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BODY PHYSIQUE AND MOTORABILITY STATUS OF BENGALEE ADULT MALES RECEIVING TRAINING IN FOOTBALL

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ABSTRACT ■ A study has been undertaken to assess the impact of undergoing regular training in football. 42 randomly selected Bengaleemale adults, age range 18-24 years, receiving training in football for at least a period of 6 years and practicing it daily for a minimum duration of 2 hours six days a week and with no chronic disease history (self- reported) constituted the Football Group (FG). On the other hand, 48 individuals of comparable age and ethnic background and without exposure to any kind of formal training in physical exercise including football were also randomly selected for the purpose of the study constituting the Control Group (CG). It has been found that the FG individuals have significantly ($P<0.05$) lower Waist Circumference (WC), Hip Circumference(HC) and Waist to Hip Ratio (WHR), Waist to Height Ratio (WHtR). On the other hand, the lower back and hamstring flexibility of the FG individuals are significantly ($P<0.05$) better compared to CG individuals. The result revealed that individuals undergoing training in football for at least 6 years and practicing it daily for a period of 2 hours for at least six days a week have significantly ($P<0.05$) favorable body physique status in terms of WC, HC, WHR, WHtR, AVI and BAI and have better ($P < 0.05$) fitness and flexibility, compared to their age and sex matched CG counterparts.

Key words: Physical activity, fitness, non - communicable diseases, central obesity, exercise

INTRODUCTION

Obesity,abnormal or excessive fat accumulation to the extent that health is impaired(Offei F, 2005), is a recognized modifiable risk factor for various chronic non-communicable diseases including hypertension, type 2 diabetes mellitus, dyslipidemia, coronary heart disease, pancreatitis, osteoarthritis, breast cancer, colon cancer (Wang*et al.,* 2011)reproductive problems (Kay VJ 2009, Maheshwari A, 2007).Another association has also been established between Obesity (Geiss*et al*., 2001,McGee, 2005) and psychological and emotional status of an individual (Latner, 2003, Banerjee*et al.*,2014,).Therefore, obesity has deleterious psychological and social consequences (Kraig, 2001,Latner, 2003), leading to premature mortality, morbidity and a markedly reduced health related quality of

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life and it is considered asan economic burden on the society (Withdraw, 2011). As a consequence, prevention and effective treatment of obesity are very important public health issues today. Currently, obesity has become an increasing problem in the developing country especially in India, experiencing a rapid demographic, epidemiological and economic transition (Ford, 2008, Wang *et al.,* 2011). It has been found in studies that 30-65% of adult urban Indianis either obese, overweight or exhibit abdominal obesity. Therefore prevalence of overweight or obesity has become a major health issue affecting Indian residing in the urban areas, compared to the rural Indian (Bhadra*et al.,* 2005,Sen*et al.,* 2013, WHO 2004, Banerjee*et al.,* 2013). On the other hand, different kinds of physical activities have become popular nowadays. Physical activity is defined as any bodily movement produced by skeletal muscles, resulting in energy expenditure and varies continuously from low to high intensity activities. On the other way physical exercise is a planned, structured, repetitive, and purposive physical activity that results in improvement or maintenance of one or more components of physical fitness (Caspersen, 1985) and in turns the body physique of an individual. Among different forms of physical exercises football has created an impressive position worldwide. It is a team game that needs a high level of conditioning in addition to technical and tactical skills with repeated physical impact. The game has been characterized as a discontinuous predominant aerobic exercise bout combined with frequent intermittent short intense actions with a high rate of the anaerobic energy turnover (Boone*et al.,* 2012). On the other hand, motor ability, ability related to perform motor skill,plays a crucial role in the social and emotional functioning of an individual. It has an impact on quality and wellbeing of life. Studies indicate that positive correlation exists between motor ability and performance. Each motor skill requires specific motor abilities to establish the potential of the specific performance. Motor ability can be assessed in terms of different physical components including dynamic body movements, endurance, speed, strength, power, agility, and flexibility (Cicirko, 2007). Recently motor skill has also been found to be related with cognitive development, suggesting that individuals with poorer motor skill have decrease in activity compared to their counterparts with better-developed motor skills. In this backdrop, a study has been undertaken to assess the effect of being trained in football on body physique and motor ability status of adult Bengalee males.

