www.ajbrui.net

Nutrition and Goiter Status of Primary School Children in Ibadan, Nigeria

***Sanusi R. A. and Ekerette N. N.**

Department of Human Nutrition, College of Medicine, University of Ibadan, Nigeria

ABSTRACT: Iodine Deficiency Disorders (IDD) has continued to be of significant health problem in some communities despite universal salt iodization (USI). There is therefore a need to investigate several other factors beside iodine intake that could likely contribute to the continued prevalence of iodine deficiency in these communities. This study was therefore designed to assess the iodine deficiency status of primary school children in four schools in Ibadan, and also to answer if there is a relationship between both gender and protein energy malnutrition (PEM) with iodine deficiency. Goiter status of the subjects was determined using the WHO techniques and classifications. Heights and weights were measured using standard techniques and anthropometric indices of weight-for-age, height-for-age and weight-for-height were used to classify the children into various category of nutritional status. Four hundred and seventy one (471) school children comprising of 246(52.2%) males and 225(47.7%) females were assessed. The mean age (SD) was 10.9 (1.05) yrs, mean height (SD) was 1.36 (0.08) m and mean weight (SD) was 28.7(5.3) kg. It was observed that 42.2% of the school children had palpable goiter, 21.2% were stunted, 15.1% were underweight and 3.7% were wasted. There was no significant gender difference observed for goiter, stunting, wasting and underweight. It was observed that, only goiter and stunting were significantly associated ($p<0.05$). Apart from goiter and stunting being chronic or long-standing, this relationship remains unclear. Since more than 40% of these children had some degree of goiter and more than 21% were stunted, iodine deficiency and malnutrition among school children in Ibadan remain public health problems.

Keywords: goiter, iodine deficiency, malnutrition.

INTRODUCTION

Enlarged thyroid gland in front of the neck (goiter) is usually not a life-threatening condition, but its presence signifies that there may be iodine deficiency disorders (IDD). The spectrum of disease called IDD may include; increased rate of still births, spontaneous abortions, infant deaths, reduced mental function, growth failure, speech and hearing defects (ACC/SCN 1992). Much has been achieved in the area of universal salt iodization (UNICEF 2003, Egbuta et al 2003, NAFDAC 2003) in the sub-Saharan Africa and Nigeria in particular. Nevertheless iodine deficiency continues to be of public health importance (UN/SCN 1993,Ojule et al 1998, SCN 2004) in some communities.

Apart from iodine intake, other factors are known to interfere with adequate iodine nutrition, these includes protein-energy malnutrition (Gaitan et al 1983, Brahmbhatt et al 2001), vitamin A deficiency (ACC/SCN 1994) and intake of goitrogens in foods (ACC/SCN 1987) which also predispose to goiter formation.

The issue of gender cuts across all area of health and living (Kishor and Neitzel 1996, Oniang'O and Mukuledi 2002). Gender has been implicated in the prevalence of iodine deficiency and protein energy malnutrition (Gur et al 2003, Osmani and Sen 2003). Furthermore there is contrasting evidence on whether or not gender affects the nutritional well being (Kahaela et al 2002, FAO 2003) and if so, which of the gender groups are mostly affected (SCN 2002, Kimhi 2004).

The effect of both iodine deficiency and PEM may be pronounced among the school age children as they seem to be the most exposed to the fundamental risk factors; poor food consumption patterns, poor sanitation, infections, illnesses (UN/SCN 2000, Amigo et al 2000). Whether or not there is a gender bias in the prevalence of goiter among school children between 9 to 12 years in Nigeria is not clear. This study was,

Manuscript received: February 2008; Revision Accepted June 2008

*Address for correspondence: sanusiadegoke2003@yahoo.com

therefore, carried out to investigate whether there is a difference between boys and girls in prevalence of goiter and PEM (as measured by indices for stunting, wasting and underweight). Secondly, to investigate whether there is a relationship between goiter and PEM in these school children.

The general objective of this study was to assess the prevalence of goiter and protein energy malnutrition in primary school children in Ibadan. The specific objectives included (a)To assess the prevalence of PEM as measured by indices for underweight, stunting and wasting among the school children (b)To assess the prevalence of goiter using WHO techniques of observation and palpation (WHO 2004), (c)To assess the relationship between nutritional status and goiter status among the school children (d) To assess the prevalence of goiter in boys and girls in order to evaluate if there is a difference (e) To assess if there is a difference in prevalence in wasting, stunting and underweight between the boys and girls

MATERIALS AND METHODS

Study Design:
This study was descriptive and cross-sectional in design, and was carried out in five primary schools selected using random sampling techniques from the five local government areas (LGA) in Ibadan. Data collection was in November 2004 and lasted two weeks.

