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BIOCHEMICAL AND CLINICAL ASSESSMENT OF THYROID STATUS IN PATIENTS WITH THYROID DISORDERS REFERRED TO EL-OBIED REGIONAL HEALTH LABORATORY

Majdolin Mohammed Eltayeb, MSc. ** Omer Hassan Daoud, MD. *** Ahmed Abdalla Ajabeldour, MD. * Khalid Eltahir Khalid, PhD. **** Khalid Eltom Ali, PhD**

Address:
*Department of Biochemistry, Faculty of Medicine, Kordofan University, Sudan
** Department of Paediatrics, Faculty of Medicine, Kordofan University, Sudan.
***Department Pathology, Faculty of Medicine, Kordofan University, Sudan.
****Department of Biochemistry and Nutrition, Faculty of Medicine, University of Gezira, Sudan.

Correspondence:
Khalid Eltahir Khalid Kheiralla,
Department of Biochemistry and Nutrition, Faculty of Medicine, University of Gezira
P.O.Box: 20, Wad Medani-Sudan
E.mail: khatahir12@gmail.com

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Abstract:

Objective of this study: This study aimed at assessing the thyroid status in Kordofan region (western Sudan) where the prevalence of goitre was not clearly defined.

Material and Methods: A cross-sectional, prospective study was conducted in Elobied regional health laboratory on 150 thyroid patients (136 female, 14 male) referred during the period between May-November 2003, their ages ranged between 6 to 65 years. A matching control group of 50 subjects (39 female, 11 male) without symptoms or signs of thyroid disease, were included for comparison. After clinical evaluation and data collection through a questionnaire, serum concentrations of TSH, total triiodothyronine (TT3), and total thyroxine (TT4) were measured by radioimmunoassay.

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Results: The frequency of thyroid disorders was higher in females (90.7%) than in males (9.3%), among the age group between 25-34 years. The percentage of patients with euthyroid was significantly higher (62%) compared with 28.3% of hyper and 9.3% of hypothyroidism. 69.3% of the thyroid patients had stage II goitre. TT4, TT3 and TSH showed significant differences ($P<0.001$) in hyper and hypothyroidism compared with the euthyroid patients and the control group. Serum TT_4 values correlated negatively with TSH ($r = 0.272$, $P = 0.001$), and positively with TT_3 ($r = 0.693$, $P = 0.000$).

Conclusion: The prevalence of thyroid diseases was found higher in this area, with strong association with the food intake and genetic background, a problem needing to be considered seriously.

Introduction:

More than one billion persons are at risk of iodine deficiency worldwide and 200 millions have goitre (Elnour *et al.*, 2000). In Africa, goitre is endemic in many countries, notably, Congo, Uganda, Kenya, and Sudan; the prevalence of goitre is as high as 81% in some parts of these countries (Ekpechi, 1987). Although iodine deficiency is the main factor in the aetiology of endemic goitre (Ermans *et al.*, 1969), the additional role of goitrogens has been shown or suspected in areas such as Congo (Bourdoux *et al.*, 1978), and Sudan (Osman and Fatah, 1981; Elmahdi *et al.*, 1983), in which goitre is endemic. In Sudan, endemic goitre and iodine deficiency disorders are serious health problems in many areas. The prevalence of goitre among school children was estimated to be 85% in Darfur region in western Sudan, 74% in Kosti area in the centre of Sudan, 13.5% in Port-Sudan in eastern Sudan, and 17% in the capital, Khartoum (Eltom, 1984), 22.3% in southern Blue Nile area of Sudan (Elnour *et al.*, 2000), and 43.3 % in the White Nile area of Sudan (Dawelbiet, 2001). Thyroid hormones in relation to iodine status had been studied in a group of Sudanese pregnant women with goitre in Central Sudan (Eltom et al., 1999). Little is known about the prevalence of thyroid status and goitre in Kordofan region in western Sudan.

