ASSOCIATION OF FEVER AND DIARRHEA WITH INFANT TEETHING AMONG MOTHERS ATTENDING TWO HEALTH CENTRES IN NAIROBI

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Abstract

Introduction: Many global communities associate infant teething with diarrhea and fever. The perception that infant teething is a cause of pain and discomfort is often shared by both mothers/care-givers and healthcare workers and influences the choice of remedies used for the management of infant teething.

Materials and methods: This descriptive cross-sectional study was conducted among mothers presenting at two health centres in Nairobi in November-December 2014. Mothers who presented to the health centres with infants aged 0-3 months were sequentially recruited and screened to establish if they had older children. Only mothers who had older surviving children were included in the study. An interviewer administered closed ended questionnaire was used for data collection. Data was entered into IBM® SPSS® Statistics Version 20 and analysed for frequencies, while chi-square test of significance was used for categorical variables (confidence level set at 95%,a≤0.05).

Results: A total of 399 mothers satisfied the inclusion criteria and their age ranged from 19 - 48 years (Mean 28.25, SD 4.59). A total of 377 (94.5%) mothers responded to the question on whether they perceived fever to be associated with teething, while 376 (94.2%) responded to the question on whether diarrhea was associated with teething. Majority of mothers associated infant teething with fever 288(76.4%) and diarrhea 278(73.9%). Mothers association of infant teething with diarrhea and fever did not differ significantly according to mothers age (p=0.527 and p=0.282) and the highest level of education attained (p=0.093 and p=0.573), Mothers' association of diarrhea with infant teething different significantly with mothers employment status (p=0.009). More than half 17(55.2%) of mothers whose children had experienced diarrhea in the preceding two weeks sought treatment at health facilities, while 3(10%) used home-made remedies. Slightly below half 14(44.8%) of mothers whose children experienced fever sought treatment at the health centres. Majority of mothers 152(67%) consulted the nurse at the health clinic while 34.5% of mothers utilized commercially available teething powders and/or gels during infant teething.

Conclusion: Mothers knowledge on the association of infant teething with diarrhea and fever could impact on their health seeking behavior.

Introduction

A wide range of conditions have been attributed to teething by different global communities, and they include diarrhea, fever, vomiting, convulsions, coughing, ear infection, sleep disturbance among many others[1-3]. The exact origin of the traditional beliefs and practices about teething is not known, but studies have reported that during the nineteenth century, records of cause of death for 12% of all children younger than four years in England were attributed to teething, while in France of 50% of all infant deaths from the sixteenth to nineteenth century had teething as their cause[3]. More recent studies from Australia, America and many parts of Africa have reported that high numbers of mothers and even healthcare workers attribute common childhood illnesses to teething[2,3,5-8]. The perception that teething causes pain and discomfort is shared by both mothers/caregivers and medical personnel[5-8].

Confusion on this matter is further complicated because the child cannot express itself verbally, and those around it are left to interpret the non-verbal communication.

At birth, all crowns of the deciduous teeth are fully mineralised and root formation is ongoing. The teeth advance axially towards their erupted position and may present as obvious bulges within the gumpads. The tooth follicle is a source of eicosanoids, cytokines and growth factors which aid in tooth eruption and have also been linked to the occurrence of localized symptoms related to the teething period among them; low-grade fever, drooling of saliva and itchiness of gums[9,10]. Teething pain may thus be a manifestation of inflammatory mediators in the crevicular fluid surrounding the erupting tooth. Studies indicate that such symptoms can be relieved by massaging the gums, biting on teething rings, as well as administering of gels or powders with soothing effects on the gums.

The age of mothers/caregivers has been shown to influence the choice of the home remedies used for teething-related illnesses, while other studies report that the caregivers level of education has no association with the caregivers home remedy use[11,12]. The current study was designed to investigate the association of fever and diarrhea among mothers attending two health centres in Nairobi, and to describe their health seeking behaviours.

