

Teething Problems and the Influence of Microbial Infections

This article was published in the following Scient Open Access Journal:

Interdisciplinary Journal of Nursing and Critical Care

Received August 07, 2017; Accepted August 17, 2017; Published August 22, 2017

Ifeanyi O. C. Obiajuru^{1*}, Chidinma A. Ikpeama², Chinyere N. Ohalet³ and Immaculata O. Uduchi⁴

¹Department of Medical Microbiology, Faculty of Medicine, Imo State University Orlu Campus, Nigeria

²Department of Animal & Environmental Biology, Imo State University, Owerri Imo State, Nigeria

³Department of Microbiology, Imo State University, Owerri Imo State, Nigeria

⁴Department of Microbiology & Parasitology, Imo State University Teaching Hospital, Orlu Imo State, Nigeria

Abstract

Introduction: Teething in children starts around 6 months and lasts until the child reaches about 3 years of age. The symptoms of teething and management of teething problems constitute major challenge for mothers and their babies. A good knowledge of teething and teething problems help the mother and child get through it without much challenges.

Materials and Methods: Teething problems and the influence of microbial infections was studied between January and June, 2017. Four hundred and thirty eight mothers with teething babies were recruited for the study. Their socio – demographic data were collected using a structured questionnaire. Blood and stool samples were collected from the teething children for laboratory examinations. Out of 438 children that participated in the study, 38 (8.7%) presented with excessive salivation, 39 (8.9%) presented with vomiting, 40 (9.1%) presented with loss of appetite, 44 (10%) presented with halitosis, 61 (13.9%) presented with gingival inflammation, 71 (16.2%) presented with irritability, 81 (18.5%) presented with itching gingival, 102 (23.3%) presented with fever and 106 (24.2%) presented with diarrhea. Investigation of the practices adopted by the mothers before reporting to hospitals showed that 24 (5.5%) mothers used teething soap, 29 (6.6%) used herbal remedies, 67 (15.3%) rubbed fingers on the gums of their children, 80 (18.3%) applied teething powder, 81 (18.5%) administered analgesic drugs, 83 (18.9%) administered teething mixture and 74 (16.8%) took their children direct to hospitals. Laboratory examination of blood and stool samples collected from the teething children presenting with the different problems showed that 121 (27.6%) had malaria parasites, 10 (2.3%) were infected with *Shigella dysenteriae*, 34 (7.8%) were infected with *Salmonella* species, 80 (18.3%) were infected with *Escherichia coli*, 60 (13.7%) were infected with intestinal helminthes and 69 (15.8%) were infected with intestinal protozoa. Relating microbial infections to teething problems presented, out of 102 teething children that had fever, 1 (0.98%) had intestinal helminthes infection, 2 (1.9%) had intestinal protozoa infections, 36 (35.3%) had bacterial infection and 89 (87.3%) had *Plasmodium* parasites infection. Out of 71 teething children presenting with irritability, 12 (16.9%) had bacterial infection, 12 (16.9%) had *Plasmodium* parasites infection, 13 (18.3%) had intestinal protozoa infection. and 16 (22.5%) had intestinal helminthes infection. Out of 100 teething children presenting with diarrhea, 7 (7%) had intestinal helminthes infection, 38 (38%) had intestinal protozoa infection and 55 (55%) had bacterial infection. Analysis of the data using ANOVA showed strong positive correlation ($p < 0.05$) between the teething problems presented and types of infections diagnosed.

Keywords: Teething, Problems, Infections

Introduction

Teething is a normal developmental stage in children between the ages of 6 months to 2 years. It is a significant landmark in the life and growth of a child. Like pregnancy and child birth, it is a thing of joy. Among the Igbos of south eastern Nigeria, it is celebrated hence the first person to see and announce that a child has developed tooth will give a remarkable gift to the child. Among the Yorubas of south western Nigeria, early eruption of primary teeth is regarded a sign of great intelligence [1].

