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The Prevalence of Goitre and The Corresponding Iodine Urine Status in Al Haj Yousif Area -Khartoum Bahri- Sudan, 2006

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Abstract

Introduction: In Sudan iodine deficiency disorders (IDD) . is a major public health problem and the current situation is alarming for all parts of the country where nationwide surveys and pilot studies have been conducted. The rates for goitre prevalence call for immediate intervention.

Objectives: The major objective of this study is to assess the iodine deficiency situation in Al Haj Yousif area-Alkhartoum Bahri – Sudan. The study was designed to have a precise epidemiological information of iodine deficiency disorders (IDD). Indicators include goiter prevalence and urinary iodine excretion.

Method: A cross sectional community – based field study was conducted during June, July 2007, in five zones of Al Haj Yousif area using a multistage random sampling technique. The sample population was selected by house to house visits. One hundred households (average members per house of 7+2) were selected, covering 300 children (age 6–12 years) as subjects for goitre examination, and a sub-sample of 50 children (16.7%) were chosen at random for urinary iodine level assessment.

Results: The result of goitre examination revealed that the prevalence rate of goitre was (23.3%).It was significantly higher in females (26.7%) than males (20.13%).

Overall median urinary iodine (UI) was 5.0 µg/dl. For non-goitrous children it was 6.4 µg/dl and 2.35 µg/dl for grade 1 and grade 2 goitres respectively.

Conclusion: The study findings suggest that significant efforts are needed towards achieving the goal of raising the IDD awareness as well IDD elimination. This includes distribution of iodine capsules as a short term strategy and iodized salt as a long term strategy .

الملخص:

مقدمة: في السودان مشكلة نقصان اليود مشكلة اجتماعية كبيرة والوضع الحالى محزن في كل اجزاء الوطن ولهذا اقيمت دراسات ومسوحات في هذا الشأن حيث وجد أن الوضع يحتاج لتدخل سريع لتحسين الوضع.

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الأهداف: تقويم وضع عوز اليود في منطقة الحاج يوسف – الخرطوم بحري السودان. صمم البحث للحصول علي معلومات دقيقة عن تفشي إضرار عوز اليود. اشتملت المؤشرات علي الكشف علي تضخم الغدة الدرقية وتحديد نسبة الإنتشار وفحص البول لليود.

الطريقة: أجريت دراسة تقاطعية للمجتمع في شهري يونيو ويوليو 2007م في خمس مناطق من الحاج يوسف. استخدمت عينة عشوائية متعددة المراحل واختير مجتمع العينة بالزيارات المنزلية اختيرت100أسرة للعينة (متوسط عدد الأسرة 7 + 2) ومنها اختير عشوائياً 300 طفل في المدى العمري (6 – 12 سنة) ،وعينة أخري شملت 50 طفلا (16.7%) من العينة الرئيسية لفحص اليود في البول.

النتائج: فحوصات تضخم الغدة الدرقية كشفت عن أن معدل الانتشار هو(23.3%) كان أعلى عند الإناث (26.71%) من الذكور (20.13%). المتوسط الحسابي لنسبة اليود في البول لكل أطفال العينة هو 5 ميكروغرام/دسل، والمتوسط الحسابي لنسبة اليود في البول للأطفال الذين ليس لديهم تضخم في الغدة هو 6.4% ميكروغرام/دسل ، أما متوسط اليود في البول لدرجة تضخم الغدة الدرقية 1 و تضخم الغدة الدرقية 2 فهو 3.8 ميكروغرام/دسل و 2.35 ميكروغرام/دسل علي التوالي.

خاتمة و توصيات: النتائج الرئيسية لهذا البحث تؤيد وتدعم أن اضطرابات عوز اليود هي مشكلة صحية عامة في الأطفال من عمر6 – 12 سنة في المنطقة. وانه من المهم والضروري وضع برنامج لتحسين وضع اليود في المنطقة ، وذلك بطرح إستراتيجية قصيرة المدي كتوزيع كبسولات اليود ، وتوفير الملح المزود باليود كإستراتيجية طويلة الأمد ورفع وعي الجمهور عن المشكلة.

Introduction:

Considering the problem in focus, Iodine Deficiency Disorder, the president of the micronutrient initiative Venkatesh Mannar in Geneva in 11 May 2006 stated that: " There are six countries representing about half of the world's burden today, these countries are: India, Pakistan, Sudan, Senegal and Haiti ".[(1)]

Until recently iodine deficiency was equated with goitre. In recent years, it has become increasingly clear that iodine deficiency leads to a much wider spectrum of disorders commencing with the intrauterine life and extending throughout childhood to adult life with serious health and social implications.

Unfortunately, (IDD) exist in their most severe forms in places which are most difficult to reach with preventive programs.[(2)]

Method:

This study is a cross-sectional community based undertaking aiming at determining the prevalence of IDD and the corresponding urine iodine secretion in children of Al Haj Yousif area, Khartoum Bahri, Sudan, during June-July 2007. The study area population, is a mixture of different ethnicities (the host community. In addition to thousands of internally displaced population. The population is estimated at >720000 (local committees 2007) inhibitory 9 zones.

