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PREVALENCE OF AND FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG NURSERY SCHOOL CHILDREN AGED 3-6 YEARS IN ELDORET MUNICIPALITY

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ABSTRACT

Childhood overweight and obesity is a serious emerging problem in both developed and developing countries. The developed world is already grappling with a proportionately high burden of obesity in children, with the developing countries experiencing a double burden of under nutrition and over nutrition. Obesity posses a significant public health threat to children as it has a significant impact on both their physical and psychological health. Furthermore, childhood overweight and obesity has been associated with an increase in cardiovascular risk factors in adult life. The objective of this study was to determine the prevalence of overweight and obesity among nursery school children aged 3-6 years in Eldoret Municipality and to identify the associated factors. Cross-sectional study of 320 nursery school children aged 3-6 years was carried out in 20 nursery schools sampled from Eldoret Municipality. Simple random sampling proportionate to each of the schools population size was used to select the children. A child's anthropometric data, which was converted to Weight – for- Height z-scores, was used to determine the prevalence of overweight and obesity. A structured questionnaire was used to collect data. Anthropometric data was analyzed using WHO anthro software for child standards in monitoring and growth. Data was analyzed using SPSS version 12.0 and Epi Info version 3.4.3. Chi-square test of association and logistic regression (binary) was used to determine the significant variables affecting the prevalence of overweight and obesity. All p values <0.05 were considered to be statistically significant. Results indicated that the prevalence of overweight was 13.4% and obesity 6.9%. Type of school, owning television, parent's employment status and mode of transport to school were each independently significantly associated with overweight and obesity of the children. In conclusion, overweight and obesity exist in nursery school children in Eldoret Municipality, Kenya. Increase in physical activities should be ensured both at home and in the communities.

Key words: Overweight, Obesity, factors, children, prevalence

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INTRODUCTION

Childhood overweight and obesity is a serious emerging problem in both developed and developing countries. At a global level, the WHO has placed the fight against obesity among its top priorities [1].The worldwide prevalence of childhood overweight and obesity has been increasing. The prevalence increased from 4.2% in 1990 to 6.7% in 2010.

The prevalence is increasing in developing countries, often in addition to an ongoing problem of under nutrition [2]. In industrialized countries, children in lower income families are particularly vulnerable while in developing nations, childhood overweight and obesity is most prevalent in wealthier sections of the population [3, 4]. In Kenya, the trend compares with the global scenario but mainly affects the urban population [5]. Childhood overweight and obesity has a significant impact on both their physical and psychological health. Obesity in children has been associated with several risk factors for later heart diseases including hyperlipidaemia, hyperinsulinaemia, hypertension and early atherosclerosis [6, 7, 8].These risk factors may operate through the association between child and adult obesity, but they may also act independently [9].In addition, psychological disorders such as depression occur with increased frequency in obese children [10].Overweight children followed up to 40[11]and 55 years [9] were more likely to have cardiovascular and digestive diseases and die from any cause as compared with those who were lean. The causes of obesity in children are complex and multifactorial. Genetic factors are important in its development, and several genes that may be implicated have been identified [12, 13].Although 30-50% of the predisposition towards obesity in children can be explained by genetic factors, environmental influences also play a crucial role. The increase in rates of obesity and Non Communicable Diseases has been associated with shifts in dietary patterns, where traditional food systems and habits have been preferred over western type cereal based high energy diets [14].The transition from rural to an urban lifestyle is associated with increased levels of overweight and obesity which has been linked to dramatic changes in lifestyle. In many developed countries, higher calorie intakes and lower calorie expenditure have already resulted in a rapid increase in the prevalence of overweight, obesity and related Non Communicable Diseases [15]. Many developing countries are in the process of undergoing similar transition. Industrialization has brought greater dietary diversity as well as increase in consumption of processed foods, dietary sugar and saturated fats. There is greater and easy availability of a wide variety of energy dense food, eaten not only for satiety, but also for leisure. Although children are taking foods high in calories, they expend less of these calories. This can be explained partly by the increased use of motorized transport to school, too much television viewing and less physical activity in school, mainly in urban children. While the prevalence of overweight and obesity in developing countries is low, its early diagnosis and treatment is crucial to being able to prevent and control the emerging public health challenge.

