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EFFECT OF BHARATNATTYAM DANCING ON BODY COMPOSITION AND PHYSICAL FITNESS STATUS OF ADULT BENGALEE FEMALES

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ABSTRACT ■ Globally more than 1 billion adults are overweight, and at least 300 million of them are clinically obese. Obesity in the developing countries, including India, undergoing major nutrition and lifestyle transition, too, is on the rise. It has also been found to be associated with increased risk of the metabolic syndrome, coronary heart disease (CHD etc. American College of Sports Medicine (ASCM), recommends aerobic exercise for of body weight optimization and maintaining cardio vascular fitness. In this backdrop a study has been undertaken to assess the impact of undergoing training in Bharatnatyam dancing- a popular form of Indian classical dancing – an aerobic exercise, on body composition and physical fitness status in young adult Bengalee females. 87 such volunteers, receiving the training for at least five years, constituted the dancing group (DG). It has been observed that individuals receiving the training have significantly favorable body composition and fitness status, compared to the control group (CG) consisting of 39 individuals from similar socioeconomic background and but not receiving exercise training of any form. It could therefore be concluded that Bharatnatyam dancing is a cost effective beneficial way of exercising for maintaining a healthy body composition and better fitness status and thus consequently reducing the cardio vascular risk factors.

Keywords: Dancing, Obesity, Overweight, Body Fat, Physical Fitness, Metabolic Syndrome

INTRODUCTION

Obesity has reached epidemic proportions globally. Out of about 7 billion global populations, more than 1 billion adults are overweight and at least 300 million of them are clinically obese (Bharadwaj *et al,* 2008). Obesity is also increasing rapidly in developing countries (Mokdad, 2003) undergoing major nutrition and lifestyle transition, due to rapid urbanization and mechanization causing reduction in the energy expenditure (Cakmakci *et al,* 2011) along with an increase in energy intake because of increased purchasing power and availability of high fat, energy-dense fast foods (WHO, 2003) and intriguingly, it often coexists with under-nutrition. Obesity is also associated with increased risk of the metabolic syndrome, type 2 diabetes mellitus (T2DM), hypertension, dyslipidemia, polycystic ovarian syndrome (PCOS), and coronary heart disease (CHD) (Napolitano *et al,* 2008), cancer

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(Bianchini *et al,* 2002), early aging (Hart *et al* , 1999) and a number of other pathological conditions (Rolandsson *et al,* 2001, Peltonen *et al* , 2003), and some of these metabolic derangements start in childhood. India, having a more than 1.2 billion strong population, is on the verge of attaining some dubious distinctions in this category. The emerging epidemic of metabolic syndrome has highlighted the importance of assessment of body composition making it a central topic of current epidemiological research (Kriemler *et al,* 2010). On the other hand, physical exercise defined as any form of physical activity performed on a repeated basis for a defined period of time (exercise training) contributes to the creation of the energy deficit by increasing energy expenditure and can promote body weight optimization. Physical activity combined with optimal nutrition can also make significant contributions to promote a healthy body composition leading to a lower incidence of morbidity and mortality from a number of chronic diseases and improve overall quality of life. But proportion of population actually engaged in daily regular physical activity is quite less, particularly in adult and adolescent females, for various reasons including social, economic infrastructural and accessibility issues (Biddle *et al*, 2005). Dancing is one form of physical activity that the females enjoy (Inchley *et al*, 2008) and among various forms of dancing, Bharatnattyam is one of the very common socially accepted traditional and popular Indian classical dance form. Basically a low impact dancing, having its genesis in 'devdasi' dance of southern Indian temples, it is famous for its precise technique, sculpturesque postures, rhythm as well as expressions. There are some special types of exercise or initial basic steps, *adavu,* which are necessary to be learnt before performing the dance. It involves a lot of neck movement and finger gestures, i.e., 'mudras' and adoption of postures like, sitting, bending, standing, and twisting, which help to prepare the body for adopting the dance style requiring extreme sidewise knee bending and body flexibility. Thus, from the physiological point of view, regular training in Bharatnatyam dancing is expected to serve as a good exercise having potential beneficial effect in maintaining favorable body composition. Adverse effects of obesity and its management through different mode of exercise have been extensively studied but the health benefits of dancing, an aerobic exercise, have been but are less extensively evaluated (Westerterp *et al* 2001). This is all the more true for Bharatnatyam form of dancing. In this backdrop, a study was undertaken, with an aim to study the impact of receiving exercise training, in Bharatnatyam dancing, a physical activity necessitating very little expenses, on body composition, physical fitness status and indirect benefit in reducing the cardiovascular risk factors, in young adult Bengalee females receiving the training for at least five years.