Teething however is associated with a number of health challenges commonly referred to as *teething problems*. Some authors [2] and Doctors prefer to use the word teething signs. Teething problems have been recognized as health challenge for over 400 years and have caused death of infants [3]. Until recent times, death rate due to teething problems was as high as 4 out of 5 babies per year in many areas [4]. Improved healthcare and practice of high standard of personal hygiene and environmental sanitation have reduced death rates due to teething problems. Notwithstanding, many infants still suffer teething problems; namely: drooling, swollen bulging gums, irritability, trouble sleeping, rubbing of face, rejecting food, trying to bite, chew and suck on everything and grabbing the ears.

*Corresponding author: Ifeanyi O. C. Obiajuru, Department of Medical Microbiology, Faculty of Medicine, Imo State University Orlu Campus, Nigeria, Email: drifeanyi_oc@yahoo.co.uk

According to Deb Lonzer, Chairperson, department of community pediatrics, Cleveland Clinic Children’s Hospital, “No more than a third of babies has any one symptom” [2].

Mothers, nurses and midwives regard teething problems as major health challenge and adopt different measures to manage them. Dentists and Paediatricians believe the problems are caused by other factors such as malaria, gastrointestinal tract infections, etc. There is paucity of research information on teething problems. Available reports [1,5,6] dealt more on traditional recognition and management of teething problems. The present study was designed to assess the attitudes and management approach of mothers towards teething problems as well as laboratory diagnosis of common problems associated with teething in Imo State.

Materials and Methods

Study area

This study was carried out in 16 Primary Health Centres selected from 14 Local Government areas within Owerri and Orlu zones of Imo State, south eastern Nigeria. Imo State situates on the latitude 5° 29’ N and 7° 2’ E. It comprises of three geopolitical zones: Owerri, Orlu and Okigwe. Owerri is the capital city and comprises of 9 Local government Areas. Orlu zone comprises of 12 Local government Areas.

Selection of respondents and administration of questionnaires

Four hundred and thirty eight nursing mothers aged 20 to 35 years were recruited from 14 Local Government Areas of Imo State. The objectives of the study were explained to them. Their consent and willingness to participate in the study was sought for. Those who indicated interest to participate were given the research questionnaire to read and complete on the spot. Those who could not write were assisted by nurses and midwives at the primary health centres who acted as field assistants in the research.

Collection of samples

After completing and returning the questionnaires, the

mothers were given sterile specimen bottles to collect stool samples from their teething babies. The nurses and midwives assisted to collect 1ml of blood from the babies using sterile needles and anticoagulant vacutainers. The blood and stool samples were labeled and carried with the questionnaires to the microbiology laboratory Imo State University Teaching Hospital Orlu for analysis.

Microbiological analysis of the samples

The blood samples were examined for malaria parasites using Quantitative buffy coat (QBC) and microscopic examination of stained blood films stained with Giemsa stain as in [7,8]

The stool samples were examined for gastrointestinal tract parasites using microscopic examination of direct wet mount and stool concentration techniques as in [7,8].

Statistical analysis

Data obtained from the study were analysed statistically using simple percentage and two way ANOVA as in [9].

Results

Four hundred and thirty eight mothers with teething children were recruited for the study. Table 1 summarized their occupation and educational background. As shown, 22 (5.0%) were non - working housewives, 125 (28.5%) were civil servants, 134 (30.6%) were artisans and 153 (34.9%) were traders. Also, 15 (3.4%) had no formal education, 96 (21.9%) completed primary school, 188 (42.9%) completed secondary school and 139 completed tertiary schools.

