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Correlation Between Sleep Apnea With Neck Circumference, Dyspnea, Vo2max And Quality Of Life In Sarcopenic Obesity.

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ABSTRACT:

BACKGROUND: Sarcopenia has been primarily studied in older adults and individuals with chronic conditions but emerging evidence suggests that healthy, younger individuals are also at risk for presenting with this condition.
METHODOLOGY: Study included 50 subjects. To assess demographic and medical history obtained from initial assessment. Handgrip strength was measured with a dynamometer, skinfold thickness was measured at four sites ,triceps, biceps, Suprailiac and suprascapular.
RESULT: The age of patients ranged from 19-69 yrs with mean (± SE) 42.62 ± 1.47 yrs and median 42 yrs. Among patients, 35 (70.0%) were females and 15 (30.0%) were males. The study participants were thus female predominance with 1:2.3 male tofemale ratio.
Conclusion: The Study shows positive correlation with neck circumference and dyspnea in sarcopenic obesity.

Keywords: Sleep apnea , Neck circumference , Sarcopenic obesity , VO2max

Introduction

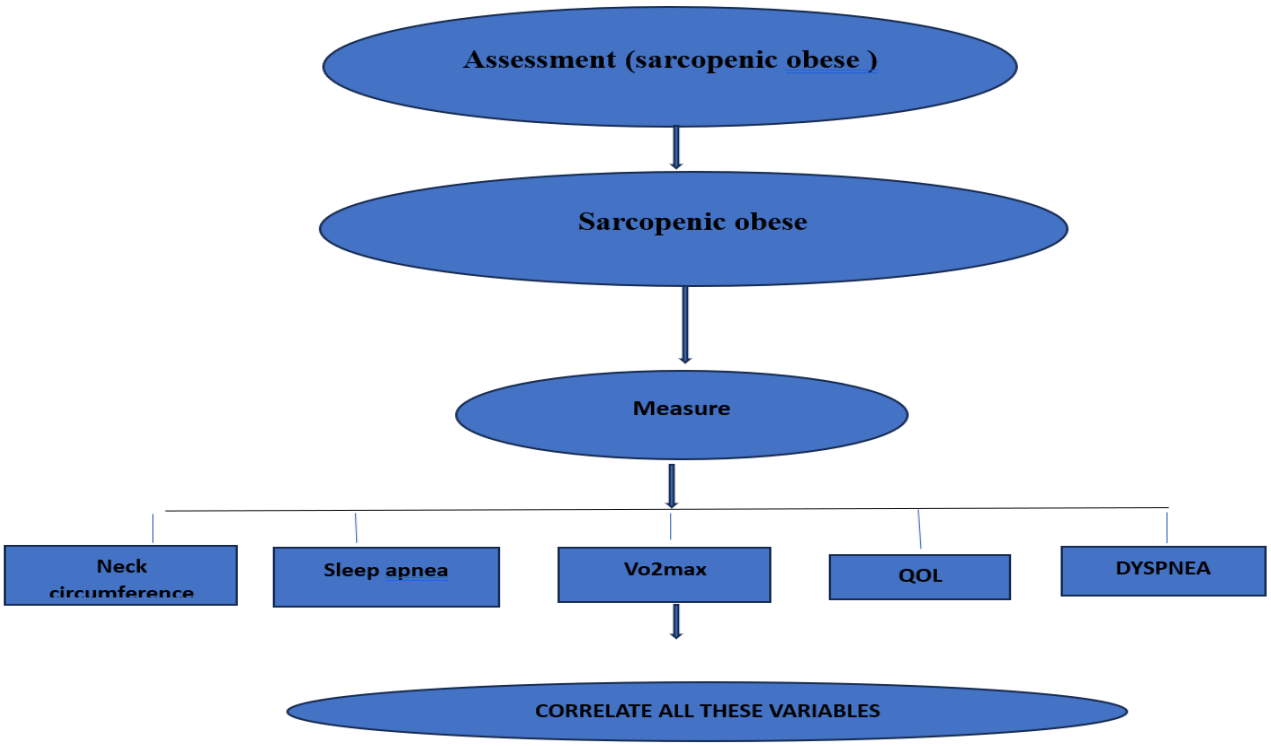
This large and supposedly involuntary loss of muscle tissue in the elderly was considered responsible in part for age related decline in functional capacity.[1]sarcopenia from Greek 'sarco'for flesh and Penia for loss originally referred to the loss of muscle mass.[2] Combination of high muscle mass and low fat mass is considered a healthy combination , from a clinical perspective the most concerning is combination of low muscle mass plus high fat mass termed sarcopenic obesity.[3] obesity is another age related health problems potential sarcopenic obesity are significantly more likely to exhibit impaired performance and to have concomitant diseases than those with sarcopenia or obesity alone.[4] The WHO defines obesity as excess of adipose tissue in the body and consider it a chronic disease which is directly or indirectly related with pathological situation that contribute to morbidity and mortality such as cardiovascular disease , osteomuscular disorders and cancers.[5] currently the term sarcopenia does not refer exclusively to reductions of fat free mass but also to a concomitant loss of strength and muscle function , this phenomenon is observed in both men and women and is associated with loss of autonomy , increased risk of falls.[6]sarcopenia imposes a significant but modifiable economic burden on government reimbursed healthcare services in the united states because the number of older Americans is increasing the economic costs of sarcopenia will escalate unless effective public health campaigns aimed at reducing the occurrence of sarcopenia are implemented.[7] aging is a continuous process involving changes in several physiological systems and a decrease in functional capacity , which impacts quality of life.[8] Therefore the aim of the present study was to prevent the further complications in sarcopenic obesity and to evaluate the treatment approach of these variables.