MATERIALS AND METHODS

At first some institutions imparting training on Bharatnattyam dancing were approached for getting access to adult Bengalee females, being trained in dancing, for the purpose of conducting the assessments and they were briefed about the study requirements. The institutions, whose authorities were willing to allow us to carry out the studies, were further explained the details of the studies. Then the study requirements were again explained to the individuals attending these dancing schools. The initially interested volunteers thereafter enlisted their names and thus a prior informed consent was obtained. The individuals, receiving training other than

Bharatnattyam dancing exercises (e.g., other dancing forms, swimming, karate, cycling, and yoga) and receiving Bharatnatyam dancing training for less than five years were excluded from the study. Eighty seven adult Bengalee female individuals regularly receiving Bharatnatyam dancing training constituted the dancing group (DG) and thirty nine individuals, not undertaking regular exercise training of any form and leading a sedentary life, from similar age and socioeconomic background constituted control group (CG). Dancing as well as control group subjects were divided into two age groups, i.e., 17-20 years and 21-24 years. In mutual convenience, dates of studies were arranged for recording of basic physical and physiological parameters. The age in years, period for which individual are receiving training on Bharatnattyam dancing, preliminary socio-economic data, and information about medical histories were recorded in pre-designed schedules.

The measurements were carried out in morning hours in the University laboratory. Body height (to the nearest of 0.1 cm) using an anthropometric rod, and body weight (to the nearest of 0. 1 kg) were recorded without shoe using a pre calibrated weighing scale. Body mass index (BMI) was then calculated as the subject's weight (in kilogram) divided by the squared height (in meters) (Weisell, 2002). Body fat% was measured by impedance technique (Bohm *et al,* 2013). Whole body fat% and subcutaneous fat% at different parts of the body were measured by impedance technique using body composition analyzer with subjects in socially permissible minimum light clothing. Estimated VO_{2max} following Queens College technique (McArdle *et a ,l* 1972; Shamsi *et al,* 2011) and estimation of Physical Fitness Index, following Harvard step test (Brouha *et al,* 1943 and Khodnapur *et al,* 2012) were also carried out. Arithmetic mean and standard deviation of different parameters of DG and CG in both the age groups were calculated and they were analyzed to find the significant difference and $P < 0.05$ was considered statistically significant.

RESULTS

In figure 1, the data of BMI and Whole Body Fat % of subjects belonging to Dancing Group

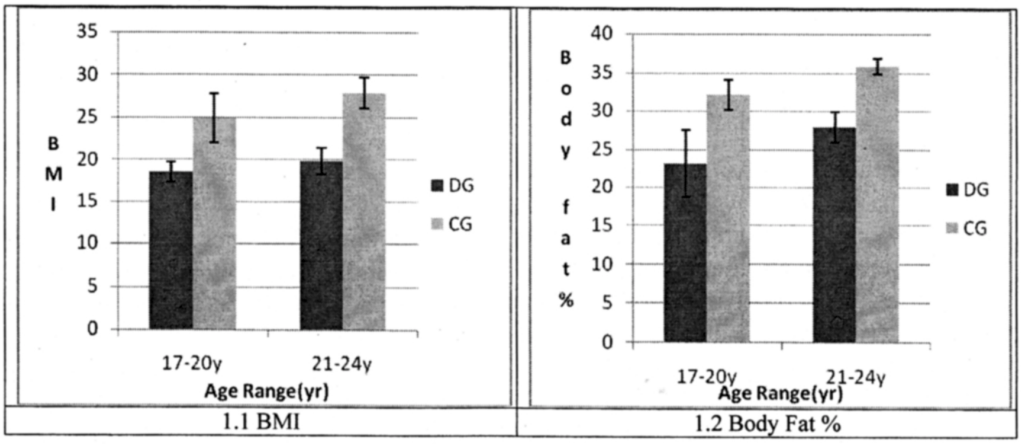

Figure 1: Comparison between dancing group (DG) and control group (CG) individuals in respect of BMI and body fat%