Materials and methods

This was descriptive cross-sectional study which aimed at collecting baseline information as part of a health education intervention study among mothers presenting at two conveniently selected health centres in Nairobi; Westlands and Makadara health centres. This study was approved by the Kenyatta National Hospital/ University of Nairobi ethics and standards committee (REF P677/12/ 2012). Mothers with who presented to the clinics with infants aged 0-3 months were interviewed to establish if they had an older surviving child. Those who satisfied this criteria and the consenting procedures were sequentially recruited into the study until the desired sample of 385 mothers was achieved. An interviewer administered closed ended questionnaire was used for data collection. Data was entered into IBM SPSS Statistics Version 20 and analysed for frequencies, while chi-square test of significance was used for catergorical variables with the confidence level set at 95% ($a \leq 0.05$)

Results

A total of 399 mothers satisfied the inclusion criteria; 200 mothers from Westlands health centre and 199 from Makadara health centre. Mothers' age ranged from 19 to 48 years (Mean 28.25, SD 4.59). Mothers were drawn mainly from low socio-economic group as 280(70.4%) indicated they lived in single roomed dwellings with shared washrooms. About a third 120(30.4%) of mothers were aware that their children were exposed to stagnant water and open drainage/sewers. The majority 319 (80.2%) of mothers interviewed had access to piped water, but about one fifth 79(19.8%) of mothers purchased water from vendors.

Mothers ethnicity across the two health centres differed significantly ($p=0.000$). There were more from the Kamba (28.8%) ethnic group mothers in Makadara while Westlands had more mothers from the Luhya (34.6%) ethnic group (Table 1).

Table 1 Mothers Ethnic Background

Characteristic	n	Category	Westlands HC n(%)	Makadara HC n(%)	X^2	p-value
Ethnic Background	**389**	Kalenjin	4(2.1)	2(1.0)	30.012, df=6	0.000#*
		Kamba	21(11.0)	57(28.8)		
		Kikuyu	64(33.5)	57(28.8)		
		Luhya	66(34.60	37(18.7)		
		Luo	13(6.8)	21(10.6)		
		Kisii	19(9.9)	15(7.6)		
		Others	4(2.1)	9(4.5)		

*# Fishers Exact statistic reported,*Indicates result is statistically significant at a ≤ 0.05*

Association of infant teething with diarrhea and fever by mothers

Majority of mothers associated infant teething with fever 288(76.4%) and diarrhea 278(73.9%). Mothers association of infant teething with diarrhea and fever did not differ according to mothers age (p=0.527 and p=0.282) and the highest level of education attained (p=0.093 and p= 0.573). The association of diarrhea with infant teething however different significantly with mothers employment status (p=0.009)(Table 2).

Socio-demographic Variable and characteristics		Association of teething with diarrhea			Association of teething with Fever		
		Good knowledge n(%)	Inadequate Knowledge n(%)	p-value	Good knowledge n(%)	Inadequate Knowledge n(%)	p-value
Age	<24 years	17(22.7)	58(77.3)	0.527	21(28.0)	54(72.0)	0.282
	25-34 years	70(26.4)	195(73.6)		64(24.1)	202(75.9)	
	35 years	10(33.3)	20(66.7)		4(13.3)	26(86.7)	
Highest education level	Upto Primary level	30(22.1)	106(77.9)	0.093	29(21.3)	107(78.7)	0.573
	Secondary level	41(25.0)	123(75.0)		43(26.2)	121(73.8)	
	Tertiary level	27(35.5)	49(64.5)		17(22.1)	60(77.9)	
Employment status	Unemployed	38(19.5)	157(80.5)	**0.009**	43(22.1)	152(77.9)	0.769
	Formal employment	18(28.6)	45(71.4)		15(23.4)	49(76.6)	
	Self-employed	41(35.0)	76(65.0)		30(25.6)	87(74.4)	

There was no significant difference between mothers ethnic backgrounds with their association of infant teething with diarrhea (p=0.300) and fever (p=0.056) (Table 3)

Table 3 Relationship Between Mothers Ethnic Background And Association Of Diarrhea And Fever With Infant Teething.

Ethnic Background	Association of teething with diarrhea n=368			Association of teething with Fever n=369		
	Good knowledge n(%)	Inadequate Knowledge n(%)	p-value	Good knowledge n(%)	Inadequate Knowledge n(%)	p-value
Kalenjin	2(40.0)	3(60.0)	0.300	1(20.0)	4(80.0)	0.056
Kamba	18(24.0)	57(76.0)		16(21.3)	59(78.7)	
Kikuyu	37(32.5)	77(67.5)		28(24.6)	86(75.4)	
Luhya	18(18.6)	79(81.4)		20(20.4)	78(79.6)	
Luo	7(21.2)	26(78.8)		3(9.1)	30(90.9)	
Kisii	11(33.3)	22(66.7)		13(39.4)	20(60.6)	
Others	3(27.3)	8(72.7)		5(45.5)	6(54.5)	

