

Decreased nutritional intake of Vitamin D Lower intake of vitamin D-fortified foods, particularly milk and fortified cereals, may result in vitamin D-deficiency rickets in certain populations, particularly in dark-skinned people who live in higher latitudes and in the winter months. The decreased intake may be from choice or from necessity in societies poor enough to be unable to afford these foods. Reduced intake of fortified milk is common among adolescents and young women of childbearing age, which results in decreased vitamin D concentrations in blood [1]. Decreased vitamin D levels in the mother result in decreased Transplacental transfer of vitamin D and reduced stores at birth. Serum 25(OH)-D levels in infants correlate with maternal serum 25(OH)-D [9]. This study addressed the determinants of vitamin D deficiency rickets at Yekatit 12 hospital

Methods and Materials

The study was conducted at Yekatit 12 hospital located in Arada sub city, Addis Ababa which is one of the government general hospitals of Addis Ababa found near to Addis Ababa University College of Social Science. The study was conducted in pediatrics outpatient and inpatient wards of the hospital.

Unmatched case control study was conducted to identify determinants of rickets among under five children. Total sample size was 295, 99 cases and 196 controls.

Cases were under five children in the study area during the study period who has rickets. Cases were identified based on the confirmation of the diagnosis of rickets clinically and radiologically and were defined by the presence of two or more clinical signs (rachitic rosaries, chest wall deformity, frontal bossing, wide anterior fontanel, craniotables, caput quadratum wide wrist and double malleoli), and radiological evidence of rickets, i.e. cupping and fraying of the ends of the ulna and radius, and widening of the epiphysis, on wrist X-ray. Controls were all under five children in the study area during the study

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Male	50(54.9%)	11.9(61.5%)
Female	41(45.1%)	69(38.5%)
0-11months	22(24.2%)	38(21.2%)
12-23 months	48(52.7%)	53(29.6%)
24-60 months	21(23.1%)	88(49.2%)

Milk	None	31(34.1%)	37(20.7%)	0.022
	1 to 3 times	39(42.9%)	77(43%)	
	>3 times	21(23.1%)	65(36.3%)	
Fish	None	77(84.6%)	106(59.2%)	<0.001
	1 to 3 times	9(9.9%)	62(34.6%)	
	>3 times	5(5.5%)	11(6.1%)	
Egg	None	43(47.3%)	52(29.1%)	0.003
	1 to 3 times	39(42.9%)	85(47.5%)	
	>3 times	9(9.9%)	42(23.2%)	
Cheese	None	71(78%)	136(76%)	0.002
	1 to 3 times	6(6.6%)	33(18.4%)	
	>3 times	14(15.4%)	10(5.6%)	
Yogurt	None	72(79.1%)	146(81.6%)	0.003
	1 to 3 times	7(7.7%)	27(15.1%)	
	>3 times	12(13.2%)	6(3.4%)	

Nutritional intake.

0-11 months	22(24.2%)	38(21.2%)	3.879(.990-15.199)
12-23 months	58(42.7%)	53(29.6%)	4.935(1.576-15.45)
24-59months	21(23.1%)	88(49.2%)	1
Housewife	47(51.6%)	81(45.3%)	6.47(1.04-40.111)
Merchant	37(40.7%)	89(49.7%)	1.1 28(.349-3.648)
Private and government employee	7(7.7%)	9(5%)	1
Illiterate &primary	48(42.8 %)	68(37.1%)	.314(.0910-1.09)
Secondary& above	43(47.3%)	111(62.1%)	1
None	72(79.1%)	146(81.6%)	.647(.063-6.6)
1-3 days	7(7.7%)	27(15.1%)	.748(.056-9.93)
Above three	12(13.2%)	6(3.4%)	1
< 30 minutes	39(90.6%)	111(65.7)	7.747(1.95-30.71)
30 minutes and above	4(8.4%)	58(34.3%)	1
Very dark	19(20.9%)	6(3.4%)	1.675(.608-4.61)
Dark Brown	37(40.7%)	61(34.2%)	18.704(3.29-106.2)
Light brown	35(38.5%)	112(62.2%)	1
No	20(45.9%)	25(14.8%)	3.99(1.33-11.98)
Yes	22(43.8%)	144(85.1%)	1
Yes	33(78.6%)	45(26.6%)	10.638(3.75-30.14)
No	9(21.4%)	124(73.4%)	1

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Discussion

Vitamin D is an essential nutrient for linear growth of bones and for reaching peak bone mass among children and adolescents. Vitamin-D deficiency rickets is still a major health problem in developing countries. Inadequate direct exposure to ultraviolet rays of sunlight is the predominant cause of rickets [10]. The major cause of nutritional rickets in Ethiopian children is lack of exposure to sunshine and/or inadequate intake of vitamin D. Lack of awareness and traditional

beliefs are major causes for not exposing infants to sunshine [11]. In this study the direct exposure of sun light was 43.8% in cases and 85.1% in controls.

identified reasons for lack of exposure to sunlight were: lack of adequate space (28.8%), fear of bad weather (27.1%), lack of awareness (27.1%), inconveniences of the mother due to different reasons; business, loneliness and mothers who have twin children accounts (10%) and fear of evil eye (6.8%).

In this study, sunlight exposure for more than 30 minutes per day (AOR=7.7,95% CI 1.95-30.72), children who were not exposed to direct exposure to sun light (AOR=3.99,95% CI 1.33-11.98), children with applied baby oil before sun exposure (AOR=10.6,95%CI 3.76-30.138), children who had dark brown skin (AOR=18.7, 95%CL 3.3-106.3), children with age group of 12-23 months (OR=4.9 95%CI 1.57-15.45) and mother whose occupational status of house wife (AOR=6.47 95%CI 1.04-40.11) were significant variables associated with rickets.

In our finding the odds of having rickets was 7.7 times higher in children who were exposed to sun light for less than 30 min than those exposed for 30 min and above per day. The odds of having rickets was 3.9 times higher in children who didn't get direct exposure to sun light than those who got direct sun exposure. This finding was in line with the study done in black lion hospital also showed that lack of sun exposure 3.5 times increase prevalence of rickets than who were exposed [6].

With regard to application of baby oil, 78.6% of cases applied baby oil before sun exposure, while only 26.6% controls applied baby oil before sun exposure. Rickets was 10.6 times higher in children with applied baby oil before sun exposure than in children who didn't apply. The study done in Debre Markos, East Gojjam showed, almost all mothers (98.4%) apply lubricants on the infant's body during the time of sunlight exposure [12-15]. This makes prevalence of rickets in children was high.

Skin color was also significant predictor of rickets. In our study children who have dark brown skin were 18.7 times higher having rickets than children who had light brown skin. This finding was supported with people with a naturally dark skin tone have natural sun protection and require at least three to five times longer exposure to make the same amount of vitamin D as a person with a white skin tone [8].

Rickets was 4.9 times higher in children with age group of 12-23 months than age group of 24-59 months. This finding was line with the study done in Jimma which showed children in the age group 12-23 months were 4.5 times more likely to develop rickets as compared to the other age groups [6]. Lack of adequate exposure to sunlight is