All the mothers had children presenting with one teething problem or the other. Table 2 summarized the problems presented by the respondents’. As shown, out of 438 children presented in the study, 38 (8.7%) presented with excessive salivation, 39 (8.9%) presented with vomiting, 40 (9.1%) presented with loss of appetite, 44 (10%) presented with halitosis, 61 (13.9%) presented with gingival inflammation, 71 (16.2%) presented with irritability, 81 (18.5%) presented with itching gingival, 102 (23.3%) presented with fever and 106 (24.2%) presented with

Study Area	Number of mothers Exam	Educational Background				Occupation			
		No Academic Qualification	Primary	Secondary	Tertiary	House Wife	Trader	Civil Servant	Artisan
Owerri Municipal	35	-	6	18	11	3	12	9	11
Owerri West	32	2	9	11	10	5	10	8	9
Owerri North	31	3	8	12	8	1	13	9	8
Mbaitoli	37	-	5	17	15	2	7	16	12
Ikeduru	33	2	7	15	9	3	13	7	10
Ngor Okpala	34	3	9	16	6	1	15	7	11
Orlu	37	-	7	14	16	2	13	12	10
Orsu	25	-	3	12	10	1	9	8	7
Oru East	28	2	8	10	8	2	10	7	9
Oru West	31	-	7	15	9	1	15	5	10
Nkwerre	33	-	5	16	12	-	8	14	11
Njaba	30	2	9	9	10	1	11	8	10
Isu	27	1	7	12	7	-	12	6	9
Nwangele	25	-	6	11	8	-	9	9	7
Total	438	15 (3.4)	96 (21.9)	188 (42.9)	139 (31.7)	22 (5.0)	153 (34.9)	125 (28.5)	134 (30.6)

Table 1: Educational Background and Occupation of Mothers of children presenting with Teething Problems.

Study Area	Number of Children Exam	Number of children Presenting with Teething Problem (%)								
		Fever	Irritability	Itching Gingival	Gingival inflammation	Diarrhea	Vomiting	Halitosis	Loss of Appetite	Excessive salivation
Owerri Municipal	35	7	5	6	5	8	3	5	4	3
Owerri West	32	8	4	6	4	7	5	3	3	2
Owerri North	31	6	5	7	6	6	2	2	4	3
Mbaitoli	37	10	8	6	5	7	3	3	2	2
Ikeduru	33	6	6	5	4	8	3	4	3	2
Ngor Okpala	34	8	5	7	5	8	2	3	3	4
Orlu	37	9	8	9	6	10	4	4	2	3
Orsu	25	5	2	3	2	5	2	3	3	2
Oru East	28	6	4	5	4	7	3	2	3	2
Oru West	31	7	5	7	4	6	2	3	3	4
Nkwerre	33	8	6	7	5	8	3	4	2	3
Njaba	30	9	5	5	4	8	2	3	3	4
Isu	27	6	4	5	3	6	2	3	2	2
Nwangele	25	7	4	3	4	6	3	2	3	2
Total	438	102 (23.3)	71 (16.2)	81 (18.5)	61 (13.9)	106 (24.2)	39 (8.9)	44 (10.0)	40 (9.1)	38 (8.7)

Table 2: Teething Problems Presented By Respondents.

Study Area	Number of Mothers Exam	Number of mothers that Adopt the method						
		Teething Powder	Teething Mixture	Teething Soap	Analgesics	Herbal remedies	Rubbing Finger	Hospital or Maternity
Owerri Municipal	35	7	6	1	6	3	7	5
Owerri West	32	8	5	1	5	1	5	7
Owerri North	31	6	7	2	5	2	6	3
Mbaitoli	37	9	5	2	8	2	7	4
Ikeduru	33	7	6	1	3	2	5	9
Ngor Okpala	34	8	8	2	7	3	4	2
Orlu	37	5	6	2	8	2	6	8
Orsu	25	3	7	1	5	1	2	6
Oru East	28	5	4	2	6	2	5	4
Oru West	31	6	5	3	6	2	4	5
Nkwerre	33	4	9	2	7	2	5	4
Njaba	30	5	5	2	5	2	3	8
Isu	27	4	5	1	5	2	5	5
Nwangele	25	3	5	2	5	3	3	4
Total	438	80 (18.8)	83 (18.9)	24 (5.5)	81 (18.5)	29 (6.6)	67 (15.3)	74 (16.9)

Table 3: Pre - Clinical Management Practices Adopted by Mothers towards Teething Problems.

diarrhea. The most common teething problem presented by the respondents was diarrhea (24.2%) followed by fever while the least was vomiting (8.9%).