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Materials and Methods:

A cross-sectional, prospective study was conducted at Elobeid Regional Health Laboratory in Kordofan State, Western Sudan. 150 (136 females, 14 males) thyroid patients (Age between 6-65 years) were referred during the period between May-November 2003. Patients using thyroid drugs or other drugs affecting thyroid function were excluded in this study. 50 (39 females, 11 males) sex and age matched normal subjects were used as control group. A questionnaire was designed to include data information for all participants. The clinical evaluation was assessed by a trained physician; goitre was diagnosed and graded according to World Health Organization criteria (Delange *et al.*, 1986). After written consent, 5 mls heparinised blood was collected by venepuncture in a plain tube from each individual of study population. The blood was allowed to coagulate at room temperature for 30 minutes. Serum was separated by centrifugation at 1800 rpm for 5 minutes and stored in -20 C^{o} until analysis. Serum total thyroxine (TT_4) and Total triiodothyronine (TT_3) were analyzed by radioimmunoassay (RIA) methods as previously described (Gowenlock *et al.*, 1988). Serum thyroid stimulating hormone TSH was analysed by immunoradiometric assay (IRMA) kit purchased from Sudan Atomic Energy Commission 2004. Analysis of variance (ONE WAY ANOVA) was applied for comparison between different parameters, P. value less than 0.05 was considered significant. The study was approved by the Institutional Medical Ethics Review Board of the University of Gezira.

Results:

150 thyroid patients and 50 normal subjects were included in this study. The clinical data is shown in Table I. The overall prevalence of goitre was 94% (n=141), 69.3% (n=104) of the goitrous group had a large size goitre (stage II), while 20.7 % (n=31) and 4% (n= 6) had stage I and stage III respectively. 77.4% of euthyroidism have stage II goitre compared with hyper (58.1%) and hypothyroidism (50%). The frequency of thyroid disorder was common in the age group between 25-34 years, and higher in females 90.7% (n=136) than

in males 9.3% (n=14). The common diet taken in the rural and urban area was the millet and wheat respectively (Table II).

In comparison with the control and reference value, the percentage of patients with euthyroid was significantly higher (62%) compared with 28.3% of hyper and 9.3% of hypothyroidism (Figure 1). Serum total T_4, total T_3 and TSH concentrations were significantly different ($P<0.001$) in hyper and hypothyroidism compared with the euthyroid and control group (Table III). Serum total T_4 values correlated negatively with TSH ($r = 0.272$, $P = 0.001$), and positively with T_3 ($r = 0.693$, $P = 0.000$).

65.3% of the thyroid patients had family history of thyroid disease. 68% of the subjects didn't use the iodized salt.

Discussion:

In Sudan the prevalence of goitre was high in adults, pregnant women, and children (Eltom *et al.*, 1985; Eltom *et al.*, 1984; Abdel-Wahab *et al.*, 1984; Osman *et al.*, 1983), and in newborns (Elnagar *et al.*, 1997). Iodine deficiency in Kordofan State in Central Sudan was also reported (Elnagar *et al.*, 1997). FSH, LH, and hCG had been reported to have a thyrotropic action and they suppress TSH level (Goodwin *et al.*, 1992; Yoshimura and Hershman, 1995; Dwalbiet, 2001). This notion may explain our finding of high frequency of goitre in females than in males, which is comparable with the study done by Dawelbiet in 2001. In the present study, 69.3% of the goitrous group had stage II goitre, the same higher percentage was found in Darfur state in Western Sudan (Kambal, 1969; Eltom *et al.*, 1984), while stage III was observed in central Sudan (Dawelbiet, 2001). In the villages, the staple diet comprised of only millet, however, in towns it was a combination of durra and wheat (Osman and Fatah, 1981). This may explain the high frequency of goitre in rural areas than in the urban (Eltom *et al.*, 1984). Epidemiological evidence suggests that the millet play a role in the aetiology of endemic goitre (Elnour *et al.*, 1998). Interestingly, most of our study subjects were from rural areas (68%), and they didn't take iodized salt that was recommended by the WHO in 1993. This notion may explain the higher percentage of goitre

in all the euthyroids and 71.4% of the hypothyroids. In this study, 28.7% of the thyroid patients were hyperthyroid, most likely due to the presence of some genetic or other factors that contribute to the prevalence of hyperthyroidism in this area, a notion supported by the high frequency of family related disease status. A negative correlation was found between total T4 and TSH, this result agrees with Dawelbiet study in 2001. Despite the small sample size in this study which may not completely reflect the situation in this area, these results highlight the situation of the biochemical and clinical status of goitre. However, further studies are needed to support our findings and to assess the iodine status in western Sudan and the factors that contribute to the prevalence of thyroid problems.

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