The objective of this study was to investigate prevalence of and factors associated with overweight and obesity among children aged 3-6 years in Eldoret Municipality, Kenya.

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MATERIALS AND METHODS

Study design and site

This study was conducted in Eldoret town, Uasin Gishu County, Rift Valley Province, Kenya.

The cross-sectional study design was employed in this study.

Study population and sampling

The study and the target population consisted of nursery school children aged 3-6 years living in Eldoret Municipality. A representative sample of twenty nursery schools was chosen from both public and private schools using simple random sampling method. Fishers formula, as suggested by Mugenda and Mugenda [16] was used to arrive at a sample size of three hundred and eighty four children (384). Simple random sampling proportionate to the school population size was then employed to select a representative sample from each school. However, a total of sixty four (64) children dropped out of the study; forty five (45) parents did not give consent, nine (9) children refused to be taken measurements, while ten (10) children failed to turn up in school on the days of the study. Therefore, three hundred and twenty children (320) participated in this study.

Anthropometric measurements

The child's anthropometric measurements which included age, weight, height and MUAC were taken while the children were in school, during school days in the months of May, June and July. Anthropometric information about the children was obtained as follows: Age of the child was obtained from the class register, which was then confirmed form the copy of child's birth certificate or clinic card; Height of the child was measured to the nearest 0.1 cm using a wooden height board fitted with a metallic tape, a head board and a foot board and the weight of the child was measured to the nearest 0.1 kg using a weight scale model HY-RGZ160 from China, which was calibrated for use; Mid Upper Arm Circumference (MUAC) of each child was measured to the nearest 0.1cm using a non-stretchable and flexible MUAC tape. Socio-demographic information was obtained from the parent/guardian of the child using interviewer administered questionnaire.

Data analysis

Data was analyzed using a combination of SPSS version 12.0 and Epi Info version 3.4.3. SPSS generated frequencies, percentages, means, standard deviations, chi-square test of association and logistic regression (binary), which was used to determine the significant variables affecting the prevalence of overweight and obesity. Childhood overweight and obesity was defined in terms of body mass index z-scores. In order to obtain comparable estimates of overweight/obesity indices across other surveys, data were analyzed using the proposed procedures and cut-offs by the World Health Organization. Using the WHO method, overweight was defined as weight-for-height z-score>1 (corresponding approximately to the 84^{th} percentile) and obesity as weight-for-height z-score>2(corresponding to approximately 98^{th} percentile).

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Logistic regression analysis was used to assess the odds of being overweight or obese. Bivariate analysis was used to assess the association between each of the selected demographic and socio-economic factors and the child's overweight and obesity. Factors that showed a significant association with being overweight were included in the basic multivariate logistic regression that assessed the association between a child's overweight/obesity status and socio-economic and demographic factors.

Mid-Upper Arm Circumference (MUAC) measurements were compared with WHO cut off points. Children with MUAC of <11.5 cm were considered undernourished, while those with MUAC of 11.5-12.5 cm were considered to be at risk. Those with MUAC of >12.5 were considered well nourished/healthy.

Ethical consideration

Ethical clearance was obtained from Institutional Research and Ethics Committee (IREC) of Moi University. Permission was also sought from Municipal Education Officer (MEO) of Eldoret Municipality and headteachers of the selected schools. Informed consent of the subjects was sought from their parents/guardians. Letters were mailed to the parents/guardians of the subjects, through the subjects, after getting permission from the head teachers of the different schools. Informed consent was sought in writing. Confidentiality was assured and privacy protected for the information collected by using numbers instead of names. Participation in the study was voluntary and if the parent of the child objected, the child was not included in the study.