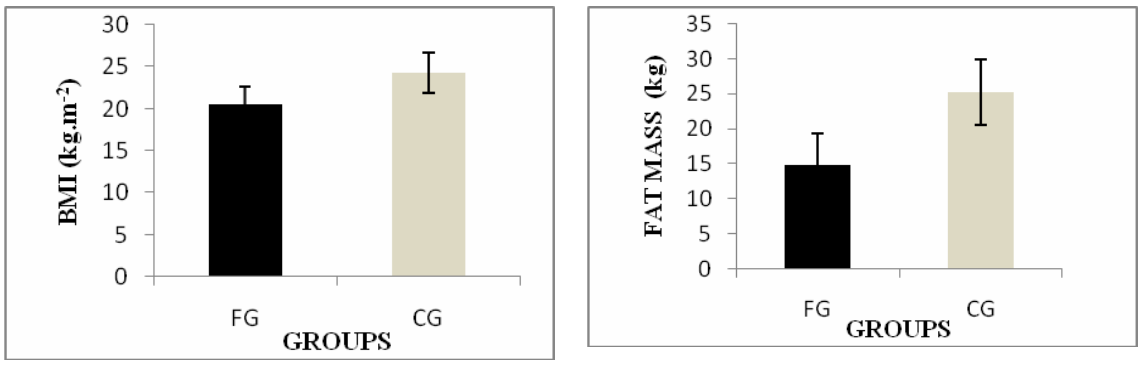
MATERIALS AND METHODOS

Initially several centers in Hooghly district, West Bengal, imparting training to adult and adolescent males on football were approached for getting access to individuals for carrying out the study explaining the assessment requirements. The measurements were obtained, on dates of mutual convenience, from the volunteering individuals undergoing training in football with no chronic disease history (self- reported).42 randomly selected males, of age range 18-24 years, fulfilling the inclusion criteria constituted the Football Practicing Group (FG). Initially basic information regarding their duration of training period(year), daily practicing time(hour), playing experience(year), specific playing position (if any),educational qualifications, socio-economic status, were recorded in the pre-designed schedule. Stature (cm) was measured (to the nearest 0.1cm) using anthropometric measurement set and body weight (kg) was measured (to the

nearest 0.1 kg) using an electronic weighing scale with individuals being without shoes and in socially acceptable light weight exercising clothings; and Body Mass Index (BMI) (kg.m^{-2}) was calculated. Body fat (%) of the subjects was calculated from the skin fold measurements taken at biceps, triceps, subscapular, suprailliac and calf (Pollock, 1980).Select obesity indices were calculated fromrespective anthropometric parameters: Waist to Hip ratio (WHR) (Cornelissen, 2009) from Waist Circumferences (WC) and Hip Circumferences (HC), Waist to Body Height ratio (WHtR) (Ashwell, 2012) from WC and stature; Body Adiposity Index (BAI) (Freedman, 2012),Abdominal Volume Index (AVI) (Guerrero – Romero, 2003) were also computed.For estimating the lower back and hamstring flexibility, sit and reach (Artero*et al.,* 2009)test was conducted.Similar measurements were taken from 48 individuals of comparable age, similar socioeconomic and ethnic background,but not takingpart in any form of formal exercising including football, constituting the Control Group (CG). After obtaining the measurements, data were subjected to statistical analyses and $P<0.05$ was chosen as the level of significance.

RESULTS

The results obtained from the study conducted on 42 randomly selected adult Bengaleemales, of age range 18-24 years constituting Football Practicing Group (FG) and 48 randomly selected males of comparable age and ethnic background are presented. It is to be notedthat participating FG volunteers are being trained in football for at least a period of 6 years and practicing it daily for at least a period of two hours every six days a week. To assess the effect of being trained in football on body composition, BMI, one of the important obesity indicators was calculated from stature and body weight data and presented in Figure 1.a. As body composition - lean body mass, muscle and bone - referring to the body's chemical composition is divided into three well defined models - chemical, anatomical and the two-compartmental model; and the last one simplifies body composition into two components, the fat free mass (FFM) and fat mass(FM) (kg),the other important parameter related to obesity was assessed; the fat massstatus of FG and CG individuals has been presented in Figure 1.b. Waist circumference (cm) and hip circumference (cm), the two other important

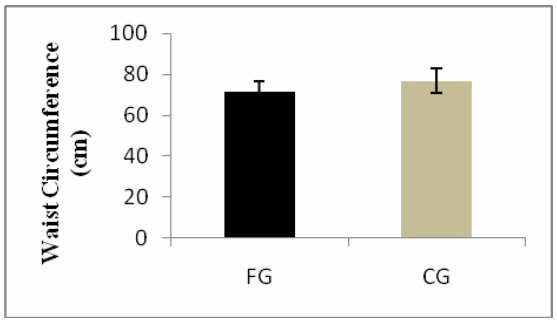


a. BMI*

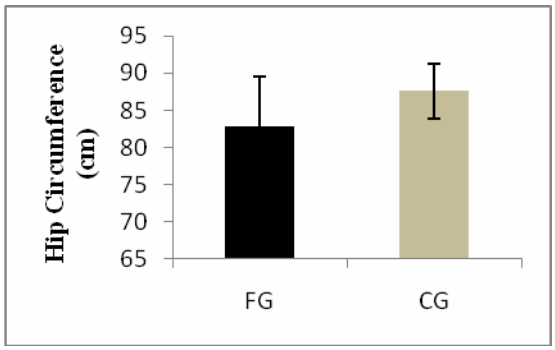
b. FAT MASS*

*P<0.05

Figure 1: Comparison between FG and CG individuals in terms of BMI and fat mass.