After an ethical approval a multistage random sampling was used to select 5 zones (namely: Dar Al salam, Alwihda, Al Emtidad, Al Barakah and Al Takamol) and 300 children aged 6 – 12 years for goitre examination and 50 others (one from every other household) to constitute the sub sample.

For prevalence and severity classification, the following WHO and International Council for the Control of Iodine Deficiency Disorders (ICCIDD1998) [(3)] indicators were adopted: goitre grade > 0, thyroid volume > 97th. percentile by ultrasound (b), median urinary iodine level (µg/dl) and TSH >5 mU/L whole blood. The method used for determining urinary iodine secretion was an adaptation of the Pino *et*

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al.1996 method, combining the ammonium persulfate digestion technique with a manual spectrophotometric reading as out lined by Dunn *et al* , 1997.[4]

Results:

The total sample size of children aged 6 – 12 years was 300. They were studied for age, sex and geographical zone. Males formed 51.3% and females 48.7% of the sample size, with a male to female ratio of 1.05 to 1.

Table (1) below illustrates the prevalence of goitre among the sample subjects .It is clear that the highest prevalence was in Dar Al Salam (39.13%) and the lowest was in Altakamol (13.56%). Goitre was always more prevalent in females than in males, except in Alemtidad zone .The total goitre rate was 23.3% , being 20.13% among males and 26.71% among females. Females constitute 55.7% of the prevalence rate, while males were 44.29%

The difference in goitre prevalence per zone was statistically significant $p< 0.05$.

Table(1): prevalence of goitre among Al Haj yousif children according to zones and sex : n = 300

Zones	Male	Female	Total No. of goitrous cases %
	No. cases %	No. Cases %	
Dar Alsalam	13 36.11 n =36	14 42.2 n = 33	27 39.13 n = 69
Alwihda	6 16.22 n = 37	10 24.39 n = 41	15 20.5 n = 78
Alemitidad	5 31.3 n = 16	3 250 n = 12	7 28.3 n = 28
Albarakah	4 12.5 n = 32	6 2.6 n = 34	11 16.7 n = 66
Altakamol	3 9.09 n = 33	5 19.2 n = 26	7 13.7 n = 59
total	31 20.13 n = 154	39 26.1 n = 146	70 2.3 n = 300

Again, in reference to the study, the highest prevalence of goitre (grade 1 & 2) was in Dar Al Salam 39.13% while the lowest was in Altakamol 13.56%. Difference in goitre grades in different zones was quite significant .

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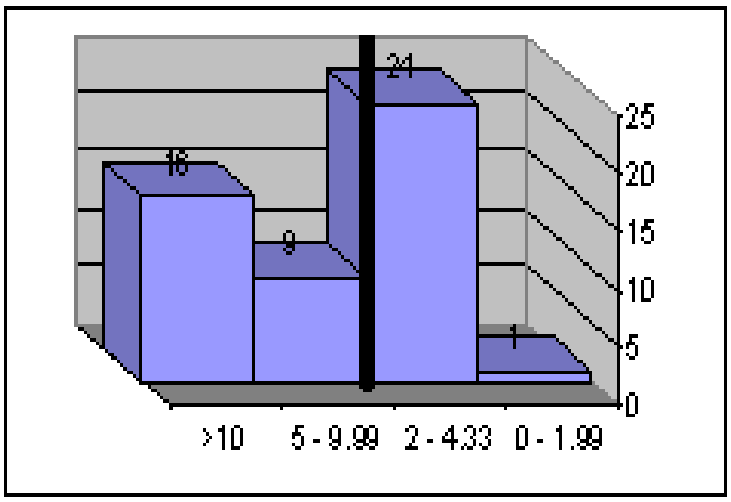
Table (2): goitre grades and the corresponding urinary iodine µg /dl

Urinary Iodine µg /dl					
Goitre grade	< 2	2 – 4.99	5 - 10	> 10	Total
0	0	13	6	16	35
1	0	10	3	0	13
2	1	1	0	0	2
Total	1	24	9	16	50
Percentage	2%	48%	18%	32%	100%

Table 2 illustrates the distribution of cases according to goitre grade and urinary iodine in the sub sample examined. From the table there is only one case grade < 2 was observed. 19 cases of median UI <10 µg /dl observed in grade 0 out of 35 candidates , 13 cases in grade 1 <10 µg /dl out of 13, 2 cases in grade 2, one case < 2 µg /dl and the other one < 5 µg /dl.



Figure(1): Distribution of urinary iodine values in Al Haj Yousif children.

The dark line represents the *cut–off* value of 10 µg /dl, which has been recommended as the value to determine the adequacy of iodine nutrition in a population. The range of urinary iodine excretion values were 1.9 – 12.0 µg /dl . 50 % of the values were < 5 µg /dl and 68 % were <10 µg /dl.

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Table(3): Distribution of children, age (6 – 12 years) by goitre grade, sex and mean urinary iodine excretion.