(DG) are presented along with that of Control Group (CG). It may be observed that the BMI (figure 1.1) of DG individuals is significantly lower ($P < 0.05$) than the CG individuals in both the age ranges, retaining the pattern as also reflected in the Body Weight data. The whole body fat % is also significantly lower ($P < 0.05$) in DG individuals compared to CG individuals in both the age groups (figure 1.2).

The mean values of subcutaneous Fat % in whole body, trunk, leg, and arm are significantly higher in 21-24y age group compared to 17-20y age group in both DG and CG.

From figures 3.1 and 3.2, it could be observed that the mean value of estimated VO_{2max} and PFI of DG individuals are significantly higher ($P < 0.05$) than the CG individuals, in both of the age groups. The mean estimated VO_{2max} and PFI values are lower in 21-24y age group, compared to 17-20y age group in both DG and CG.

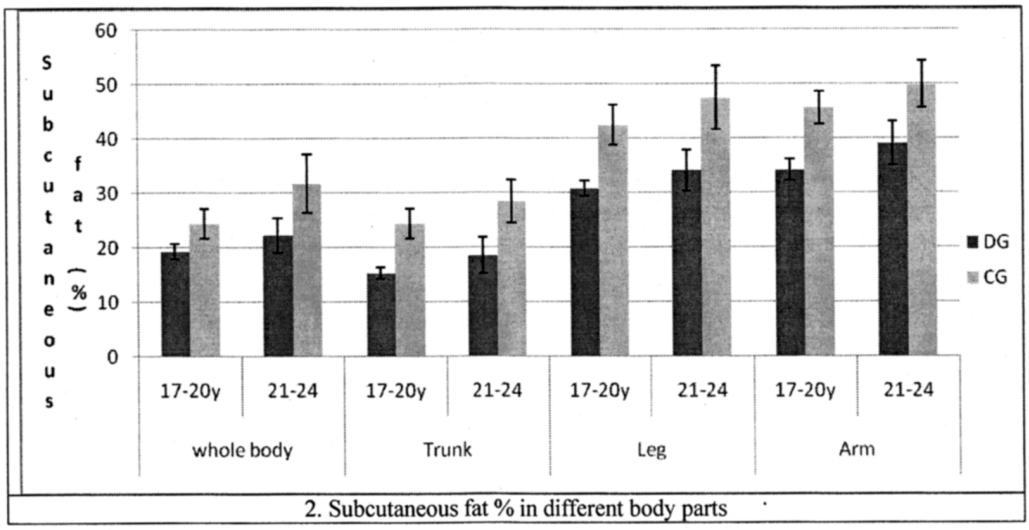

Figure 2: Comparison between dancing group (DG) and control group (CG) individuals in respect of subcutaneous fat (%) in whole body, trunk, leg, and arm

The mean BMI and Body Fat % values are significantly higher in 21-24y age group, compared to 17-20y age group in both DG and CG.

In figure 2, a comparison between DG and CG individuals in respect of subcutaneous fat % in whole body and different body segments, viz, trunk, arm and leg is presented.

From the graphical presentation (figure 2), it may be observed that the mean subcutaneous fat % in whole body of DG individuals is significantly lower ($P < 0.05$) than CG individuals, in both of the age groups. Similar trend of results are also noticed in different segments of the body.

