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Assessment of Anthropometric Profile of Epileptic Adult Population of Tirupati Region

KEYWORDS: Epilepsy, waist circumference, waist-hip ratio, non-epileptic and BMI.

V. Swapna
Research Scholar, Department of Women Studies, Sri Padmavathi Mahila Viswavidyalayam, Tirupati, A.P. India.

K.A. Parvathy
Professor, Department of Women Studies, Sri Padmavathi Mahila Viswavidyalayam, Tirupati, A.P. India.

C.V. Harinarayan
Professor, Department of Endocrinology & Metabolism, Sri Venkateswara Institute of Medical Sciences, Tirupati, A.P. India.

R. K. Anuradha
Associate Professor, Department of Home Science, Sri Venkateswara University, Tirupati, A.P. India.

Deepika Anand
Academic Consultant, Department of Home Science, Sri Venkateswara University, Tirupati, A.P. India.

ABSTRACT *Epilepsy is a chronic neurological disorder which is widely recognised but poorly understood by people. Bone mass loss and obesity are the two major risk factors of epilepsy in adults. Moreover, use of certain antiepileptic drugs for longperiods of time results in loss of bone mass, change in cognitive function, vitamin D deficiency, calcium deficiency, loss of appetite, and also interfere in nutrient absorption. The aim of the present study was to assess the nutritional status of adults utilizing anthropometric measurementsfor growth and body composition in epileptic and non-epileptic subjects. The study showed that female subjects >50 years of age of the present study had a higher risk of comorbidities as shown by their tendency to overweight, cardiovascular disorders, and elevated abdominal obesity due to slightly higher BMI, waist circumference and waist-hip ratio in comparison males.*

Introduction
Epilepsy is a chronic neurological disorder which is widely recognised but poorly understood by people. Lack of understanding about the abnormal activity of brain is a leading cause of discrimination in the work place and in schools. There are different conditions that affect the individual brain and results in epilepsy. Stroke, head trauma, complications during childbirth, infections and certain genetic disorders are some of the causes of epilepsy. Delay in recognising the seizures and inadequate treatment leads to higher risk for subsequent seizures, brain damage, disability and death (National Centre for Chronic Disease Prevention and Health Promotion, 2009). Moreover, these individuals have been found to have high prevalenceof comorbidities such as type II diabetes mellitus, arterial hypertension, blood cholesterol, stroke and cancerhave been reported in this population (Elliot et al., 2009; Gaitatzys et al., 2012).

Bone mass loss and obesity are the two major risk factors of epilepsy in adults. Use of certain antiepileptic drugs for long periods of time which may result in loss of appetite, change in cognitive function and also interfere in nutrient absorption (Reiter et al., 2004; Volpe et al., 2007). There is an increased amount of evidence showing that epilepsy affects bone mass in many ways (Sheth, 2004).

Overweight and obesity have been commonly reported in epileptic individuals with higher body mass index value (34 %) and obesity rate(24 %) than the general population (Kobau et al., 2002; Hinnel et al., 2010). Obesity is known to be associated with hypertension, diabetes, dyslipidaemia and cardiovascular disorders. Although there are several instruments to measure total body fat and its distribution; anthropometric measurements play an important role in clinical practice. There are very few evidences which prove that malnutrition increases the risk of epilepsy and also influence of epilepsy on nutritional status of adults (Volpe et al., 2004; Bertoli et al., 2006; Crepin et al., 2007; Hemb et al., 2010; Porto et al., 2010). Therefore, the present study was carried out to evaluate the nutritional status of patients with epilepsy using anthropometric measurements and correlating weight development.

Materials and methods
Selection of subjects
A total of 503epileptic and non-epileptic patients with an age range of 19 to >50 years of age of both sex, belonging to below poverty line (BPL)section were randomly selected from Super Specialty Hospital, Sri Venkateswara Institute of Medical Sciences (SVIMS),Tirupati. Out of the total number, 322 (Males–193 and Females–129) who were regularly attending epilepsy clinic of the SVIMS and who were treated exclusively for epilepsy alone, without any comorbidities were included in the study. Subjects with motor limitations, acute infections,using corticosteroids, had degenerative neurological alterations, used enteral or parenteral nutrition, who could not give their anthropometric measurements due tothe use of orthopaedics appliances or body abnormalities, and those who had not authorized their participation in the study were excluded from the study. The remaining subjects were 181 non-epileptics (Males –75 and Females –106) attending other outpatient clinics other than epilepsy were included in the study to compare their general health conditions with epilepsy patients with reference to the various parameters used for the study. Data was collected from 2007 until 2009.

