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IMPACT OF INCIDENCE OF FALL AND STUMBLES ON THE LEVEL OF PHYSICAL ACTIVITY IN MIDDLE AGED ADULTS WITH OBESITY

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ABSTRACT

Back ground: The incidence of obesity in middle age as already rose to an alarming number and many variables have been associated with the decline of level of physical activity in obese middle aged adults. However very little is been studied about the impact of falls/stumbles in decreasing the level of physical activity. **Objective:** The purpose of this study is (1) to examine the relationship between incidences of fall/stumbles and physical activity level in obese middle aged adults (2) to explore potential explanatory factors and preserve the level of Physical activity. **Hypothesis:** Incidence of falls might significantly influence the level of physical activity in obese middle aged subjects. **Study design:** Cross sectional, Observation study **Outcome measures:** Long form of International physical activity questionnaire (IPAQ) a)Categorical variable b) Continuous score-MET-min/day/week. **Participants:** In total 326 obese middle aged subjects of both genders between age 40-60 years (Mean age: 52.3) with BMI ≥ 30 kg/m² were enrolled in this study. **Intervention:** Not applicable **Methods:** Subjects were retrospectively questioned and categorized as Group A (obese fallers), N=73 and Group B (obese non fallers), N=253 using fall history questionnaire. All subjects were evaluated with base line assessment, International physical activity questionnaire (IPAQ- long term design) continuous score (MET-minutes)and categorical scoring pattern was used in IPAQ for data collection after obtaining consent. **Results:** Group A mean MET –min/day/week was 472.75 (S.D-288.384), Group B mean MET-min/day/week was 739.81(S.D-341.165) in continuous score comparison .Mann- Whitney U test analysis revealed that there was a significant difference in the level of physical activity between the groups. Chi-square analysis of categorical data between groups states that the significant difference between expected and observed frequencies is not by chance alone. **Conclusion:** Incidence of falls/stumble is associated with decline in physical activity levels of major domains among middle aged obese subjects.

Keywords: Obesity, Physical activity, fall, MET, International physical activity questionnaire

INTRODUCTION

Physical inactivity has been identified as the fourth leading risk factor for global mortality, causing an estimated 3.2 million deaths globally and deficiency in physical activity is one among the

major reasons for obesity in many countries¹⁴, WHO states physical activity as any bodily movement produced by skeletal muscles that require energy expenditure and an increasing levels of physical inactivity are seen worldwide, in high-

income countries as well as low- and middle-income countries. Recent statistics of WHO also says that currently at least 60% of world's population gets insufficient exercise¹⁴. Obesity is now an epidemic medical condition even in the absence of any associated diseases, so for many studies had proved that the only solution for obesity especially in middle aged people is to maintain a good level of physical activity and exercise. Body mass index is a heuristic proxy for human body fat based on height and weight, WHO recommended BMI guidelines for overweight (25.0–29.9 kg/m²) and obesity (≥ 30 kg/m²). In the recent past many attempts were made to find out the relationship between basal metabolic rate decline and aging. Age related decline in Basal metabolic rate is due to decrease in lean body mass¹⁷ (Lazzer S, Bedogni G 2010) which makes middle aged people gain weight easily. According to Rosenblatt NJ, Grabiner MD Unlike healthy weight fallers, most obese fallers failed to initiate or complete the recovery steps before full-body harness support. So obesity does not appear to increase the overall fall risk but fall rates after laboratory-induced trips were notably higher, potentially due to altered recovery responses. Thus in middle aged obese people a relatively high incidence of falls/stumbles occurs due to diminished static balance²¹. Several studies have addressed the importance of physical activity levels and energy expenditure through activities in management of obesity. Inactive people are often not aware of their inactivity. Providing feedback on the actual physical activity level by an

activity monitor can increase awareness and may in combination with an individually tailored physical activity advice stimulate a physically active lifestyle. This study aims on determining whether the incidence of fall/stumbles could significantly reduce the level of physical activity among obese middle aged subjects therefore this research would help identifying the risk group and this information would enable health care professional to better estimate the functional consequences of excess body weight thereby preserve or improve the level of physical activity as low levels of physical activity in middle aged obese individual can result in adverse health consequences.

