

Thyroid Function Profile in Geriatrics Living in a Semi-Urban Community in Nigeria.

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ABSTRACT: The purpose of this study is to determine the thyroid function profile amongst apparently healthy geriatrics in a semi-urban community in Nigeria. In this study, blood samples were collected from 200 elderly persons (120 males and 80 females) and 260 young adults (11 males and 15 females) served as control. Serum thyroxine (T4), triiodothyronine (T3) and thyroid stimulating hormone (TSH) levels were estimated using microwell ELISA technique. Result showed no significant difference in serum T3, T4 and TSH levels when compared with control ($p > 0.05$). Mean serum T3, T4 and TSH levels in the geriatric population was ($11 \pm 0.09 \text{ ng/ml}$; $8.27 \pm 3.31 \mu\text{g/ml}$ and $0.75 \pm 0.70 \text{ uIU/ml}$ respectively). There was however no statistically significant difference in thyroid function profile between male and female geriatric ($p > 0.05$). Conclusively, apparently healthy geriatric population in the semi-urban community under survey have adequate iodine intake. Additionally gender difference has no significant influence on thyroid profile in geriatrics.

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INTRODUCTION

The thyroid gland secretes two thyroid hormones; which are thyroxine (3, 5, 3^1 , 5^1 -L-tetraiodothyronine) and triiodothyronine (3,5, 3^1 -L-triiodothyronine), commonly referred to as T4 and T3 respectively. In addition the thyroid gland secretes small amount of biologically inactive 3^1 , 3^1 , 5^1 -L-triiodothyronine reverse T3 and minute quantities of monoiodotyrosine (MIT) and diiodotyrosine (DIT) which are precursors of T3 and T4. Thyroxine is synthesized by the follicular cells from free tyrosine on the tyrosine residues of protein called thyroglobulin (TG). Iodine is captured via the iodine trap by the hydrogen peroxide generated by the enzyme thyroid peroxidase (Ekholm and Bjarkham, 1997) and linked to the 3^1 and 5^1 sites of the benzene ring of the tyrosine residue on TG and on free tyrosine. These reactions are all stimulated by TSH of the pituitary. Usually a much greater amount of T4 than T3 is synthesized although in iodine deficiency, the T3 to T4 rate in the gland increases (Nsirim, 1999). Total T3 concentration also vary with alterations in binding proteins, although usually to a lesser degree than T4 concentration in circumstances where thyroid hormone binding protein concentration are increased or decreased (Wheeler and Lazarus, 1994). In thyroid disorders such as hypothyroidism pharmacological basis of treatment will involve the use of hormone replacement of the deficient thyroid hormones; hence there is need for close laboratory monitoring because hormone

replacement may prompt an increase in metabolic rate and the demand for oxygen which may precipitate angina or myocardial infarction (Larsen and Davies, 2003). In situations where impaired synthesis of thyroxine occurs such as in chronic illness or malnutrition, there is a fall in serum T4 with a compensatory increase in T3 which eventually leads to hyperplasia of the thyroid tissue at the expense of the development of goiter (Pike et al., 2000). Considering the numerous thyroid abnormalities observed in the elderly, there is need to determine whether there is an age dependent decline of thyroid function which is independent of associated non thyroidal illness as well as determine the appropriate treatment modality to be instituted in the elderly.

MATERIALS AND METHODS

Study Area

This study was conducted in Ekpoma, a semi-urban community in Edo State Nigeria. This community lies between longitude $05^{\circ} 04^{\circ}\text{E}$ and latitude $05^{\circ} 04^{\circ}\text{N}$ and $05^{\circ} 43^{\circ}\text{N}$ (CSSR, 2007) with an estimated population of over 67,000 inhabitants (NPC, 2007).

Study Subjects

A total of 460 apparently healthy subjects were recruited for this study after obtaining ethical permission from the ethical review board of the Edo State Ministry of Health and appropriate informed

consent from the subjects. The recruited participants were appropriately age and sex matched and was grouped into test (65-90years) and control group (apparently healthy younger age group between (20-25 years)).

Sample Collection/Analysis

Blood samples were collected by venepuncture into lithium heparin bottle. The samples were spun in a bucket centrifuge at a speed of 2500rpm to separate serum from red cells. The serum obtained was stored in a chest freezer at a temperature of -20°C . Serum T3, T4 and TSH were determined by ELISA technique as described (Walker, 1977; Burger and Palet, 1977; Ochei and Kolhatka, 2008).