The subjects for the study were primary school children 9 to 12 years old, who were apparently healthy and were willing to participate in the study. Ethical clearance was obtained from the ministry of Education. The minimum sample size as calculated was 339, however, 471 subjects were included in this study.

Sample Selection:
Selection of the schools from the five local government areas and the subjects from each school were all done using simple random sampling techniques.

Measurements:
Tools used in collecting required data included a Questionnaire, stadiometer and a digital weighing scale. Information collected included those on socio-economic status (name, age, class, sex, parent's occupation, family size, and type of housing), anthropometric measurements and indices (weight, height, weight-for-age, height-for-age and weight-for-height), goiter status using WHO techniques. For goiter classification or grades: Grade 0 - No visible or palpable goiter, Grade 1 – No goitre detectable by palpation and visible only when the neck is fully extended while Grade 2, goitre is both palpable and visible with the neck in its normal position.

Quality Control:
Data Collectors were trained on the various data collection procedures and standardized instruments were used. Immediate recording of data was ensured by assigning each researcher to one specific aspect of data collection.

Statistical Analysis:
Data entry and analyses were completed using the statistical package for social sciences (SPSS version 10). Descriptive statistics including means and standard deviations were determined. Prevalence of goiter, weight-for-age, height-for-age and weight-for-height were described as percentages. The student t-test was applied for test of significance between means in gender and goiter status and also between goiter and nutritional status.

RESULTS

A total of four hundred and seventy one (471) school children participated in this study, comprising of 246(52.2%) males and 225 (47.8%) females. The subjects had a mean (SD) age of 10.9 (1.06) years. Two hundred and eighty-four (60.3%) of the school children had no goiter, while total goiter rate (both visible and palpable) was 39.7% by palpation (Table 1). Only 73 (15.5%) of the children were underweight (Table 2), while 102 (21.70%) were stunted (Table 3) and 14 (3.7%) were wasted (Table 4).

Table 1:
Age and Gender of Subjects

AGE	***MALES***		***FEMALES***		**TOTAL**	
yrs	N	%	N	%	N	%
9	23	9.3	28	12.4	51	10.8
10	62	25.2	65	28.9	127	27.0
11	58	23.6	43	19.1	101	21.4
12	103	41.9	89	39.6	192	40.8
Total	246	52.2	225	47.8	471	100.0

Gender and Goitre:
While 22.6% of the males had grade 1 goitre, only 16% of the girls are in this category. Grade 2 goitre is found in 1.1% of boys and 0.6% of the girls. This is significant ($p<0.05$) (Table 5).

Table 2:
Goitre Prevalence

Grade	*Frequency*	Percentage
Normal	284	60.3%
Palpable	180	38.2%
Palpable and Visible	7	1.5%
Total	471	100%

Gender and Indices of PEM:
About 15% of the children were underweight (Table 6), 21.7 were stunted (Table 7) and 3.7 (table 8) were wasted. There was no significant difference in each of these indices when gender is considered.

Association between Goitre and Indices of PEM.
While there was no association between goiter and underweight (Table 9) and wasting (Table 11), there was a significant association between goiter and stunting (Table 10), where $p<0.05$.

Table 3:
Weight-for-Age (Underweight)

Index	*Frequency*	Percentage
Normal	398	84.5%
Mild to moderate	71	15.1%
Severe	2	0.4%
Total	471	100%

Table 4:
Height-for-Age (Stunting)

Index	*Frequency*	Percentage
Normal	368	78.3%
Mild to moderate	88	18.7%
Severe	14	3.0%

Table 5:
Weight-for-Height (Wasting)

Index	*Frequency*	Percentage
Normal	372	96.4%
Mild to moderate	13	3.4%
Severe	1	0.3%

Table 6:
Gender and Goiter Grade

Grades	*Males*	*Females*	Total
0	135 (28.66%)	147 (31.21%)	59.87%
1	106 (22.50%)	75 (15.920%)	38.43(%
2	5 (1.06%)	1 (0.21%)	1.27%
Total	246 (52.23%)	47.34%	100%