MATERIALS AND METHOD

Subjects

In this study a total of 326 obese subjects of age group between 40-60 years of both gender were randomly selected from a population of 639 community dwelling middle aged adults of Chennai. Prior to the selection, participants were subjected to baseline evaluations to check for selection criteria and details of the study were explained to the individual before obtaining consent. As a first step subjects were retrospectively questioned about the incidence of fall and stumbles in the last one year using fall history questionnaire Based on the incidence of fall/stumble the subjects were divided into group A i.e. fallers consisting of 73 subjects and group B non fallers consisting of 253 subjects. Inclusion criteria for the samples are age 40-60 years, both sexes, BMI ≥ 30 . Exclusion criteria's for both groups were BMI < 30 kg/m², age < 40 years and > 60 years, neurological disorders, visual

impairments, musculoskeletal disorders and hypotensives.

Physical activity questionnaire

The purpose of utilizing International Physical Activity Questionnaire (IPAQ) as a measuring scale is to obtain comparable estimates of physical activity, the questionnaire is very feasible with excellent reliability for measuring physical activity in large groups or populations and it is used internationally¹³ (Craig CL, Marshall AL, Sjostrom SM). The long format of IPAQ asks in detail about walking, moderate-intensity and vigorous intensity physical activity in each of four domains i.e. Work domain, Active transportation domain, Domestic & garden work domain and Leisure-time domain. Based on Continuous score-metabolic equivalent (MET) of all four domains in minutes per day per week were calculated to get total physical activity MET scores and categorical variable of the questionnaire classifies the subjects into 3 levels, depending on their physical activity in the last seven days as high, moderate and low levels. This categorical scoring method provides different thresholds for measurement of physical activity which is useful mechanism to distinguish variation in population groups¹⁸.

Procedure

The subjects were explained about the International physical activity questionnaire (IPAQ). Four interviewers were trained, supervised and given feedback by first author during data collection and questions were explained in native language when needed. The long version (31 items) was designed to collect detailed information within the domains of household and yard work activities, occupational activity, self-powered transport, and leisure-time physical activity as well as sedentary activity. A probe protocol were implemented by the interviewers to limit any sort of over-reporting of activities in IPAQ, after recording of time (min) of activity in four domains in each day for the last seven days. A metabolic equivalent (MET) score

was assigned to each of the activities and the data collected from the long IPAQ questionnaires were summed within each physical activity domain to estimate the total time spent in occupational, transport, household, and leisure related physical activity to obtain total physical activity i.e. Total MET-minutes/week and based on the level of physical activity they were categorized as high, moderate and low. Institutional ethical committee had approved the study and the duration of data collection was a period of 4 months.

STATISTICAL ANALYSIS AND RESULTS

All statistical analysis was performed using the Statistical package for social sciences SPSS, the outcomes of IPAQ are described as mean \pm standard deviation. The results were evaluated with Chi-square for categorical variables and Non parametric Mann-Whitney U test was done for MET values of the groups. Table 1 shows in group A only 1.5 % of subjects belong to high level category, when compared with 10.4 % of group B subjects, it is also evident that a total of 55.2% of subjects in group A possess optimal physical activity levels but in group B its only 10.7%. Table 2 shows Pearson chi-square proves that significant difference exist between groups (P.001) and it is not by chance alone. The mean of Group A obese fallers was 472.75 (S.D-288.384), mean of Group B obese fallers was 739.81 (S.D-341.165).

NON-PARAMETRIC MANN-WHITNEY U TEST was used to determine the comparison in MET value calculated from IPAQ (P - .000) The significant was set as P < 0.01 this significance exist in both categorical variable and continuous score MET value of IPAQ between both the groups (Table 4).

DISCUSSION

WHO estimates that at least 400 million adults (9.8%) are obese, with higher rates among women than men and rate of obesity also increases with age at least up to 50 or 60 years¹⁴. The positive health

benefits of physical activity in people of middle age have been extensively studied and are now commonly accepted, it is immensely essential for the health care eternity to identify factors that could possibly lead to decline of level of physical activity in risk groups¹¹. This study examined the history of fall or ambulatory stumbles in middle aged obese subjects and related decline in the level of physical activity, Statistical data analysis proved that there exists highly significant difference between obese fallers and obese non fallers in level of physical activity in four domains ($P < 0.01$) which supported the hypothesis of this study. Table 1 clearly exhibits that many fallers had declined their activity levels to much lower intensity in terms of MET, specifically we also found that increased body mass is associated with increased history of falls /stumbles which negatively affects health related physical activity of life. In middle-aged and older adults, obesity was associated with a higher prevalence of falls and stumbling during ambulation stated by (Cecilie Fjeldstad et al 2008)²⁰. According to the study of (Francesco Menegoni et al 2009) excessive amount of body fat modifies the body geometry by adding passive mass to different body regions which influences the biomechanics of activities of daily living¹⁶. Adipose tissue accumulation and body mass increases can be a major factor contributing to the occurrence of falls, which explains why obese persons appear to be at greater risk than normal-weight subjects under daily postural stresses and perturbations. As suggested by this study decline in activity level can adversely affect the quality of life in obese adults. The limitation of this study could be non-usage of objective scale in data collection.