Data Analysis

Data obtained was analyzed using SPSS version 17 statistical software package. Results were expressed as mean \pm SD and a p value of <0.05 was considered significant.

RESULTS

A total of 460 serum samples were analyzed from 460 apparently healthy individuals. Table 1, revealed a higher mean T3, T4 and TSH levels ($1.11\pm 0.90\text{ng/ml}$, $8.27\pm 3.31\text{ng/ml}$ and $0.75\pm 0.70\text{uIU/ml}$ respectively) in the apparently healthy subjects when compared with control ($0.99\pm 0.77\text{ng/ml}$, $7.88\pm 2.93\text{ug/dl}$ and $0.66\pm 0.43\text{uIU/ml}$ respectively). However, this was not statistically significant ($P>0.05$). In apparently healthy geriatrics, the mean serum T3, T4 and TSH levels was more elevated in apparently healthy geriatric (see Table 2) when compared with younger male control ($P>0.05$). Among apparently healthy female geriatrics the mean serum T3, T4 and TSH (0.67 ± 0.23 , levels were more elevated in the younger apparently healthy female control, although not statistically significant ($P>0.05$).

Table 1: T3 and T4 Profile in Geriatrics

Parameters	Geriatrics, N= 200	Control, N = 260
T3 (ng/ml)	1.11 ± 0.90	0.99 ± 0.77
T4 (ug/dl)	8.27 ± 3.31	7.88 ± 2.93
TSH (uIU/ml)	0.75 ± 0.70	0.66 ± 0.43

Values are expressed as mean \pm SD, $P<0.05$ was considered significant when compared with control

Table 2: Serum T3 and T4 Profile in Geriatric Males

Parameters	Geriatric Male, N = 120	Control, N = 110
T3 (ng/ml)	1.41 ± 1.06	0.95 ± 0.58
T4 (ug/dl)	9.04 ± 3.77	7.51 ± 3.55
TSH (uIU/ml)	0.75 ± 0.78	0.70 ± 0.45

Values are expressed as mean \pm SD, $P<0.05$ was considered significant when compared with control

Table 3: Serum T3 and T4 Profile in Males and Female Geriatrics

Parameters	Male Geriatric, N=120	Female Geriatric, N= 80
T3 (ng/ml)	1.41 ± 1.06	0.67 ± 0.23
T4 (ug/dl)	9.04 ± 3.77	7.11 ± 2.21
TSH (uIU/ml)	0.75 ± 0.78	0.74 ± 0.61

Values are expressed as mean \pm SD, $P<0.05$ was considered significant when compared with control

Table 4: Serum T3 and T4 Profile in Geriatric Females

Parameters	Geriatric Females, N= 80	Control, N= 150
T3 (ng/ml)	0.67 ± 0.23	1.01 ± 0.90
T4 (ug/dl)	7.11 ± 2.21	8.15 ± 2.47
TSH (uIU/ml)	0.74 ± 0.61	0.63 ± 0.42

Values are expressed as mean \pm SD, $P<0.05$ was considered significant when compared with control

DISCUSSION

Several studies have been done by different individuals or group of scientist to ascertain the thyroid hormone profile in elderly persons. Among these, is the study of Muhammad et al., (2007) who concluded that there was an increase in the level of TSH and a decrease in the level of T3 and T4 with ageing. This finding disagrees

with the findings of our study which did not show any significant variation in thyroid hormone profile with advancing age. However, Geriatrics showed a higher T3 and TSH level when compared with apparently healthy younger control. There was a general consensus in the findings of Mariotti et al., 1995, who revealed that serum TSH was lower in Geriatrics when compared to the younger population. However, the higher T3 and T4 levels in geriatrics as shown in our study may be associated with the extreme stress the elderly encounter in the environment under survey. The study by Sheila and John, (1999) corroborates the findings of our study. Their study revealed an elevated level of T3, T4 and TSH in the serum of elderly persons when compared with younger persons. In the community under survey the geriatric populations are engaged in activities such as farming (unmechanised) and other forms of hard labour in addition to anxiety and extreme emotional stress. This may have accounted for the higher serum thyroid profile observed in this environment.

CONCLUSION

From our study it can be concluded that there is relative stability in the thyroid profile with ageing. The higher serum T3 and TSH levels observed in geriatrics, though insignificant may be associated with increased laborious activity and extreme level of stress in this environment.

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