Methods:

This study was approved by the Ethical committee Santosh university , Ghaziabad , It was conducted in accordance with the declaration of Helsinki and all participants provided written consent.
This study included 50 subjects who full filled the inclusion criteria. After signing the consent form a brief description for the complete procedure will be explained to the patient.
Handgrip strength was measured with a dynamometer in the following procedure , the volunteers were seated in standardized position used by the American society of hand therapist in which the hips and knees are flexed at 90degree and shoulder adducted in neutral position , the elbow flexed at 90 degree and the forearm in semi- pronation without radial

or ulnar deviation. The grip dynamometer was adjusted according to each volunteers hand size. Test were performed three times with the dominant hand first and than the non dominant hand with an interval of 1 minute between each attempt.
Skin fold thickness was measured at four sites triceps ,biceps, suprailiac and suprascapular. Body fat was estimated using the tables of durnim. Fatmass was calculated from bodyfat percentage.
The MMSE evaluate the general cognitive ability and to provide its normative values in elderly population. The MMSE has been shown to have a good test retest reliability with the same(r=.0887) or different (r=0.827).
Stop-Bang questionnaire was specifically developed to meet the need for a reliable , concise and easy to use screening tool. It consist of eight items related to the clinical feature of sleep apnea. The tool score ranges from 0 to 8. Patients can be classified for OSA risk based on their scores.
SF-36 questionnaire, QOL was measured using the medical outcomes . The scale consist of 36 items about limitation in daily life due to healthy problems and provide a subjective estimates of individuals functional state. The SF-36 result in a classification of eight dimension : physical functioning , social functioning , physical problems , emotional problems . the answers for each dimension are coded , summed and transformed into scores from 0 to 100 where 0 corresponds worst health and 100 to best health .
6 minute walk distance were recorded according to guide lines . the 6 MWT were performed along a straight line , flat 30 m long corridor , with market at 3 m intervals at the end of each minute subjects were given feedback on the elapsed time and and standardized encouragement in the form of statements . the 6 minute walk distance was used for the calculation of the reference equation .

Flow chart: Procedure protocol



STATISTICAL ANALYSIS

All the data were analyzed statistically for normal distribution using Kolmogorov – Smirnov test before presenting as mean , with standard error or mean and minimal values and maximal values. All Statistical analyses were carried out using statistical package for SPSS version 11.0. all the test were performed with significance at $p<0.5$.

Result

The baseline demographic characteristics (age, sex, height and weight) of recruited sarcopenic obese patients is summarised in Table 1. The age ofpatients ranged from 19-69 yrs with mean (± SE) 42.62 ± 1.47 yrs and median 42 yrs. Among patients, 35 (70.0%) were females and 15 (30.0%) were males. The study participants were thus female predominance with 1:2.3 male tofemale ratio (Table 1 and Fig. 1).