DISCUSSION

The significantly lower body weight in DG individuals, compared to their CG counterparts, could be attributed to regular dancing exercise of Bharatnatyam form, as the DG and CG individuals were not differing in terms of their socio-economic background and dietary energy intake in both age groups. The trend is affirmed by significantly lower BMI in DG individuals, compared to their CG

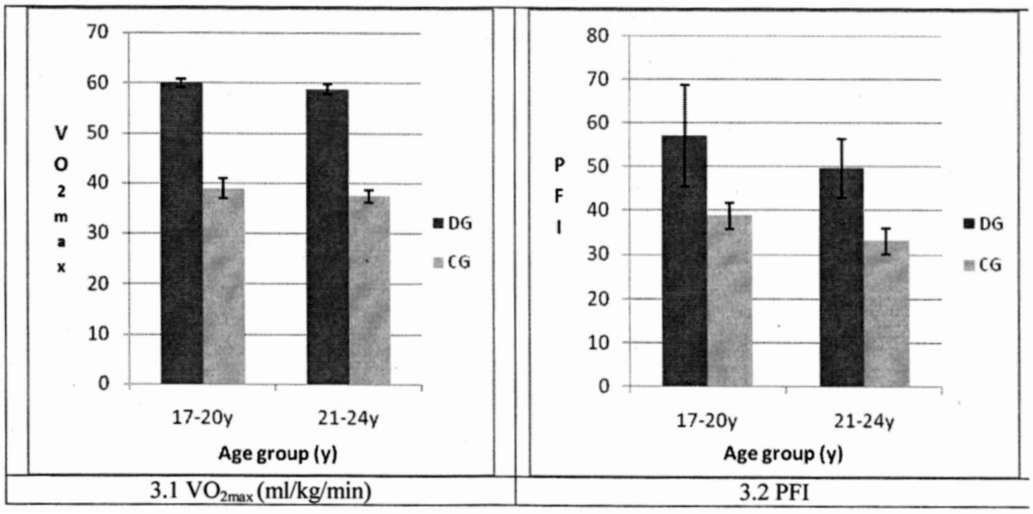

Figure 3: Comparison between dancing group (DG) and control group (CG) individuals in respect of aerobic capacity and physical fitness index (PFI)

counterparts. The average BMI of CG individuals of 21-24 year age group was falling into overweight (25.00-29.99 $kg.m^{-2}$) class, as per the WHO public health action points (2006) for Asians. It is to be noted that Asians, with BMI between 22–25 $kg.m^{-2}$, have high risk of suffering from type2 diabetes and cardio vascular diseases. It is important to further note that for any particular value of BMI, Asian Indians have a higher magnitude of adiposity, abdominal obesity and a lower muscle mass, compared to white Caucasians and for this reason Asian Indians are more prone to develop insulin resistance, metabolic syndrome and T2DM, even with a BMI considered to be within the normal international limits. As the BMI alone does not provide the true picture of fat distribution in body, for it takes into consideration both fat and fat-free components of body weight (Sweting , 2007), the limitation is overcome by assessing the total body fat percentage. The significantly lowered ($P < 0.05$) body fat percentage in DG individuals compared to CG individuals further affirms that individuals regularly practicing Bharatnatyam dancing are accomplishing optimized body weight including body fat. The findings of the present study, which are in agreement with several other studies (Tarnowska, *et al* 2003, Arslan, 2011), is important as incidence of obesity, including obesity in children, and its consequent adverse impacts in India is on the rise; 38% (in terms of waist circumference) to 65% (in terms of BMI) of adult urban Indians fulfill any of the criteria for overweight/obesity or abdominal obesity (Bhardwaj *et al,* 2008). It could be observed that the mean BMI, Body fat % and subcutaneous Fat % in whole body, trunk, leg, and arm values are higher in 21-24y age group, compared to 17-20y age group, i.e., increasing with age in both DG and CG, but the trend that values remain significantly lowered in DG compared to their intra-age CG counter parts is retained in both the age ranges. It may also be mentioned that receiving training in Bharatnatyam dancing is in a position to offset to some extent, the

trend of increase body weight and fatness with rise in age. Estimated maximal aerobic capacity (VO_{2max}), a well accepted important indicator of cardio respiratory fitness and Physical Fitness Index values could also be observed to be significantly higher ($P < 0.05$) in DG individuals, compared to their CG counterparts (figures 3.1 and 3.2).

CONCLUSION

In the light of the results of the present study, it could be concluded that receiving training in Bharatnatyam dancing, for at least a period of five years, facilitates females in achieving healthier body composition and increase physical fitness and thus consequently reducing the probability of cardiovascular risk factors.

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