RESULTS

Among the 320 children studied, 163(51.3%) were from the public schools while 157(48.7%) were from private schools. Slightly more than half 169(52.8%) were male while the rest (151) (47.2%) were female. The mean age (in months) and weight (kg) was 54.96 and 17.6 respectively. Their mean height (cm) was 103.4 while mean MUAC (cm) was 15.9. Table 1 shows the general characteristics of the study sample. As reported by parents, majority of the households 225(70.3%) had television sets and 216(96.9%) had their children watching television after school. A third of the households106 (33%) had computers and among them only 28(26.4%) of the children played computer games. More than three quarters of the children 280(87.5%) had lunch in school and only 27(8.5%) carried packed lunch as well us bought snacks as indicated in Table 1. Figure 1 below shows the different means of travelling to school used by the children.

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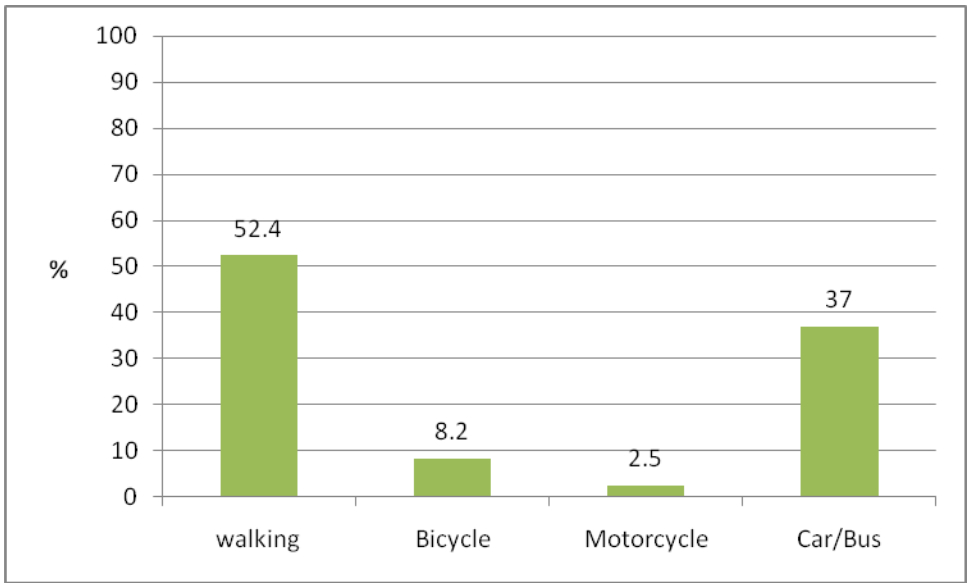

Figure1: Means of travelling to school used by the children (n =320)

Out of those children who walked to school, 138(84.6%) were public school going, while only 29(18.7%) attended private school as shown in Table 2.

Prevalence of overweight and obesity

Results from this study indicate that the prevalence of overweight and obesity 43(13.4%) while that of obesity was 22(6.9%) as indicated in figure 2 below.

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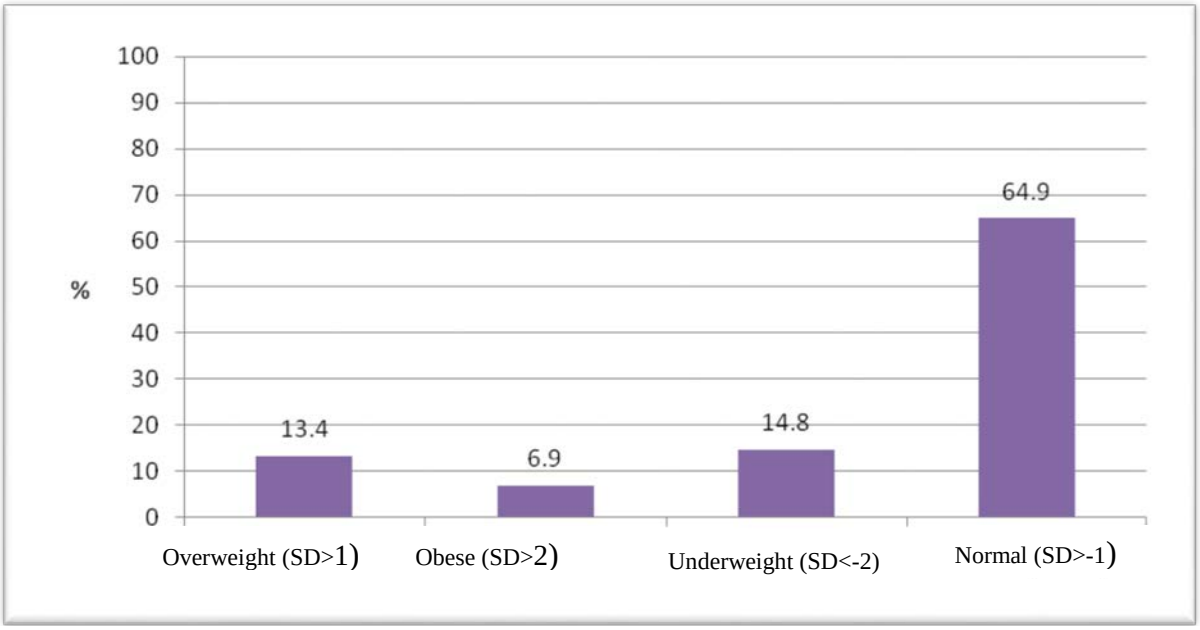

