [17]. Likewise, diarrhea can happen and get worsen because of nutritional derangements, and it can also lead to nutritional deficiencies [18]. Accordingly, World Health Organization (WHO) and United Nations Children Fund (Unicef) recommended the inclusion of zinc in the treatment of childhood diarrhea [19]. However, evidences are limited on zinc prescription practice, perceived cost and willingness to pay for and related factors. Therefore, the purpose of the current study was to assess zinc prescription practice and identify related factors among children with diarrhea who visited public health institutions in Addis Ababa, Ethiopia.

Methods and materials

Study area, design and period

The study was conducted in Addis Ababa city administration, Ethiopia. Based on the 2007 census, the population of Addis Ababa was counted to be 3,384,569 million [20]. Addis Ababa city has a total of 10 sub-cities and 86 health centers. A cross-sectional epidemiologic study design was applied. The study was conducted from September 23- November 20, 2015.

Sampling

Sample size was determined using a single population proportion formula [21] considering 95% confidence level, 50% proportion, 1.5 design effect and 10% non-response rate. Multi-stage sampling technique was employed to reach at the study unit level. Two health centers were selected from each of the five selected sub-cities. The selection of both sub-cities and health center was on lottery bases. A total of 633 under-five children with diarrhea were included in the study who attended the selected health centers.

Data collection

Data were collected using a pre-tested semi-structured questionnaire. The tool consisted of questions on socio-demographic and economic characteristics, and zinc and related issues relevant to the objectives of the investigation. Eight trained data collectors and two supervisors participated in the data collection process. Data were collected through one-on-one interview.

Data management

Each questionnaire was checked for completeness,

missing values and unlikely responses and cleaned manually. Questionnaires judged incomplete were excluded from analysis. Data entry was performed using Epi Info version 7 and analyses was performed using SPSS version 20.0 software. During data analysis sorting was used to check for missed variables, outliers and other errors. Descriptive statistical analyses were carried out to generate summary figures on the socio-demographic and demographic characteristics and zinc related outcomes. Bivariate and multivariable logistic regression analyses were done to identify factors associated with zinc prescription. Significance of results was decided at *p* - value of 0.05.

Results

Sociodemographic and economic characteristics

The study was done on a total of 633 under five children. Twenty four (*n* = 24) incomplete data cases were excluded from analysis. Slightly more than half, 334 (54.8%), of the children were males. Children's mean age was 19.5 months.

Majority, 474(77.8%), of the respondents were children's mothers. They were from multiple ethnic backgrounds: 221 (26.8%) Amhara, 163(26.8%) Oromo, 120(20%) Gurage and 97(15.9%) Tegar. By religion, majority (62.1%) of the respondents were Orthodox Christians. Concerning their education status, 106(17.4%) cannot read and write, 179 (29.47) attended primary/elementary school, 157(25.8%) attended high school, 98(16.1%) attained college diploma and the remaining 69 (11.3%) were with bachelor degree and above. Nearly three-fourth (72%) of the participants was from households with 2000 Ethiopian Birr (ETB) or less average monthly income (Table 1).

Table 1: Sociodemographic and economic characteristics of the study participants.

Variable	N (%)
Child Sex	Male 334(54.8%)
	Female 275(45.2%)
Child Age	
Caregivers' Religion	Orthodox 378(62.1%)
	Muslim 112(18.4%)
	Protestant 81(13.3%)
	Catholic 38(6.2%)
Caregivers' Educational Status	Cannot read and write 106(17.4%)
	Elementary 179(29.4%)
	High school 157(25.8%)
	College Diploma 98(16.1%)
	Degree and above 69(11.3%)
Caregivers' Relationship with the Child	Mother 474(77.8%)
	Father 51(8.4%)
	Grand Parent 29(4.8%)
	Uncle Aunt 49(8%)
	Other 6(1%)
Caregivers' Ethnic Background	Amhara 221(36.3%)
	Oromo 163(26.8%)
	Gurage 122(20%)
	Tegar 97(15.9%)
	Others 6(1%)
Average Monthly Income of the Household	< 500ETB 128(21%)
	500 -1000ETB 82(13.5%)
	1001 – 2000ETB 228(37.4%)
	> 2000ETB 171(28.1%)



Awareness about zinc and zinc source and zinc former usage

Pertaining to the exposure to message on zinc, 484 (79.5%) of the respondents heard about zinc. Health professionals were the major (63.6%) source of information about zinc, while radio/television/other posted materials also contributed. More than half (60.1%) of the respondents were aware that they can get zinc from health center, and private pharmacy was also mentioned by more than one fourth (27.6%) of the study participants as place where to get zinc. Zinc was used only by 35% of the study participants previously for diarrheal treatment. Of the 609 respondents, almost three-fourth (73.9%) of caregivers was willing to pay for zinc. There were participants (25.1%) who looked for charge free zinc (cost to pay ranging 0.00 - 2.5 \$US). The median estimated cost of which participants were willing to pay for zinc was 6ETB [0.30 ±0.45 \$US] (Table 2).