Anthropometric measurements
Anthropometric measurements used for assessing nutritional status were height, weight, body mass index (BMI), waist circumference, hip circumference and waist to hip ratio in respondents by following standard procedures given by Jelliffe (1966). Weight (kg) was assessed using a mechanical platform scale with a precision of 0.1 kg. Subjects were asked to position themselves barefoot, with an

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erect posture, feet close together and arms alongside the body, on the centre of the scale, wearing the least amount of clothes possible.For the measurement of height (cm), wall mounted stadiometer accurate to 0.1 cm was utilized. The subjects were asked to maintain an erect posture with arms alongside the body and held-up head, looking at a fixed spot on the same level of the eyes, barefoot and feet close together and in parallel.Weight and height measurements were then used to calculate BMI of the patients expressed as kg/m^2. Waist and hip circumferences (cm) were measured using a measuring tape. Waist circumference was measured at the most lateral contour of the abdomen while hip circumference was measured at the widest portion of hips. Waist to hip ratio was calculated by dividing waist circumference by hip circumference. Anthropometric measurements were always taken by the same researcher or under her supervision by a trained personal.

Statistical analysis

Statistical analysis of the data was also performed using a two-way ANOVA calculation with Duncan's pair wise comparisons between groups. The results were considered significant at $p<0.05$ and $p<0.01$ levels.

Results and discussion

Data on anthropometric profiles of epileptic and non-epileptic adults is presented in Table 1 and 2. Mean height of males in both age groups was found to be significantly ($p<0.01$) higher than females in epileptic and non-epileptic groups. Epileptic females had slightly higher height (cm) of 150 and 156 for >50 and 19-50 years age groups, respectively whereas non-epileptic females had slightly lower height (cm) of 148 and 152 for >50 and 19-50 years age groups, respectively.

Table 1. Anthropometric profile of epileptic subjects

Parameters	Epileptics			
	19-50 years		>50 years	
	Males (n=159)	Females (n=102)	Males (n=34)	Females (n=27)
Height (cm)	165 ± 0.56**	156 ± 0.75	165 ± 1.05**	150 ± 1.23
Weight (Kg)	58 ± 0.72*	55 ± 1.09	60 ± 1.54	58 ± 1.41
BMI (Kg/m^2)	22 ± 0.38	22 ± 0.39	22 ± 0.53	26 ± 0.66**
Waist circumference (cm)	69 ± 0.52	68 ± 1.07	66 ± 0.73	70 ± 1.24**
Hip circumference (cm)	83 ± 0.81	84 ± 0.99	82 ± 0.9	83 ± 2.51
Waist-to-hip ratio	0.84 ± 0.01**	0.8 ± 0.01	0.81 ± 0.01	0.86 ± 0.02

All values are Mean ± SE; 95% CIs in parentheses; P * <0.05 **<0.01 (Significance between the males and females of same age in epileptic group)

Body weight is the simplest and widely used indicator as an anthropometric measurement for the overall evaluation of nutritional status of a person. It indicates the body mass and is a composite of all body constituents like water, minerals, fat, protein, bone etc. (Eastwood, 2003). Mean weight of epileptic and non-epileptic males was found to be significantly ($p<0.05$ and $p<0.01$) higher than females of both the age groups, respectively. Epileptic males had 58 and 60 kg weight for 19-50 and >50 years, respectively whereas non-epileptic males had slightly higher weight for both age groups. Similar results have been shown by epileptic and non-epileptic females of both the age groups. Epileptic subjects of both the age groups had nearly normal weight whereas non-epileptic subjects showed slightly higher weight with respect to weight (kg) of Indian reference man (60) and women (55), respectively (ICMR, 2010).