Table 7:
Gender and Underweight

Index	*Males*	*Females*	Total
Normal	45.2%	39.9%	84.9%
Mild to moderate	7.0%	7.9%	14.9%
Severe	0.0%	0.2%	0.2%
Total	52.2%	47.8%	100%

Table 8:
Gender and Stunting

Index	*Males*	*Females*	Total
Normal	42.3%	36.0%	78.3%
Mild to moderate	8.9%	9.8%	18.7%
Severe	0.9%	2.1%	3.0%
Total	52.1%	47.9%	100%

Table 9:
Gender and Wasting

Index	*Males*	*Females*	Total
Normal	54.4%	42.0%	96.4%
Mild to moderate	1.2%	1.3%	3.4%
Severe	0.3%	0%	0.3%
Total	56.7%	43.3%	100%

Table 10:
Goitre and Weight for Age (Underweight)

Index	Goiter Grade			
	Grade 0	Grade 1	Grade 2	Total
Normal	50.9%	32.7%	1.3%	84.8%
Mild to moderate	8.5%	6.0%	0.4%	14.9%
Severe	0.2%	0.0%	0.0%	0.2%
Total	59.6%	38.7%	1.7%	100%

No significant association was observed between goiter and weight-for-age ($p>0.05$).

Table 11:
Goitre and Height-for-Age (Stunting)

Index	Goiter Grade			
	Grade 0	Grade 1	Grade 2	Total
Normal	47.3%	30.3%	0.6%	78.3%
Mild to moderate	10.9%	7.2%	0.6%	18.8%
Severe	1.5%	1.1%	0.4%	3.0%
Total	59.7%	38.6%	1.7%	100%

($p<0.05$)

DISCUSSION

The results from this study showed that 189(40.12%) had goiter, (23.7%) from males and (16.6%) females. This high goiter rate among the primary school children agrees with the WHO declaration in 2004, that iodine deficiency was still a public health problem in most countries.

No gender differences was observed for goiter prevalence ($p>0.05$) in this study. This however is not consistent with findings from many studies, which had reported gender difference in iodine nutrition (Sinha et al 1999, ACC/SCN 2001 and Medda et al 2005). In a study to investigate the prevalence of goiter among school children in Iran (Bazrafshan et al 2005), more girls, were reported to have had a higher risk for developing goiter. Furthermore, Medda et al (2005) found gender to be a significant risk factor for developing congenital hypothyroidism. It is not clear whether this difference is linked to the socio-cultural attitude to the girl-child in these populations. There is no reported bias to the girl child in Ibadan, Nigeria where this study was conducted.

The study revealed a statistically-significant relationship between goiter and stunting ($p<0.05$), the most prevalent form of PEM as shown by the results. Evidences from studies support that PEM could be an etiological factor (among others) for iodine deficiency disorders (Gaitan et al 1983, Brahmhatt et al 2001). The high prevalence of PEM as revealed in the study (21.7% stunting, 15.1% underweight) is in line with findings that PEM is still very much an important problem (Anwer et al 2003, Chowdhury et al 2008) in the developing countries of the world.

While some studies have reported gender differences in the prevalence of PEM, others are of contrary opinion based on their specific studies. In some studies, it has been suggested that female gender is a risk factor for malnutrition (Chowdhury et al 2008, Anwer et al 2003) while in another study to assess the prevalence of malnutrition in Saudi Arabia, Al-Hasliem (2008) reported that boys had a higher risk of being underweight and wasted. No statistically significant gender differences were found in these studies just as no gender differences in nutritional status was observed in this study.

Conclusion

Having recorded 40.2% goiter rate, 21.7% stunting and 15.1% underweight, among the school children, it was concluded that iodine deficiency and Protein-energy malnutrition are still of public health importance. The significant relationship between goiter and stunting (21.7%) could suggest that iodine deficiency may be precipitated in the presence of PEM. Since there were no gender differences in the study and no consistent gender difference recorded by other studies, it therefore means that gender differences does not necessarily characterise nutritional status and where they do, it could be as a result of socio-cultural factors in populations where gender inequality exists. The effect of IDD and PEM on learning ability and school retention underlines the importance of periodic monitoring of iodine nutriture of school children and the adequacy of dietary intake to reduce protein energy malnutrition.