Zinc administration

Zinc was not prescribed for more than one-third (37.9%) of children who attended health institutions because of diarrhea (Figure 1).

Out of the total zinc prescriptions, majority of zinc prescriptions (75.1%) were written by female health workers and professional nurses (52.9%). Almost one-fourth (24.6%) of the caretakers obtained zinc for free from the health centers

Table 2: Zinc awareness, source, former usage and willingness to pay for (N = 609).

Variables	No (%)
Have you ever heard about zinc?	Yes 484(79.5)
	No 125(20.5)
From where/How did you hear/see about Zinc?	Health professional 308(63.6)
	Other 176(36.4)
Where can you find Zinc?	Health center 366(60.1)
	Hospital 5(0.8)
	Private clinic 19(3.1)
	Private pharmacy 168(27.6)
	Don't know 51(8.3)
Have you ever used zinc?	Yes 215(35.3)
	No 394(64.7)
Are you willing to pay for Zinc?	Yes 301(73.9)
	No 111(25.1)

Exchange rate in was 1 US\$ for 20 ETB

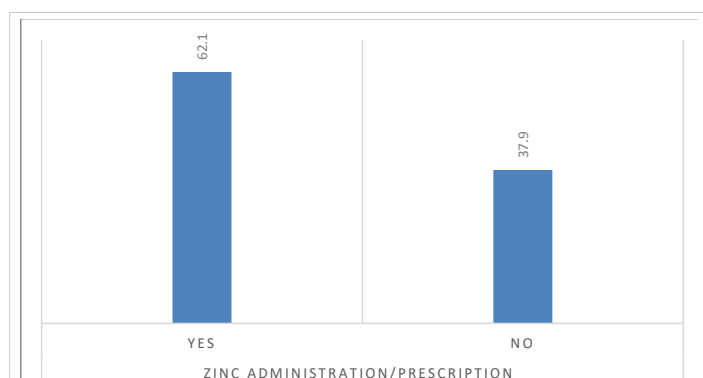


Figure 1: Percentage distribution of zinc prescription practice for children with diarrhea.

they attended. Nearly all (93.8%) of the participants to whose child zinc was prescribed received counseling about diarrhea and zinc. In addition to zinc, ORS (64.69%), diarrheal syrup (31.5%) and antibiotics (3%) were prescribed to the children with diarrhea (Table 3).

Factors associated with zinc prescription

The multivariable logistic regression analysis showed that children with caretakers who had used zinc before were 2.3 times more likely to receive zinc prescription for diarrhea than their counter parts (AOR = 2.3; 95% CI: 1.34-4.01). Moreover, children whose caregivers had exposure to zinc related information were 2.6 times more likely to receive zinc prescription (AOR = 2.6; 95% CI: 1.53-4.60). This study also revealed that zinc was 6.9 times more likely (AOR = 6.9; 95% CI: 3.84-12.6) to be prescribed for children with diarrhea who were with caregiver willing to pay for zinc (Table 4).

Discussion

This study was conducted among pairs of caretakers and children with diarrhea to assess zinc prescription practice and identify associated factors in Addis Ababa, Ethiopia. Based on the finding of the current study, 62.1% of children received zinc prescription. Previous zinc usage, care givers exposure to zinc related messages, willingness to pay for zinc were variables associated with zinc prescription.

The proportion of children for whom zinc prescribed was 62.1%. The proportion was higher than figures from studies conducted in Nepal (15.4%) [22] and India (22%) [23]. But it was lower than the findings from study done in Kenya (64.30%) [24] and in Mali (66.6%) [25]. This may be due to previous zinc usage, exposure to message about the use of zinc as treatment for diarrhea, willingness to pay for zinc, socio economic variation and the type of health facilities the participants visited.

About 80% of the caretakers of children with diarrhea who participated in the current study heard about zinc

Table 3: Zinc prescription related information.

Variable	N (%)
How did you obtain the zinc?	Free 93(24.6)
	Purchased 285(75.4)
Perceived charge of zinc	Not expensive 130(34.4)
	Affordable 242(64)
Profession of the health worker who prescribed zinc	Expensive 6 (1.6)
	Health Officer 122(32.3)
	Professional Nurse 200(52.9)
Counseling on use of zinc?	Clinical Nurse 49(13)
	Yes 571(93.8)
	No 38(6.2)
Sex of the health worker who prescribed zinc?	General Practitioner 7(1.9)
	Male 94(24.9)
Other treatments given	Female 284(75.1)
	Diarrheal Syrup 192(31.5)
	Antibiotics 18(3)
	ORS 394(64.69)
	Others 5(0.8)



Table 4: Factors associated with zinc administration for children with diarrhea who attended health centers in Addis Ababa.