Figure 2: Prevalence of overweight and obesity among nursery school children (n =320)

Among the children who were overweight, 26(60.5%) were males and 17(39.5%) were females, while 11(50%) of those who were obese were males. Ninety five percent 21(95.5%) of obese children were from private schools while only 1(4.5%) was from a public school. Of the 43 children who were overweight, 12(27.9%) were from public school while 31(72.10%) were from private school.

Table 3 and Table 4 show the factors found to be associated with overweight and obesity, respectively. Having television, having computer, child carrying packed lunch to school, mothers and father's employment and income were each independently significantly associated with overweight and obesity. Children in private schools were more likely to be overweight or obese as compared to those in public schools ($p<0.001$). The children of families that owned a television were more likely to be overweight or obese as compared to those from families that did not have television ($p<0.002$).

Controlling for owning computer and owning television, multivariate logistic regression indicated that the type of school was a significant predictor of overweight ($p<0.001$). Those in private schools were 3 times more likely to be overweight as compared to those in public schools (OR:95%CI; 3.083(0.968-9.816)) and OR:95%CI:21.468(1.663-277.167) for obesity. This is shown in Table 5 and Table 6, respectively.

DISCUSSION

The prevalence of overweight of 13.4% reported in the present study is slightly lower than that reported by Gewa [5] of 18% in Kenya. However, the prevalence of obesity

of 6.9% reported in the present study is higher than the global prevalence of 6.7%[17] and that reported in Kenya [5], but compares with that reported in Nigeria [18]. The lower prevalence of obesity reported earlier in Kenya could be attributed to the fact that the study subjects included those from rural and urban areas, while for the present study, subjects were recruited from urban areas, where the prevalence had earlier been reported to be high[19]. The finding of a significantly higher prevalence of overweight (OR:95%CI; 3.083(0.968-9.816) and obesity(OR:95%CI:21.468(1.663-277.167) among children in private schools is similar to that reported in Guatemala [20] and in Nairobi[21], who reported a higher prevalence of overweight and obesity among children in private than in public schools. The reason for this higher prevalence could be that most of the children in public nursery schools walked to schools as compared to those in private schools who used motorized mode of transport to school.

Having a television set and having a computer were each independently significantly associated with overweight and obesity ($p<0.005$). These findings were consistent with other findings elsewhere [22, 23]. Positive associations between overweight/obesity and TV viewing have been reported elsewhere [24, 25]. However, a less consistent association of overweight and access to computer and video games have also been reported [25]. Television viewing requires little energy beyond the resting metabolic rate, and also replaces time spent in more vigorous activity. This could be the reason for the positive association with overweight and obesity.

This pattern suggests that overweight and obesity prevalence rates are linked to the availability and affordability of sedentary entertainments such as television and computer gaming as confirmed by other studies [26]. The study results also showed that 14.8% of the children were moderately malnourished (<-2SD). Therefore, amid the overweight and obese, there are those who are malnourished.