REFERENCES

ACC/SCN (1992) Second Report on the World Nutrition Situation Volume 1: Global and Regional Results.

Al-Hashem FM (2008) Prevalence of malnutrition among high and low altitude preschool children of southern Saudi Arabia. Saudi Journal of Medicine 29(1):116-21

Anwer I, Awan JA (2003) Nutritional status comparison of rural with urban school children in Faisalabad District, Pakistan. Rural Remote Health 3(1):130

Amigo H, Erazo M and Bustos P (2000) Heights of childean parents and their children from different ethnicity and social status. Salud Publica Mexico 42:504-510.

Brahmbhatt SR, Brahmbhatt RM, Boyages SC (2001). Impact of Protein-Energy Malnutrition on thyroid size in iodine deficient population of Gujarat (India).

Bazrafshan HR, Mohammadian S, Ordookhani A, Farhidmehr F, Hedayati M, Abdolahi N, Azizi F, Braveman LE and EN Pearce (2005) prevalence of goiter among school children from Gorgan, Iran, A decade after national iodine supplementation: association with age, gender and thyroeroxidase antibiotics. Journal Endocrinol invest 28(8) 727-33.

Chowdhury SD, Chakraborty T, Ghosh T (2008) Prevalence of under nutrition in santal children of Punihija district, west Bengal. Indian Journal of Paediatrics 45 (1): 43-46.

Egbuta J, Onyezili F, Vanormelimgen K (2003) Impact of evaluation of efforts to eliminate iodine deficiency disorders in Nigeria. Public Health Nutrition 2003. 6(2) 143-73.

FAO (2003) State of food insecurity in the world 2003: Monitoring process towards the World Food Summit and Millennium Development Goals. Food

and Agriculture Organization of the United Nations, Rome.

Gaitan JB, LG Mayoral and E Gaitan (1983) Defective thyroidal iodine concentration in PEM. Journal of Clinical Endocrinol Metab. 57: 527-333

Gur E, Erca O, Can C (2003) Prevalence and risk factors of iodine deficiency among school children. Tropical Journal of Paediatrics (2003) 49(3):168-71.

Kimhi A (2004) Gender differences in health and nutrition in southern Ethiopia. The departments of agricultural economics and management, Hebrew University, Israel.

Kishor S, Neitzel K (1996) The status of women: indicator for twenty-five countries, Macro international, Calverton 1-113.

Medda E, Olivieri A, Stazi MA, Grandolfo ME, Fazzini C. Baserga M et al (2005) Risk factors for congenital hypothyroidism: results of population case control study (1997-2003). European Journal of Endocrinol 153(6): 765-73

NAFDAC (2003) Achieving and sustaining universal salt iodization: Doing it well through regulation and enforcement. Lessons learned from USI in Nigeria.

Ojule A.C, Abbiyesuku F.M, Osotimehin B.O (1998) Endemic goiter prevalence in Ifedapo Local Government Area of Oyo state. Afr. J Medical Sciences 27(1-2); 77-80

Oniang'O R and Edith Mukuledi (2002) "Nutrition and Gender" in Nutrition: A foundation for Development, Geneva ACC/SCN 2002

Osmani S, Sen A (2003) The hidden penalties of Gender inequality: Fetal origin of health. Economics and human biology 1: 105-121

Raheela M, Mohammed A, Paola A, Peter Underwood (2002) Nutritional status of school aged children in an urban squatter settlement in Pakistan. Pakistan Journal of Nutrition 1(3); 121-12

SCN (2002) School Age Children, Their health and nutrition. A periodic review of developments in international nutrition. Geneva ACC/SCN 2002.

SCN (2004) Nutrition to improve development outcomes. 5th report on the World Nutrition situation. UN standing committee on Nutrition, Geneva

Sinha RK (1999) Body iodine status in school children and availability of iodized salt in Calcutta. Indian Journal of Public Health 43:42-48

UNICEF (2003) The State of the World's Children. United Nations Children's Fund, New York.

UN/SCN (1993) Second report on the world nutrition situation, Volume 11; Country trends methods and statistics (UNSSCN, 1993, 142p.): 1

UN/SCN (2000) Assessment of nutritional status in emergency –affected population of adolescents. UN system/subcommittee on nutrition page 24