Mothers health seeking behaviour

Most mothers 316(79.4%) had visited the health centre for childs' immunization or routine growth monitoring. A total of 82(20.8%) of children had experienced illness in the preceding two weeks. Thirty children (7.6%) had diarrhea, while 32(8.8%) had experienced fever. More than half 17(56.7%) of mothers whose children had experienced diarrhea sought treatment at health facilities, while 3(10%) used home-made remedies for the management of diarrhea, another 10(33.3%) did not seek any treatment. Slightly below half 14(44.8%) of mothers whose children experienced fever sought treatment at the health centres, while 55.2% said the fever resolved without treatment. Management for children who had suffered diarrhea or fever in the preceding two weeks is summarized in Table 4

Table 4 Mothers health seeking behavior

Characteristic	**n**	**category**	**Westlands**	**Makadara**	**X^2**	**p-value**
Reason for current visit to health centre	398	Immunization/ Growth monitoring	159(79.9)	157(78.9)	5.193, df=2	0.075
		Seek Medical care	12(6.0)	23(11.6)		
		Other	28(14.1)	19(9.5)		
Management of Diarrhea in the preceding two weeks	20	ORS/Oralite	7(70.0)	10(100)	-----	-----
		Home-made sugar-salt solution	1(10.0)	0(0)		
		Other- Home made remedies	2(20.0)	0(0)		
Management of Fever in the preceding two weeks	28	Anti-Malarials	1(11.1)	3(15.8)	1.753, df=2	0.464#
		Antibiotics	1(11.1)	6(31.6)		
		Anti-pyretics	7(77.8)	10(52.6)		

---- No X^2 value as some cells have 0 score, # Fishers Exact statistic reported.

Some mothers indicated that they had sought professional assistance when their older child experienced teething-related symptoms (Table 5). The majority of mothers 152(67%) consulted the nurse at the health clinic. About one third of mothers (34.5%) utilized commercially available teething powders and/or gels. A small minority 4(2%) of mothers however still utilized the services of traditional practitioners for the management of their children during infant teething.

Table 5: Mothers Health Seeking Practices For Teething-related Symptoms For Older Child

Practice	Frequency Yes (%)	No (%)
Consulted the Nurse at Health clinic (n=227)	152 (67)	75 (33)
Consulted a pediatrician (n=195)	9 (4.6%)	186 (95.4)
Applied commercial teething powder/gel (n=203)	70(34.5)	133 (65.5)
Applied traditional teething powders (n=198)	9 (4.5)	189 (95.5)
Consulted an oral health practitioner (n=193)	10 (5.2)	183 (94.8)
Visited traditional practitioner for gum incision (n=197)	4 (2)	193 (98)

Discussion

This was a descriptive cross-sectional study among mothers attending two health centres in Nairobi. Due to the study design and the sampling procedures used during this study, the findings should be interpreted with caution as they may not be generalizable to whole population of mothers in Nairobi. However, these finding shed light on the important subject of infant teething, mothers perception about the symptoms associated with infant teething as well as the practices in the management of such symptoms.

Mothers who participated in this study were literate as 254 (63.7%) had completed secondary school level of education. General average adult literacy levels in Kenya have been recorded at 66.4%[13]. This group of relatively young mother was thus comparable to the Kenyan population average literacy levels. Low literacy levels have been associated with low health literacy scores, and impact negatively on oral health behavior and health seeking behaviors[14,15]. High unemployment status continues to be a challenge for the country. About half 204(51.5%) of all mothers interviewed were not engaged in any form of employment prior to the delivery of the current child. This is inconsistent with the unemployment rates in Kenya where female unemployment rate has been reported at 10.5% in 2012[16]. More mothers in this study who were unemployed recorded inadequate knowledge on the association of teething with diarrhea (p=0.009) compared to those in formal employment and the self-employed. Majority of mothers (79.4%) had visited the health facility for child immunization and monitoring services. Kenya has programs for maternal and child health care which include immunization and growth monitoring for children under the age of 5 years. The recorded national statistics of fully immunized children was 82%, with Nairobi's County recording 94.5% in 2012[17].

