



Gross Efficiency of Mid age Obese and Non-Obese Men

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ABSTRACT

A measure of gross efficiency is important to all kinds of human population including athletes, non-athletes and people of sedentary habits. The present study assessed the status of gross efficiency of obese and non-obese mid age men residing in West Bengal, India and compared the same between two groups. A total of 44 mid age men of sedentary habits aged 45±6 years participated in this study. Age, height and weight were measured as personal data and the subjects were categorised into two groups- obese and non-obese based on BMI. Gross efficiency was calculated from work output and exercising energy expenditure by using standard equations of the ACSM (2002). The results indicated that both the groups possess low levels of % gross efficiency while non-obese group had significantly better % gross efficiency in comparison to obese group (p<0.05) of mid-age men.

KEYWORDS

Gross efficiency, mid age men, obese and non-obese groups.

Background

Every man has a unique combination of abilities and disabilities related to physical, physiological, psychic and social perspectives. Leading life with greater efficiency is a challenge today and physical activity is less a part of daily life, especially in mid-age people. In human movements, efficiency is the relationship between the amount of work done on a load and the energy expended in completing the work (Kent, 2008). Irrespective of athletes or non-athletes, an efficient movement is one in which a given amount of desired work (energy output) is achieved with a minimum amount of energy expenditure. Gross efficiency is an exercise term that describes the ratio of work output and work input during physical activity. Gross efficiency is % ratio of external work achieved compared to the total energy expenditure (Sarka-Jonae Miller, 2003). This means how much work one produces in relation to how much energy is used. Work efficiency and physiological fitness declines with age and improves with exercise training. Therefore, it is presumed that aged men with sedentary habits may have lower efficiency and low level of physiological fitness.

Materials and Methods

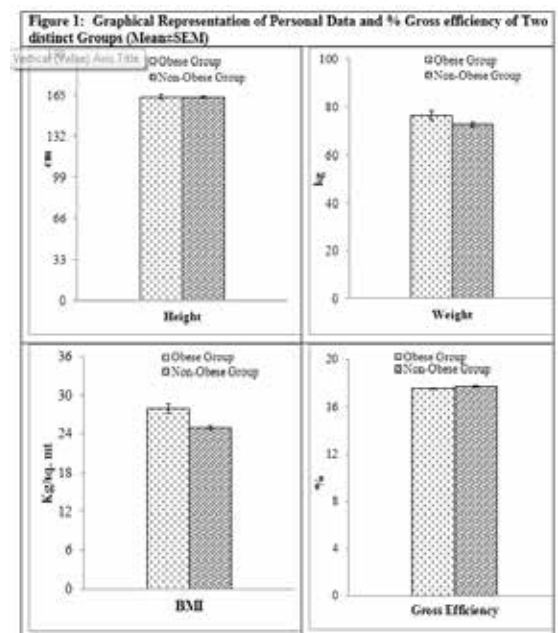
Forty four mid age male subjects aged 45±6 years from Birbhum district, West Bengal, India. participated in this study. The subjects were categorised into two groups namely obese and non-obese. Twenty two subjects were contained in each group. Criterion Measures: gross efficiency was measured in terms of work output and energy expenditure and measured in % using standard equations. The mode of exercise for estimating work output was 3 minutes stepping. Expenditure of energy was estimated in kcal from Gross VO₂. Analytical Techniques: To assess the mean difference between two groups on % gross efficiency descriptive statistics and independent t-test were computed using Microsoft excel and SPSS Software version 20. The level of significance was set at 0.05.

Findings and Results

The finding pertaining to personal data and % gross efficiency of the subjects has been presented in table 1.

Age (year)	45.14	40.32	5.83	4.37	1.24	0.93
Height (cm)	164.14	163.73	7.72	5.40	1.65	1.15
Weight (kg)	75.24	66.84	8.89	5.03	1.90	1.07
BMI (kg/sq. m)	28.01	24.94	3.59	1.49	0.77	0.32
% Gross Efficiency	17.55	17.75	0.21	0.41	0.05	0.09

The mean gross efficiency of obese group was 17.55% and that of non-obese group was 17.75%. This designates a minimum level of % gross efficiency of both the groups as the normal range is between 17-20% (Luhtanen P, Rahkila P, et al., 1987). The possibility of increasing gross efficiency can be through volume and intensity of training (Hopker et al., Santalla et al., 2009).



	Mean		± SD		SEM	
	Obese	Non-obese	Obese	Non-obese	Obese	Non-obese
Age (year)	45.14	40.32	5.83	4.37	1.24	0.93
Height (cm)	164.14	163.73	7.72	5.40	1.65	1.15
Weight (kg)	75.24	66.84	8.89	5.03	1.90	1.07
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Parameter	Group	Mean	Mean Difference	Std. Error Difference	t-value	Sig. (2-tailed)
% Gross Efficiency	Obese	17.55	0.20	0.10	2.04*	.041
	Non-Obese	17.75				

*. Significant at 0.05 levels

Table 2 shows that the mean difference of two groups on % gross efficiency. The mean difference of two distinct groups was 0.20 and the t-value 2.04 was significant at 0.05 level.

In the present study both the groups of obese and non-obese men are found with minimum level of % gross efficiency. The result might be due to habituation and physiological characteristics of the subjects. Further, the obese group has lower efficiency than that of non-obese group. This result of the study is supported by the study of Chen K Y, Acra S A, et al. (2004). It may be reasonable to interpret that as the workload increased in stepping exercise, oxygen requirement increased more rapidly in obese than in non-obese subjects, leading to the decreased efficiency in obese subject (Dempsey et al., 1986). Stepping mostly consists of vertical movements and requires a constant exchange of kinetic and potential energy, which could result a lower efficiency.

Conclusion

On the basis of results of the study it may be concluded that the Non-obese people with normal BMI have superior gross efficiency in comparison to the obese men.

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