a. WC (cm)*



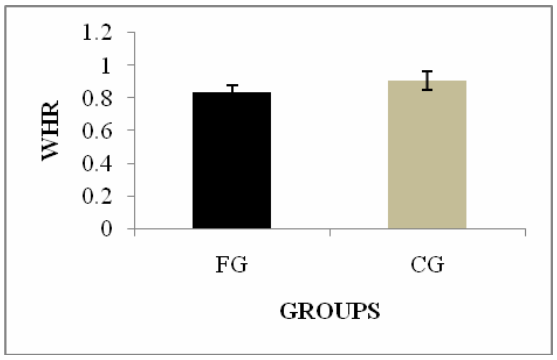
b. HC (cm)*

*P<0.05

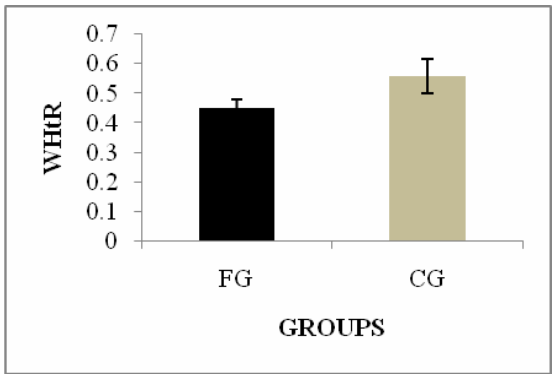
Figure 2: Comparison between FG and CG individuals in terms of WC and HC

indicators of body physique status, have been measured in FG and CG individuals and presented in figure 2a and 2b.

Two ratio indices - Waist to Hip Ratio (WHR) and Waist to Body Height Ratio (WHtR),important indicators of central obesity, have been calculated for FG and CG individuals and presented in figure 3a and 3b



a. WHR*



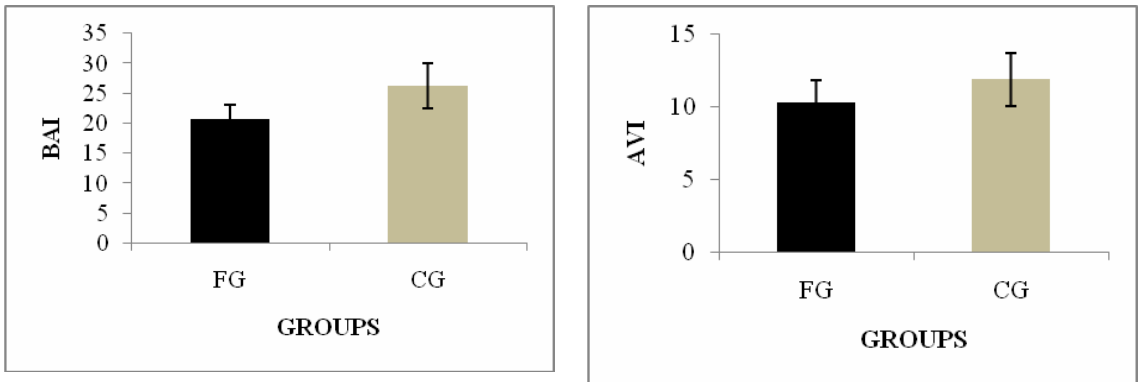
b. WHtR*

*P<0.05

Figure 3: Comparison between FG and CG individuals in terms of WHR and WHtR.

BAI and AVI are some of the indices denoting the obesity particularly obesity of the abdominal region. The status of abdominal obesity, assessed in terms of BAI and AVI of both FG and CG individuals have been calculated and presented in figure 4a, and 4b.

Flexibility (as a physical readiness factor), one of the most important motor ability status assessing parameters, has been estimated in present study for FG and CG individuals.In figure 5 lower back and hamstring flexibility in terms of Sit and Reach Test score of the study participants have been presented.