Majority of mothers in this study associated infant teething with fever 288(76.4%) and diarrhea 278(73.9%). This compares closely with findings of a study involving pediatricians, pediatric dentists and parents in Iowa, where 74.6% of the study participants associated fever with infant teething while 56.7% associated teething with diarrhea[5]. In a different study conducted among parents attending maternity and child health clinics in Jordan, 84.9% of them associated fever with teething while 71.8% associated diarrhea with teething[8]. Studies that have utilized prospective study designs of

children during the eruption period of deciduous dentition and those that have reviewed records of illnesses during the period of deciduous teeth eruption have reported fewer cases of diarrhea and fever during the teething period[4,18]

Only 44.8% of mothers whose children had experienced fever in the preceding two weeks sought treatment at the health centre. Previous studies have indicated that although parents perceive fever as dangerous, majority have poor knowledge on recognition of fever, and are not able to accurately measure fever[17]. Unrealistic fear of fever which causes panic when children are feverish has been documented[17]. Kenya has malaria endemic zones and prompt treatment with effective anti-malaria drugs for children with fever in malaria risk areas has been advocated as a key intervention in reducing child mortality[19]. During the time period 2000-2004, the number of children in Kenya under five who presented with fever and were treated with any anti-malarial drugs constituted 27% of the children, which reduced to 24% for the period 2005-2009[19]. Febrile diseases in childhood tend to easily lead to fatality if untreated. Parents associating fever with teething may fail to take their children to health facilities for diagnosis and management, thus resulting in possible consequences.

Diarrheal disease are responsible for about 1.8 Million child-deaths annually worldwide[19]. In the current study, 7.6% or children had suffered diarrhea within the last two weeks, and 55.2% of mothers sought treatment at the health facilities (Table 1). Diarrhea is often linked to low level of mothers' education, poor sanitary conditions and lack of safe drinking water[20]. Loose stools in infants can also be associated with introduction of foods before the infant's digestive system is adequately developed. The Global Strategy for Infant and Young Child Feeding developed jointly by WHO and United Nations Children's Education Fund (UNICEF) recommends exclusive breastfeeding of infants for the first six months of life without receiving any solids or liquids except vitamins, minerals, or medicines[21,22]. The recommended first line of management for diarrhea in children is utilization of oral rehydration therapy. There should also be emphasis on the provision of safe drinking water for children under the age of five years to minimize diarrheal episodes. The influence of the continued association by majority of mothers of teething with diarrhea in children requires further investigation.

Teething remedies used for the management of pain or perceived discomfort are often not prescribed by the dental practitioner, rather many are over-the–counter medication, while other preparations including herbal therapies are passed down generations. About a third (34.5%) of the study participants reported using teething gels/powders to manage teething-related symptoms in their older child. Teething remedies can largely be classified as either pharmacological or non-pharmacological. Most pharmacological therapies for teething aim at achieving analgesia or local anaesthesia. Preparations of analgesic gels containing paracetamol, ibuprofen and choline salicylate have been applied topically[11]. Other preparations with anaesthetic combinations like benzocaine and lignocaine are also applied topically. Evidence for the effectiveness of these analgesics and anaesthetic preparations is weak and some adverse reactions associated with them have been reported in literature[11,12]. Chronic use of choline salicylate may induce intoxication and has also been associated with methemoglobinemia, a rare but serious condition[24]. The administration and use of most teething powders/gels lacks proper dose dispensation mechanisms and their use has been discontinued in some countries over safety concerns. There is need for monitoring of the use of teething gels/powders in the market and to properly advise mothers in order to avoid adverse effects as a result of their use.

Despite the high literacy among mothers reported in this study population, beliefs may affect utilization of health services by mothers and slow the achievement of optimal child health. Furthermore,

previous studies have reported harmful practices of canine tooth-bud enucleation, often practiced by communities associating teething with persistent fever and diarrhea with resultant fatalities[25]. Emphasis should be placed on educating mothers on the determinants of diarrhea especially hygiene practices, the need for clean and safe drinking water and appropriate weaning practices. These factors have the potential to reduce the number of children experiencing diarrhea and thus minimize the beliefs around the association of infant teething with diarrhea.

Conclusion

Majority of mothers in the studied population associate infant teething with diarrhea and fever. Management of teething-related symptoms is often done in consultation with nursing staff at the child health clinics within health centres. The use of teething powders/gels is prevalent with over a third of mothers utilizing them during infant teething. The practice of utilizing teething gels/powders should not be encouraged as the dosage and safety are of concern. Few mothers still use the services of traditional practitioners for the management of teething-related illnesses in their young children.

Conflict of interest: The authors declare no conflict of interest

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