The baseline outcome measures or clinical characteristics (BMI, NC, dyspnea, VO2max, QOL and sleep apnoea) of recruited sarcopenic obese patients is summarised in Table 2. The BMI of patients BMI of patients ranged from 26- 41 kg/m^2 with mean (± SE) 33.65 ± 0.46 kg/m^2 and median 33 kg/m^2
Further, the dyspnea score of patients ranged from 1-5 with mean 2.16 ± 0.18 and median 2. Similarly, the VO2max of patients ranged from 11-29 ml/kg/minwith mean 20.31 ± 0.61 ml/kg/min and median 20 ml/kg/min. Furthermore, the QOL score of patients ranged from 29-65 with mean 52.77 ± 0.93 and median 53.
Moreover, among patients, 31 (62.0%) had low risk sleep apnoea and 19(38.0%) had high risk apnoea. Thus, the prevalence of high risk apnoea in sarcopenic obesity was 38.0% (Table 2 and Fig. 2). The correlation between BMI and sleep apnoea (low risk and high risk) in patients with sarcopenic obesity is summarised in Table 3 and also depicted in Fig. 3. The BMI in low risk patients ranged from 29-41 kg/m^2 with mean (±SE) 33.64 ± 0.56 kg/m^2 and median 33 kg/m^2 whereas in high risk patients it ranged from 26-39 kg/m^2 with mean (± SE) 33.66 ± 0.80 kg/m^2 and median 34 kg/m^2. The mean BMI was almost similar between two sleep apnea groups.
Comparing the mean BMI of two apnea groups, Student's t test showed similar ($P > 0.05$) BMI between the two groups (33.64 ± 0.56 vs. 33.66 ± 0.80,
mean difference: 0.01 ± 0.95, 95% CI: 1.90 to 1.92, t=0.01, $P = 0.992$) i.e. did not differ significantly (Table 3 and Fig. 3). In other words, sleep apnea is not associated to BMI in sarcopenic obesity.

Variable	**Total patients (n=50) (%)**
Age (yrs): Mean ± SE, Min-Max, Median	42.62 ± 1.47, 19-69, 42
Sex: Female Male	 35 (70.0) 15 (30.0)
Height (cm): Mean ± SE, Min-Max, Median	156.80 ± 1.24, 145-184, 155
Weight (kg): Mean ± SE, Min-Max, Median	82.89 ± 1.68, 65-128, 82

The demographic age, height and weight of patients is summarised is Mean ± SE, Range (Min-Max) and Median respectively whereas sex is summarised in number (n) and percentage (%).

Table 8.1: Baseline demographic characteristics of patients with sarcopenic obesity

Variable	**Total patients (n=50) (%)**
BMI (kg/m^2): Mean ± SE, Min-Max, Median	33.65 ± 0.46, 26-41, 33
NC (cm): Mean ± SE, Min-Max, Median	39.42 ± 0.55, 33-47, 40
Dyspnea (score): Mean ± SE, Min-Max, Median	2.16 ± 0.18, 1-5, 2
VO2max (ml/kg/min): Mean ± SE, Min-Max, Median	20.31 ± 0.61, 11-29, 20
QOL (score): Mean ± SE, Min-Max, Median	52.77 ± 0.93, 29-65, 53
Sleep apnoea: Low risk High risk	 31 (62.0) 19 (38.0)

The clinical BMI, NC, dyspnea, VO2max and QOL of patients is summarised is Mean ± SE, Range (Min-Max)and Median respectively whereas sleep apnoea is summarised in number (n) and percentage (%).

Table 8.2: Baseline clinical characteristics of patients with sarcopenic obesity

Sleep apnoea		**Mean difference(HR-LR)**	**t value**	***P* value**
Low risk(LR) (n=31)	**High risk(HR) (n=19)**			
33.64 ± 0.56	33.66 ± 0.80	0.01 ± 0.95	0.01	0.992

The BMI of patients of two groups of sleep apnoea (low risk and high risk) are summarised in Mean ±SE and compared by Student's t test (t value).