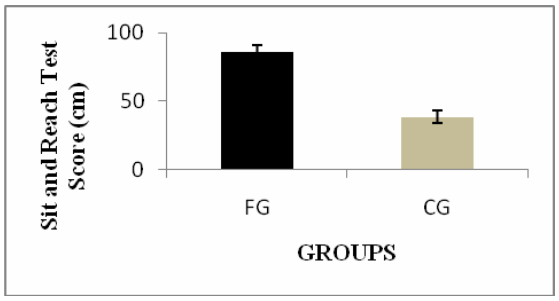


a. BAI*

b. AVI*

*P<0.05

Figure 4: Comparison between FG and CG individuals.in terms of BAI, AVI.



a. Sit and Reach Test Score (cm)*

*P<0.05

Figure 5: Comparison between FG and CG individuals in terms of Sit and Reach Test Score indicating the motor ability status

DISCUSSION

Recently, obesity has almost attained an epidemic status in many countries of the world and therefore, it has become a matter of concern for one and all including the young generation. There is also simultaneous attempt to address it worldwide through different approaches right from pharmaceutical aid to surgical interventions. On the other hand, it has been found from different earlierstudies that different physical activities (Santra*et al.,* 2014, Mukherjee*et al.,* 2014,2015) had beneficial impact on challenges posed by obesity; in the present study, impact of undergoing training in football, one of the most popular sport activities especially among male individuals,on body composition, has been assessed. It is found from the present study that the FG and CG individuals, comparable in terms of age, socio-economic status, vary significantly (P<0.05) in respect of stature (cm) and fat mass (kg). In the present study, it has been found that the average BMI value of FG is 18.9 (Fig 1a); it is not only significantly lower (P<0.05) compared to the CG individuals, but also well within the cutoff applicable for the south Asians; it is in agreement with the previous work carried out on trainee Bengalee Indian classical dancers (Mukherjee *et al*., 2012,2014,Kundu*et al*., 2014) and trainee adolescent football players (Banerjee*et al.,* 2014). As BMI solely cannot give the true picture about the body fat distribution of the individuals, total body fat mass (kg) is also considered. It has been found in the present study, that fat mass (Fig 1b) is significantly lower (P<0.05) in FG individuals compared to the CG individuals. From the previous studies, it has been reported that body fat percentage is higher in individuals engaged in sedentary lifestyle compared to

those engaged in regular physical activity (Banerjee *et al.,* 2013). Similar beneficial impact on maintaining favorable body fatstatus has been found in Bengalee adult females receiving training in Indian traditional dances (Mukherjee *et al.,* 2014, Banerjee *et al.,* 2014, Chatterjee*et al.,* 2015). In the present study, it has been found that the average value of WC in FG individuals (71.5 cm) is significantly lower ($P<0.05$) than their CG counterparts (76.7 cm), and also within the cutoff value for WC for Bengalee men; the WC values in CG individuals are also within the limit (Fig 2 a). The body physique status has also been assessed in terms of WHR and WHtR. In the present study the average value of WHR (Fig 3.a) in FG and CG individuals are 0.84 and 0.91 respectively. The average value of CG individuals is not only significantly ($P < 0.05$) higher compared to the FG individuals, it is also above the cut off limit (0.90) applicable for south Asian males. As WHR is usually conceived as an index of fat distribution, low WHR indicates a more curvaceous body shape with low abdominal adiposity, possibly indicating a better body physique. The WHtR value of FG individuals is found to be significantly ($P<0.05$) lower compared to their CG counterparts (Fig 3b); the findings are similar to earlier observations in female adolescents receiving regular training in Indian classical dances (Chatterjee*et al*., 2013, Mukherjee, *et al*., 2013, Banerjee *et al.,* 2014,Chatterjee*et al.,* 2014). Similar trend has also been observed in adolescent Bengalee males undergoing regular training in football (Bhattacharjee*et al.,* 2014).

The obesity indices like Body Adiposity Index (BAI), Abdominal Volume Index (AVI) have been calculated and presented. It has been found that the mean value of BAI is significantly ($P<0.05$) lower in FG individuals (20.8) than their CG counterparts (26.2) (Fig 4 a) indicating a reduction in risk of having health related co-morbidities in the FG individualscompared to their age and sex matched CG males; these findings are in consonance with one of our earlier studies(Banerjee *et al*, 2015).The Abdominal volume index (AVI)(Fig. 4b) (Jou*et al.,* 2006) yet another central adiposity marker is also significantly lower ($P < 0.05$) in FG individuals (fig.4.b).

Football requires enormous flexibility of the players, right from the beginning, for desirable performance. The flexibility, as a physical willingness factor, has remarkable significance and it could reduce the chance of injuries of the players (Chatterjee*et al.,* 2014). In the present study FG individuals has been found to have significantly higher ($P < 0.05$) lower-back and hamstring flexibility compared to their age and sex matched CG counterparts (Fig 5); it is in agreement with the reports from studies conducted on adult Bengalee females practicing Bharatnatyam dance (Bhattacharjee*et al.,* 2014), another form of aerobic exercise requiring flexibility during different dynamic body movements.

CONCLUSION

It could be concluded from the findings of the present study that individuals receiving training in football, for at least a period of six years and a minimum duration of two hours six days a week, have favorable body physique and significantly higher motor ability status compared to their age and sex matched control group individuals, indicating that individuals regularly being trained in football have lower chance of developing obesity and related co-morbidities.

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