CONCLUSION AND RECOMMENDATIONS

Overweight and obesity exist among nursery school children in the Eldoret Municipality, Kenya. The factors associated with overweight and obesity in the children were type of school, family owning a television set, family owning computer and child carrying packed lunch to school. Schools (especially private) need to become actively involved in preventing overweight and obesity in children by increasing the time children spend in physical activity in schools. There is also need to expand the space and facilities required for physical activities in schools for the children to have adequate space and materials for playing.

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Table 1: Characteristics of the study sample (n = 320)

Characteristic	**N**	**(%)**
Family have television	225	70.3
Child watches television	216	96.9
Family have computer	106	33.2
Child plays computer games	28	26.4
Child plays games in estate	319	99.7
Enough room for playing	307	95.9
Child participate in physical education in school	318	99.4
Child eats in school	280	87.5
Child carries packed lunch	27	8.5
Child buys snacks	27	8.5

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Table 2: Means of travelling to school in relation to type of school (n= 320)

Type of school	Walking	Bicycle	Motorcycle	Car/bus
Private	29(18.7%)	11(7.1%)	6(3.9%)	109(70.3%)
Public	138(84.6%)	15(9.3%)	2(1.2%)	8(36.9)

Table 3: Factors associated with overweight (n = 320)

Variable	Overweight		Chi-square value/t-value	P-value
	Overweight			
	No	Yes		
School type				
Private	124(80.0%)	31(20.0%)	12.171	**<0.001**
Public	152(93.3%)	11(6.7%)		
Family computer				
Yes	86(81.1%)	20(18.9%	3.952	**0.047**
No	190(89.2%)	23(10.8%)		
Child carry packed lunch				
Yes	27(100.0%)	0(0.0%)	4.595	fishers exact
No	249(85.3%)	43(14.7%)		**0.004**

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Table 4: Factors associated with obesity (n=320)

Variable	Obese Yes	Obese No	Chi-square value/ t-value	p-value
School type				
Private	134(86.5%)	21(13.5%)	20.642	**<0.001**
Public	162(99.4%)	1(0.6%)		
Family television				
Yes	204(80.7%)	21(9.3%)	7.154	**0.006**
No	94(98.9%)	1(1.1%)		
Family computer				
Yes	93(87.7%)	13(12.3%)	7.123	**0.008**
No	204(95.8%)	9(4.2%)		
Mother's level of education				
Primary	57(96.6%)	4(3.3%)	20.402	fishers exact
Secondary	117(96.7%)	2(3.4%)		**0.005**
College	124(89.2%)	15(10.9%)		
None	1(100%)	0(0.0%)		
Father's occupation				
Formal employment	116(89.2%)	14(10.8%)	14.684	fishers exact
Informal employment	99(98.0%)	2(2.0%)		**0.002**
Small scale business	34(97.1%)	1(2.9%)		
Large scale business	12(75.0%)	4(2.5%)		

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Table 5: Logistic regression of factors associated with Overweight (n = 320)

Variable	B	S.E	Sig	OR(95%CI)
School (Private)	1.126	0.591	0.057	3.083(0.968-9.816)
Owning computer (Yes)	-0.208	0.450	0.644	0.812(0.336-1.961)
Occupation (Father)				
Formal employment	-0.634	0.619	0.306	0.531(0.158-1.784)
Informal employment	-0.939	0.798	0.239	0.391(0.082-1.868)
Small scale business	-0.838	0.903	0.353	0.433(0.074-2.539)

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Table 6: Logistic regression of factors associated with Obesity (n = 320)

Variable	B	S.E	Sig	OR(95%CI)
School (private)	3.067	1.305	<0.001	21.468(1.663-277.167)
Owning computer (Yes)	-0.090	0.557	0.871	0.914(0.307-2.722)
Owning television (Yes)	0.256	1.383	0.853	0.774(0.051-11.646)
Birth weight	2.038	0.865	0.018	7.676(1.408-41.840)
Occupation (father)				
Formal employment	-0.686	0.694	0.323	0.503(0.129-1.963)
Informal employment	-0.915	1.059	0.388	0.401(0.050-3.193)
Small scale business	-0.873	1.258	0.488	0.418(0.035-4.914)

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