Table 3 summarized the pre-clinical practices adopted by the mothers before reporting to hospitals. As shown, 24 (5.5%) mothers adopted use of teething soap, 29 (6.6%) used herbal remedies, 67 (15.3%) rubbed fingers on the gums of their babies, 74 (16.8%) took their babies direct to hospitals, 80 (18.3%) applied teething powder, 81 (18.5%) administered analgesic drugs and 83 (18.9%) administered teething mixture. The most common practice adopted by mothers in management of teething problems in Imo State is self-medication using teething mixture (18.9%), analgesic drugs (18.5%) and teething powder (18.3%).

Laboratory examination of blood samples collected from teething children presenting with the different problems (Table 4) showed that 121 (27.6%) had malaria parasites. Analysis of the intensity of parasitaemia amongst the children showed that 41 (9.4%) had 1 - 2 parasites per high power field of the blood

film, 64 (14.6%) had 3 - 4 parasites per high power field and 16 (3.7%) had > 5 parasites per high power field. Analysis of the data using ANOVA showed strong positive correlation ($p < 0.05$) between the number of children presenting with fever and those infected with *Plasmodium* parasites

Laboratory examination of stool samples from the children presenting with different teething problems (Table 5) showed that 10 (2.3%) were infected with *Shigella dysenteriae*, 34 (7.8%) were infected with *Salmonella* species, 80 (18.3%) were infected with *Escherichia coli*, 60 (13.7%) were infected with intestinal helminthes and 69 (15.8%) were infected with intestinal protozoa. Analysis of the data using ANOVA showed strong positive correlation ($p < 0.05$) between the number of children presenting with diarrhea and those having intestinal parasitic infections.

Relating the prevalence of microbial infections to teething problems presented (Table 6), out of 102 teething children that had fever, 1 (0.98%) had intestinal helminthes infection,

Study Area	Number of Children Examined	Number Negative	Number Positive or Malaria Parasites			Total Infected with Malaria Parasites
		No Malaria Parasite seen	Parasite Intensity			
			1 - 2ppHF	3 - 4 ppHF	≥ 5 ppHF	
Owerri Municipal	35	22	6	5	2	13
Owerri West	32	23	4	4	1	9
Owerri North	31	22	2	5	2	9
Mbaitoli	37	26	3	6	2	11
Ikeduru	33	26	2	4	1	7
Ngor Okpala	34	25	2	5	2	9
Orlu	37	26	5	4	2	11
Orsu	25	20	2	3	0	5
Oru East	28	21	3	4	0	7
Oru West	31	21	3	6	1	10
Nkwerre	33	22	4	5	2	11
Njaba	30	21	2	6	1	9
Isu	27	22	1	4	0	5
Nwangele	25	20	2	3	0	5
Total	438	317 (72.4)	41 (9.4)	64 (14.6)	16 (3.7)	121 (27.6)

Note: ppHF = Parasites per High Power field (p < 0.05)

Table 4: Examination of Blood samples of Children with Teething Problems for Malaria Parasites.

Study Area	Number of Children Examined	Number Infected (%)					
		Bacteria				Worms	Protozoa
		Escherichia coli	Salmonella species	Shigella dysenteriae	Staphylococcus aureus		
Owerri Municipal	35	6	3	1	-	3	6
Owerri West	32	7	2	-	-	4	5
Owerri North	31	5	4	-	-	3	6
Mbaitoli	37	6	3	2	-	4	7
Ikeduru	33	7	2	-	-	6	6
Ngor Okpala	34	9	3	2	-	5	7
Orlu	37	6	2	1	-	5	4
Orsu	25	3	2	-	-	4	5
Oru East	28	5	2	-	-	4	4
Oru West	31	6	3	1	-	5	3
Nkwerre	33	4	2	2	-	3	4
Njaba	30	5	3	-	-	6	4
Isu	27	4	2	1	-	4	5
Nwangele	25	3	1	-	-	4	3
Total	438	80(18.3)	34(7.8)	10(2.3)	11(2.5)	60(13.7)	69(15.8)

(p < 0.05)

Table 5: Examination of Stool samples of Children with Teething Problems for Intestinal Parasites.