Table 8.3: Correlation between BMI and sleep apnoea in patients with sarcopenic obesity (n=50)

Sleep apnoea		**Mean difference(HR-LR)**	**t value**	***P* value**
Low risk(LR) (n=31)	**High risk(HR) (n=19)**			
38.58 ± 0.74	40.79 ± 0.69	2.21 ± 1.09	2.03	0.048

The NC of patients of two groups of sleep apnoea (low risk and high risk) are summarised in Mean ± SE and compared by Student's t test (t value).

Table 8.4: Correlation between NC and sleep apnoea in patients with sarcopenic obesity (n=50)

Sleep apnoea		Mean difference (HR-LR)	t value	*P* Value
Low risk(LR) (n=31)	High risk(HR) (n=19)			
1.87 ± 0.21	2.63 ± 0.32	0.76 ± 0.37	2.08	0.043

Discussion

The present study was the first study to describe the correlation between sleep apnea with neck circumference, dyspnea, vo2 max, quality of life in sarcopenic obesity. The present study shows correlation with dyspnea and neck circumference in sarcopenic obesity. Subjects has a higher risk to develop dyspnea and had a higher neck circumference. On the other, there were no significant differences between sleep apnea with vo2 max and quality of life in sarcopenic obesity.
Previous studies shows, neck circumference was a surrogate measure of upper airwayobesity, and was directly associated in sleep apnea, so neck circumference had a higher in sarcopenic obesity and in future they may be at higher risk to develop sleep apnea . Although sleep apnea is not significantly associated in sarcopenic obesity, but it was strongly associated with neck circumference. Sleep apnea was observed not associated in sarcopenic obesity but in obesity sleep apnea was significantly associated [9]
Prevalence rates of dyspnea in general population has been reported to be from 3to5%in young individuals approximately 10%in elderly men and 20in elderly women. Previous studies correlate dyspnea and respiratory function parameters, in a highly select group of obese individuals. BMI correlated significantly with the following
.baseline, the residual volume /total lung capacity ratio; the forced expiratory volume in one second /forced vital capacity ratio[10]
low pulmonary function was found to be associated with low muscle mass in community dwelling older adults, a low FEV1 value was associated with low muscle mass in both males and females. Several epidemiological cross-sectional studies have documented associations between low skeletal muscle mass and physical disability or low physical performance with the level of disability 2 to 5 time higher in the sarcopenic groups. Sarcopenia also results in decrease in muscular strength and endurance[12]. The (VO2max) declines at the rate of 3 to 8% per decade after the age of 30 years, but adjusted for muscle mass, VO2max no longer declines.[15] This suggests that a loss of muscle mass is a significant contributor to fatigue and decreased endurance. Consequently, we can speculate that sarcopenia is a predictor of disability in the elderly, but, very few longitudinal studies have demonstrated that sarcopenia[11] Most patients who present with neck pain have non-specific (simple) neck pain, where symptoms have a postural or mechanical basis[13]. Obesity has been linked to fatal and nonfatal diseases, including insulin resistance,[14] glucose intolerance, diabetes mellitus hypertension, dyslipidemia, sleep apnea, arthritis, hyperuricemia, gallbladder disease, back pain, renal disease, surgical complications, and certain types of cancer.[16]

Clinical relevance

firstly regarding sarcopenic obesity studies have emerged only in past 2-3 decades, and research in this area is still in its infancy. However, the population with sarcopenic obesity around the world has major health, social and economic consequences often with limited coverage of social security system in developing countries.
Therefore most countries are expected to experience increasing challenges to deal with the significant impact of sarcopenic obesity regarding mobility disability, hospitalization, increased chronic diseases, mortality and healthcare cost.

Conclusion

This study shows positive correlation with neck circumference and dyspnea in sarcopenic obesity. And negatively associated between sleep apnea with vo2 max and quality of life. A alternative hypothesis is accepted and null hypothesis is rejected.

Limitations

The diagnostic criteria to diagnose the sarcopenic obesity like DXA , BIA anthropometric measurement, but they are costly and time consuming, suggest to choose the calf circumference was positively a correlated with DXA-measured ASM and SMI ,and could be used as a surrogate marker of muscle mass for the diagnosis of sarcopenia .
The cutoff values of each parameter for detecting sarcopenia were based on recommendation of AWGS where they might be some difference in individualethnicities.

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