CONCLUSION

This is probably the first study to have studied the physical activity level in middle aged obese adults after history of fall/stumbles. The statistical analysis of data and results of this study concludes the existence of compromise in physical activity in

obese adults with more stumbles/falls. So, development of a complete screening tool to identify deficiency of activity will help preserve physical activity and diagnose the early changes.

CLINICAL IMPLICATIONS

If we are to preserve physical activity in obese subjects, attempts should be made to evaluate the factors contributing to fall/stumbles in obese adults and present level of Physical activity

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Table: 1 Comparison of categorical variable between Group A (obese fallers) and Group B (Non fallers)

Groups		IPAQ-Level of Physical activity			Total
		HIGH	MODERATE	LOW	
Group A Obese fallers	N	5	30	38	73
	% of Total	1.5 %	9.2 %	11.7 %	22.4 %
Group B Obese non fallers	N	34	146	73	253
	% of Total	10.4 %	44.8 %	22.4 %	77.6 %
TOTAL	N	39	176	111	326
	% of Total	24.0 %	26.0 %	50.0 %	100 %

Table: 2 Chi-square Tests

	Value	df	Asymp sig(2-sided)
Pearson Chi-square	13.908 ^a	2	.001
Likelihood ratio	13.507	2	.001
Linear-by- Linear Association	12.185	1	.000
N of valid cases	326		

a- 0 cells(0.0 %) have expected count less than 5.The minimum expected count is 8.73

Fig: 1

Comparison of subjects in Group A & B - Categorical Variables

Group A obese fallers Categorical variable Group B obese nonfallers Categorical variables

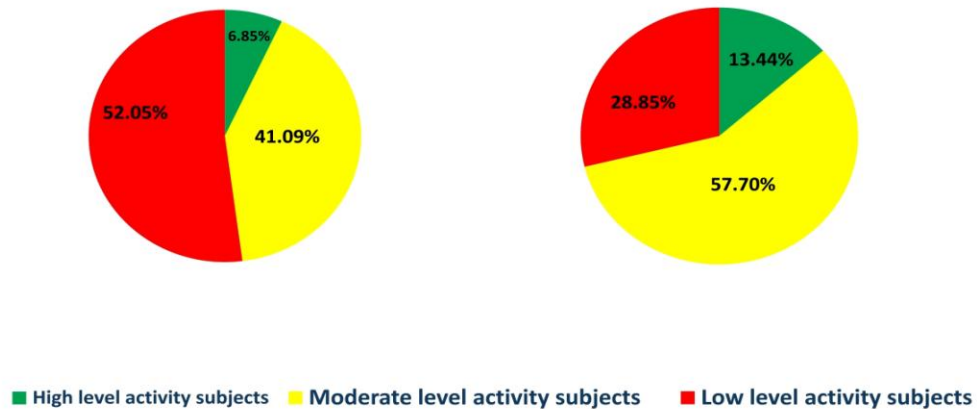


Table: 3 T-Test Group statistics of continuous score- MET values

Group	N	Mean	Std.Deviation	Std.error
Group A (Obese fallers)	73	472.75	288.384	33.753
Group B (Obese non fallers)	253	739.81	341.165	21.449

Table 4 Independent samples test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	sig	t	df	Sig.(2-tailed)	Mean Difference	Std.error difference	95% confidence Interval of the difference	
								Lower	Upper
MET VALUE	8.670	.003	-6.088	324	.000	-267.061	43.865	-353.357	-180.764
Equal variances assumed			-6.678	135.574	.000	-267.061	39.991	-346.148	-187.973
Equal variances not assumed									

Table: 5 Mann-Whitney U Test

Non-Parametric Tests	MET Value
Mann-Whitney U	3932.000
Wilcoxon W	6633.000
Z	-7.474
Asymp. Sig. (2-tailed)	.000

Fig 2

Mean of level of Physical activity in MET