Teething Problem	Number Examined	No Microbial Infection	Microbial Infection (%)			
			Bacteria	Intestinal Protozoa	Intestinal worm	Plasmodium parasites
Fever	102	0	36 (35.3)	2 (1.9)	1 (0.98)	89 (87.3)
Irritability	71	18	12 (16.9)	13 (18.3)	16 (22.5)	12 (16.9)
Itching Gingival	81	47	12 (14.8)	22 (27.2)	-	-
Gingival Inflammation	61	51	10 (16.4)	-	-	-
Diarrhoea	100	14	46 (46.0)	33 (33.0)	7 (7.0)	-
Vomiting	39	17	-	5 (12.8)	17 (43.6)	-
Halitosis	44	30	9 (20.5)	5 (11.4)	-	-
Loss of Appetite	40	13	7 (17.5)	7 (17.5)	13 (32.5)	-
Excessive Salivation	38	25	3 (7.9)	4 (10.5)	6 (15.8)	-
Total	576	215 (37.2)	135 (30.8)	69 (15.8)	60 (13.9)	121 (27.6)

(p<0.05)

Table 6: Relationship between Teething Problems and Microbial Infections.

2 (1.9%) had intestinal protozoa infections, 36 (35.3%) had bacterial infection. Out of 71 teething children presenting with irritability, 12 (16.9%) had bacterial infection, 12 (16.9%) had Plasmodium

parasites infection, 13 (18.3%) had intestinal protozoa infection. and 16 (22.5%) had intestinal helminthes infection. Out of 100 teething children presenting with diarrhea, 7 (7%) had intestinal helminthes infection, 38 (38%) had intestinal protozoa infection and 55 (55%) had bacterial infection. Analysis of the data using ANOVA showed strong positive correlation ($p < 0.05$) between different teething problems presented by respondents and types of infections diagnosed.

The emergence of the first tooth or set of teeth in the early stage of life in humans referred to as teething, is generally associated with common signs such as drooling, swollen or bulging gums, a tooth visible below the gum, irritability, trouble sleeping, trying to bite, chew, and suck on everything, rubbing of face, rejecting food and grabbing of ears [2]. Many mothers believe that teething is a physiological process that is normally accompanied by minor problems that cannot be prevented but the intensity can only be reduced [1]. The mothers in the present study seem to disagree with this because they all resorted to one practice or the other to provide remedy for their child's teething problem. These symptoms entail discomforts that last for just a few days, or for as long as several months if a lot of teeth come through all at once. In a few children, teething does not cause any noticeable signs at all. In the present study, all the teething children exhibited one teething problem or the other such as excessive salivation, vomiting, loss of appetite, halitosis, gingival inflammation, irritability and itching gingival. Although these signs suggest that a baby may be teething, it is also very likely that something else may be wrong with the child.

Teething signs differ from one child to another and cause much pain with different experience for every child. Parents resort to different practices and measures to combat teething problems. The measures adopted by mothers in the present study: use of teething soap, use of herbal remedies, rubbing fingers on the gums of their children, use of teething powder, use of analgesic drugs and teething mixture, etc. are similar to those adopted by mothers in a previous studies [4]. While agreeing that the use of oral over-the-counter pain relievers such as acetaminophen (Tylenol) or Ibuprofen provide relief of symptoms, previous reports [6] cautioned that topical medications containing benzocaine may cause serious and potentially lethal side effects and should not be used to treat teething symptoms. Similarly, other workers [4] reported that acetaminophen and ibuprofen are good bets for temporary pain relief, as are topical oral anesthetics, as long as the recommended dosage is not exceeded, but advised that the practice of self-medication should be avoided, rather if a child has a rectal temperature of 101 degrees F or higher and symptoms such as lethargy, lack of appetite, vomiting, or diarrhea, the child's healthcare provider should be consulted.