Grade	Sex		Total	P. value
	Male	Female		
0	7.5 ± 3.5 n = 18	7.8 ± 3.3 n = 17	7.6 ± 3.3 n = 35	0.08
1	4.5 ± 1.2 n = 7	3.7 ± 0.6 n=6	4.1 ± 1.01 n = 13	0.9
total	6.73 ± 3.3 n = 25	6.65 ± 3.5 n = 23	6.7 ± 3.3 n = 48	0.08g

Table (3) shows the distribution of children studied according to goitre grade , sex and mean urinary iodine excretion in µg /dl. From the table , it is evident that urinary iodine values decrease with the increase in goitre size (7.6 ± 3.3, 4.1± 1.01 and 2.35 ± 0.6 for grade 0, grade 1 and grade 2 respectively). It is also clear that males excreted more iodine in their urine than the females.

Discussion:

The study revealed that the prevalence of goitre in the study area was 23.3%, IDD affected both sexes; however, the prevalence was higher in females (26.71%) than (20.13%) in males. It is apparent that IDD is a public health problem of moderate severity in the study area. This rate was higher than that cited by Eltom *et al* which was 17.5% in Khartoum state[2]. This difference could be attributed to the random migration of people from the Western region under stressed humanitarian situation as a result of Darfur conflict where iodine deficiency rate is known to be high.[(5)]

According to our study, the highest prevalence rate recorded was in Dar Al Salam, while the lowest was in Altakamol (39.13% and 13.56% respectively).There is a highly significant difference between areas in goitre prevalence ($p<0.05$).This significant difference in such a small geographical area may indicate the implication of other cofactors. This is substantiated by lower rates of iodine excretion in Dar AlSalam zone children, probably due to poverty, low hygiene, iron deficiency, higher consumption of goitregens and the high numbers of displaced people.

Considering goitre prevalence by grade; 22.66% of cases had grade 1 goitre, 54.41% of them were females. Only two cases in Dar Al Salam and Alwihda had grade 2 goitre (0.67%), both were females.

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The classification method of goitre grades used in this study was based on the modified plan proposed by WHO, UNICEF and ICCIDD in 1993 which combined grades 1A 1B together, and grades 2 and 3 into a second grade.[6]

Despite the large variation world- wide in daily iodine excretion, assessment of iodine concentration in casual urine samples remains a valuable method for evaluating iodine status.[7] The volume required for most analysis methods is small (1 ml), the iodine content remains stable and the samples do not require refrigeration.[8]

In this study a sub sample of 50 children (16.7%) were chosen for urinary iodine tests. The median urinary iodine concentrations was 5.0 µg/dl. For non– goitrous children it was 6. 4 µg/dl and 3. 8 µg/dl and 2.35 µg/dl for grade 1 and 2 goitrous children respectively. Severe, moderate and mild iodine deficiency is present when the concentration of iodine in urine is less than 2.0µg/dl, 2-5µg/dl and 5 – 10 µg/dl respectively [9]. Therefore it is apparent that iodine deficiency is of moderate to severe in grade 1 and 2 goitres and is of mild to moderate in non – goitrous cases that means iodine excretion is inversely related to the non – goitrous.

In the present study the total goiter rate (TGR) was 23.3%, and the overall median urinary iodine was (5.0µg/dl). This result is in intermediate range compared with the last survey which was done in 1997 by the National Nutrition Department where the TGR was 22% and the median urinary iodine analysis from the sub- samples showed that the problem was severe in Western zone with a level of 1.99 µg/dl.[5]

Considering sex differences, Darfur females were found to suffer severe iodine deficiency with a median of 1.05 µg/dl, while males were suffering moderate iodine deficiency (median 3.28 µg/dl)[5]. In the Eastern zone, the situation was reversed females median of 10.44 µg/dl was apparently suffering no problem and were better than the males with a median of 9.16 µg/dl.[10]

The findings of the present study revealed a significant difference between males and females goitre grades ratio which was 1:1.33. This is consistent with the studies we have mentioned referring to the high TGR. Indicated by this study, and other studies, could be due to the fact that goitre has never been considered as a major priority health problem. This may be due to the fact that it is painless, not life-threatening and that it affects the majority of people in the areas of origin (Western regions).

Conclusion:

The most seriously affected populations in the study area were those displaced from their origins where the level of social and economic development is very low (the high prevalence was in Dar Al Salaam-displaced population).

Gotire in children age 6 – 12 years (23.3% prevalence) is of moderate severity in Al Haj Yousif which indicates the IDDs are a public health problem in the area. The prevalence was significantly higher in females than males 1:1.33. Grade 1 was the most prevalent form of thyroid enlargement (22.66%) .The median urinary iodine was 5.0µg/dl. For non-goitrous children it was 6.4 µg/dl and 3.8 µg/dl in grade 1 and 2 goitre respectively .

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Recommendations:

1. Preventive, curative and rehabilitative care should be directed towards the affected areas
2. More care should be given specially to females and displaced people.
3. Health education, health promotion and community involvement are strongly recommended to overcome the problem

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