Variable	Zinc Prescription		COR (95% CI)	AOR (95% CI)
	Yes	No		
Education				
Cannot read and write	69	38	1.00	
Elementary	71	107	1.4(0.85-2.3)	
High school	68	89	1.5(0.9-2.4)	
College Diploma	37	61	1.08(0.6-1.9)	
Degree and above	17	52	0.35(0.16-0.75)	
Household income				
< 500 ETB	91	37	1.00	
500-1000 ETB	34	48	1.7(0.97-3.11)	
10001-2000 ETB	100	128	3.14(1.20- 4.50)**	
> 2000	60	111	1.3(0.8-2.1)	
seen/heard about zinc				
Yes	182	302	0.93(0.62-1.3)	
No	49	76	1.00	
Where did you hear/see the message				
Health professional	161	147	2.01(1.37-2.95)***	2.30(1.31-4.05)**
Other	62	114		
Have you ever used				
Yes	113	102	2.59(1.83-3.65)***	2.24(1.28-3.89)**
No	118	276	1.00	
Have you ever purchased				
Yes	87	98	1.72(1.21-2.45)**	
No	144	280	1.00	
Willing to Pay for zinc				
Yes	172	129	5.10(3.05-8.51)***	7.06(3.85-12.93)***
No	23	88	1.00	
Counseling				
Yes	215	356	0.83(0.42-1.61)	
No	16	22	1.00	

p < 0.01; *p < 0.001.

that is serve as treatment for diarrhea. The result is higher than the findings of studies from Nepal (53%) [22], Uganda (17.2%) and Benin (72.1%) [26]. This may be due to the type of exposure to message on zinc treatment for diarrhea from health professionals and mass media.

Among all caretakers, 73.9% expressed their willingness to pay for zinc. The proportion is comparable to statistics from Nepal-70.5% [22] and Kenya-67% [27], but far lower than result from Bangladesh-92% [28].

Two-third (75.1%) of zinc prescription was written by female health care workers. Consistent to the finding of the current study, a research conducted in Nigeria also reported that much of the zinc prescriptions were by female health care workers (38.1%) [29]. With regard to health cadres with whom did the prescription were written, 65.8% were by Nurse, 32.3% by health officers and 1.9% general practitioners. In Kenya, 62.5% of the prescriptions were written by community health officers [27]. The difference might be due to the number dominance of nurses in Ethiopian health care system and difference in health care system structure and cadre organization between the countries.

Children from caretakers exposed to messages about zinc from health care workers were 2.6 times (AOR = 2.6, 95% CI: 1.53-4.60) more likely to receive zinc prescription.

The association is consistent with report of a study done in Kenya in which those who had recent contact with health care workers were reported for their higher chance receiving of zinc prescription. A study conducted in Nepal also strengthens the positive association between exposure to zinc related message and the chance of zinc prescription. It reported 2 times (AOR = 2.02, 95% CI: 1.85-2.19) more chance for those who were exposed to messages from media [22,30].

This study also revealed that children of caretakers who were willing to pay for zinc were seven times (AOR = 6.9; 95% CI: 3.84-12.6) more likely to receive zinc prescription than their counter parts. In agreement to the current finding, a study conducted in Kenya reported importance of caretakers willing for zinc usage as treatment of childhood diarrhea. In the Kenyan study caretakers in the zinc-user group were willing to pay more for a course of zinc in the future than non-user group [30].

Conclusion

Even though zinc prescription is recommended to be included in the integrated management of childhood illness for the management of diarrhea, in the study area it was not prescribed for considerable proportion of children with diarrhea. The proportion of caretakers who were not willing to pay for zinc and the need for charge free health service including zinc might have contributed for



no zinc prescription. Previous experience in use of zinc for diarrheal management, exposure to zinc related message and willingness to pay for zinc were identified being positively associated with zinc prescription. Health care workers shall be encouraged to prescribe zinc to all children with diarrhea. Intervention to increase willingness to pay for zinc and zinc benefit communication shall be strengthened in parallel with operational researches

Declaration

Ethics approval and consent to participate

Ethical clearance was obtained from ethical clearance committee of Debremarkos University. A written letter of requesting for cooperation was also handed to all of the included health centers. Oral consent was secured from each of the study participants. Their participation was on voluntary bases. Obscurity was assured throughout the data collection and management process.

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Cost of data collection was covered by the authors.

Authors' contribution

AW and MB: conception and design of the study; AW, MB and AKD: Data analysis, interpretation of results; AKD: manuscript drafting. AW and MB: Manuscript review. All authors read and approved the final manuscript.

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Availability of data and material

Important data already included in the manuscript.

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