The findings of this study strongly suggest that majority of the ailments presented as teething problems are caused by microbial infections resulting from poor hygiene and poor environmental sanitation. Ailments such as diarrhea, fever, or runny nose in teething babies, should not be dismissed as a sign of teething, especially if the symptoms last longer than 24 hours. Although many parents and midwives / nurses insist that these symptoms are directly related to child's teething, but there's no scientific proof that they are linked. Excessive drooling is a normal developmental stage of infancy, so one need not assume

that drooling means teething. There is no way to prove that a child's saliva is the result of teething or not. Tooth eruption tends to come in stages, with more activity at night than during the day, so a baby may be more irritable then. Tugging can be a symptom of teething or a sign of an ear infection. The pain from the jaw gets transferred to the ear canal. The present study revealed that of all the teething children presenting with fever, many had *Plasmodium* parasites infection. *Plasmodium* parasites are the causative agents of malaria. One major symptom associated with malaria is fever. It is not unlikely that cases of fever reported by many mothers in this study are due to malaria and not due to teething. Amongst teething children presenting with diarrhea in this study, many had bacteria and intestinal protozoa infections. These bacteria and protozoa are known to cause gastroenteritis in both adults and children. These findings agree with previous reports [2] which reported that experts, including those at the American Academy of Paediatrics, say fever and diarrhea are not normal teething symptoms. One of many possible explanations for these symptoms is that because teething children frequently put things in their mouth to soothe their gums, they get sick from coming into contact with viruses and other microbes that cause infections. Previous reports [6] while agreeing with symptoms of teething to include irritability, tender and swollen gums, and the infant wanting to place objects or fingers into the mouth in an attempt to reduce discomfort, maintained that fever, cough, diarrhea, and cold symptoms are not associated with teething in children.

Conclusion

Teething problems are real and constitute a major public health challenge in Nigeria. Some ailments in teething babies regarded as teething problems e.g. fever and diarrhea are not associated with teething, rather they are caused by microbial infections such as plasmodiasis, bacteria and intestinal parasites infections. Most practices adopted by mothers to manage teething problems are erroneous and should be discouraged. Improved sanitation, personal hygiene and careful monitoring of teething children will help reduce the occurrence of many health challenges observed amongst teething children in Nigeria.

Acknowledgements

We acknowledge the assistance and contributions of Staff Nurse Philomena Agugbue and Dr. Eberendu both of Paediatrics Department, Imo State University Teaching Hospital Orlu, Dr. Oluchi, Department of Dentistry, Imo State University Teaching Hospital Orlu and the Medical Laboratory scientists in the Department of Microbiology and Parasitology, Imo State University Teaching Hospital Orlu.

References

1. Uti OG, Savage KO, Ekanem EE. Methods adopted for management of teething problems by Nigerian mothers. *Nigerian Journal of Health and Biomedical Sciences* (2007);6(2):68 -72.
2. Baby Center Medical Advisory Board (2016): Teething signs and symptoms.
3. Ann Dally. The Lancet and the gumiancet, 400 year of teething babies. *Lancet*. 1998;348:1710-1711
4. Thobald, John. The young wife's guide in the management of her children. *Griffin London* 174: 3132 In: *Paediatrics* 1972;50:298.
5. Chinda ML. Traditional Dental Practices. *East African Medical Journal*. 1996;72(4):205.

6. Mosha HJ. Dental mutilations and associated abnormalities in Tanzania
Odontol Stomat Tropical 1983;6:215-219
7. Chesbrough M. Medical Laboratory Manual for Tropical countries vol II: Microbiology. Tropical health Technology/Butterworths and Co Ltd. Cambridge/Sevanaks. CMAJ. 1986;134(12): 1378.
8. Obiajuru IOC, Ozumba UC. Laboratory Methods for Medical Microbiology & Parasitology. Revised Edition. Lifeway Amalgamations. Owerri. ISBN: 25799107. 2009;25-79.
9. Philips LO. Bayesian Statistics for Social Scientists. Whitefriar Press, London. 2003;pp.198 - 215.