Table 2.Anthropometric profile of non-epileptic subjects

Parameters	Non-epileptics			
	19-50 years		>50 years	
	Males (n=46)	Females (n=85)	Males (n=29)	Females (n=21)
Height (cm)	165 ± 0.92**	152 ± 0.71	162 ± 1.65**	148 ± 1.28
Weight (Kg)	64 ± 1.16**	60 ± 0.68	64 ± 1.21	62 ± 1.42
BMI (Kg/m^2)	24 ± 0.4	22 ± 0.33	22 ± 0.6	24 ± 0.75*
Waist circumference (cm)	72 ± 1.14	73 ± 0.98**	71 ± 1.82	75 ± 1.45
Hip circumference (cm)	86 ± 1.24	87 ± 0.84	87 ± 1.12	90 ± 1.51
Waist-to-hip ratio	0.84 ± 0.01	0.85 ± 0.01	0.82 ± 0.02	0.84 ± 0.01

All values are Mean ± SE; 95% CIs in parentheses; P * <0.05 **<0.01 (Significance between the males and females of same age in non-epileptic group)

BMI provides a measure which allows comparing the adiposity of individuals of different heights and weights and thereby provides a reasonable indication of the nutritional status of the individuals (Sander and Emery, 2003). In Asians, the increased risks associated with obesity have been shown to occur at lower BMI and these populations are predisposed to visceral or abdominal obesity. Therefore, World Health Organisation hasproposed a lower BMI value to define overweight and obesity in Asia-Pacific region and the cut off values are 23 and 25 kg/m^2 (Seidell et al., 2004; WHO, 2004).

In the present study, the mean BMI value of epileptic males and females was found to be similar (22 kg/m^2) in

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both age groups except in >50 years age group where a significant ($p<0.01$) high value of BMI i.e., 26 kg/m^{2}was observed in epileptic female. Non-epileptic females and males of 19-50 and >50 years age showed similar BMI value of 22 kg/m^2, respectively whereas non-epileptic males and females of 19-50 and >50 years age group showed slightly higher but similar BMI value of 24kg/m^2, respectively. BMI above 23 kg/m^2 shows a positive correlation between cardiovascular disorders and body fat. The present study showed that the epileptic female patients >50 years of age are at higher risk to develop obesity and associated comorbidities such as cardiovascular diseases and metabolic complications (Tan et al., 2009; Elliot et al., 2009; Verroti et al., 2010; Gaitatzys et al., 2012).

Risk factors such as cardiovascular and metabolic complications are estimated based on waist circumferencewhich acts as a strong predictor of intra-abdominal adiposity (WHO, 2000). In epileptic male groups, the mean waist circumference was 69 cm for the age group of 19-50 years followed by a decrease to 66 cm in males >50 years. On the other hand, epileptic females had 68 cm for 19 -50 years of age group followed by significant ($p<0.01$) increase to 70 cm in females >50 years. Similar observations have been made in non-epileptic males and females of both the age groups. The waist circumference of epileptic and non-epileptic males and females of both the age groups were found within the cut off levels i.e., >78 cm for men and >72 cm for women (Mishra et al., 2006) except females >50 years had slightly higher waist circumference which proves that female subjects are at higher risk of developing cardiovascular disorders. Population based studies have shown higher prevalence of elevated waist circumference among women than menat a ratio of 3:1 resulting in five times higher occurrence of metabolic syndromes (Dutra et al., 2012).

Deposition of fat around hips and buttocks in both epileptic and non-epileptic females showed slightly higher hip circumference than males in both the age groupswhich is not associated with health risks such as cardiovascular diseases, type II diabetes and etc (Lopatynski et al., 2003; Goh et al., 2004).

The waist-hip ratio is used to study the distribution of body fat. A waist-hip ratio of >0.8 and >1 in women and men, respectively indicates higher risk for hypertension, cardiovascular disorders and diabetes (Gibney et al., 2005). Waist to hip ratio of epileptic and non-epileptic males of both the age groups was found to be within above stated cut off levels. However, females of both the age groups had waist-hip ratio above the cut off levels.

Conclusions

Female subjects >50 years of age of the present study had a higher risk of comorbidities as shown by their tendency to overweight, cardiovascular disorders, and elevated abdominal obesity due to slightly higher BMI, waist circumference and waist-hip ratio in comparison to other age groups.

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