

Impact of Indian Traditional Recreational Activity on Novel Anthropometric Markers of Diabetes in Bengali Females

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Abstract

Recently there is an increasing incidence of Type 2 Diabetes Mellitus (DM), one of the most common chronic diseases, throughout the world. As it is basically a life style disorder management strategies generally focus on leading an active lifestyle. Dance which requires adoption of different body postures by movement of different muscles at a specific rhythm is an age old recreational activity which is popular today also. Therefore, dance may have some potential to influence obesity, a major risk factor of DM. A study in this backdrop, has been undertaken to find out the impact, if any, of Bharatnatyam dancing, an Indian traditional classical dance, on the novel anthropometric markers of diabetes. Six anthropometric indices namely neck circumference, waist circumference, waist to hip ratio, waist to height ratio, waist to thigh ratio and waist to calf ratio were taken as target variables. Measurements were taken from 34 consenting adult female individuals receiving the training for a minimum five years period constituting Exercising Group (EG) and 35 female individuals of comparable age, ethnic and economic background not performing any type of regular physical exercise including dancing constituting the Non Exercising Group (NEG). It has been found EG individuals have significantly ($P < 0.05$) favorable values of measured anthropometric markers of DM compared to their age and sex matched NEG counterparts. It may be concluded that receiving the training and regular practicing of Bharatnatyam dancing has a favorable impact on the established anthropometric parameters of DM.

Keywords: Lifestyle Disorder; T2DM; Upper Body Obesity; Anthropometry; *Bharatnatyam*.

Introduction

The International Diabetes Federation estimates that in 2003, 194 million people had diabetes and that by 2025, 333 million people will have the disease [23] and Asia is emerging as the centre of the epidemic [21]. The proportions of people with type 2 diabetes and obesity have increased throughout Asia. This region contains some of the most populous countries in the world, that has under gone pronounced demographic, epidemiologic, and socio economic change in recent decades and India is one of them. India with a population of more than one billion has the greatest numbers of people with diabetes, and is likely to retain the position in 2025 with 20 million

affected individuals [20]. There is established evidence that both a high proportion of body fat and a predominance of central obesity are associated with insulin resistance resulting in diabetes mellitus. A high proportion of Asians have both these characteristics. There are several established anthropometric obesity indices which correlate fairly well with diabetes such as neck circumference, waist circumference, waist hip ratio and like. Therefore, addressing body morphological characteristics are also getting importance in prevention of the disease. The intervention and prevention strategies have shown the effectiveness of lifestyle modification with emphasis on regular physical activity. Dance, an active, non-competitive form of age old recreational

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activity, has a unique characteristic that all of the people participating in the particular activity perform certain movements in the same rhythm and tempo, thereby activating different muscle groups simultaneously; dance requires adoption of different postures like, sitting, bending, standing, knee bending. *Bharatnatyam* dance, one of the most popular Indian Classical Dance, is of no exception. Previously it has been found to have beneficial role in achieving favorable body composition in terms of body fat [1, 14], enhancing fitness in terms of motor ability [3], pulmonary function status [12] but no study has focused on the impact if any, of this dancing on diabetes markers. Present study, in this context, has been undertaken to assess the impact of regular practicing of *Bharatnatyam* dance on some anthropometric markers of diabetes.

Methodology

The current study was designed as a cross-sectional investigation conducted on randomly selected 34 young adult Bengalee female volunteers with age range 20-30 years regularly receiving *Bharatnatyam* dancing training for at least a period of five years and practicing at least three times a week on and average for half an hour period and 35 adult Bengali females of comparable age, and socioeconomic background and not undertaking any form of exercise training including any form of dancing, leading a sedentary life constituting the Exercising Group (EG) and Non Exercising Group (NEG) respectively. Participating volunteers were college and university student and some of them were engaged in sedentary type of occupation. Individuals

receiving *Bharatnatyam* dancing training for less than five years, being trained in other forms of exercise and also other forms of dancing, and with self reported diabetes, hypertension, hyperlipidemia and hyperthyroidism were excluded as subjects from the study. Prior to the commencement of the study, necessary ethical permission and individual consent were obtained after explaining the test requirements. Anthropometric and demographic data were obtained for each subject. Demographic data included age, marital status, occupation, lifestyle etc. Socio economic status of the participating individuals was determined using updated Kuppaswami socio economic scale. BMI was calculated using measured weight (kg) divided by height (m) squared with participants in light indoor clothing and without shoes. 5 circumferences namely neck (NC) [18], waist (WC), hip (HC) [13], thigh (TC) [13] and calf (CC) [11] were measured with a measuring tape. Waist hip ratio (WHR), waist height ratio (WHR), waist to thigh ratio (WTR) and waist to calf ratio (WCR) were calculated. The measurement procedures were carried out in morning hours. All variables were analyzed to find the significant difference, if any, and $P < 0.05$ was considered statistically significant.

Results

In the present study participants were young adult Bengali non-pregnant females residing in the urban region of West Bengal. All of them belonged to Bengali Hindu Caste Population (BHCP) and were from middle class strata of the society.

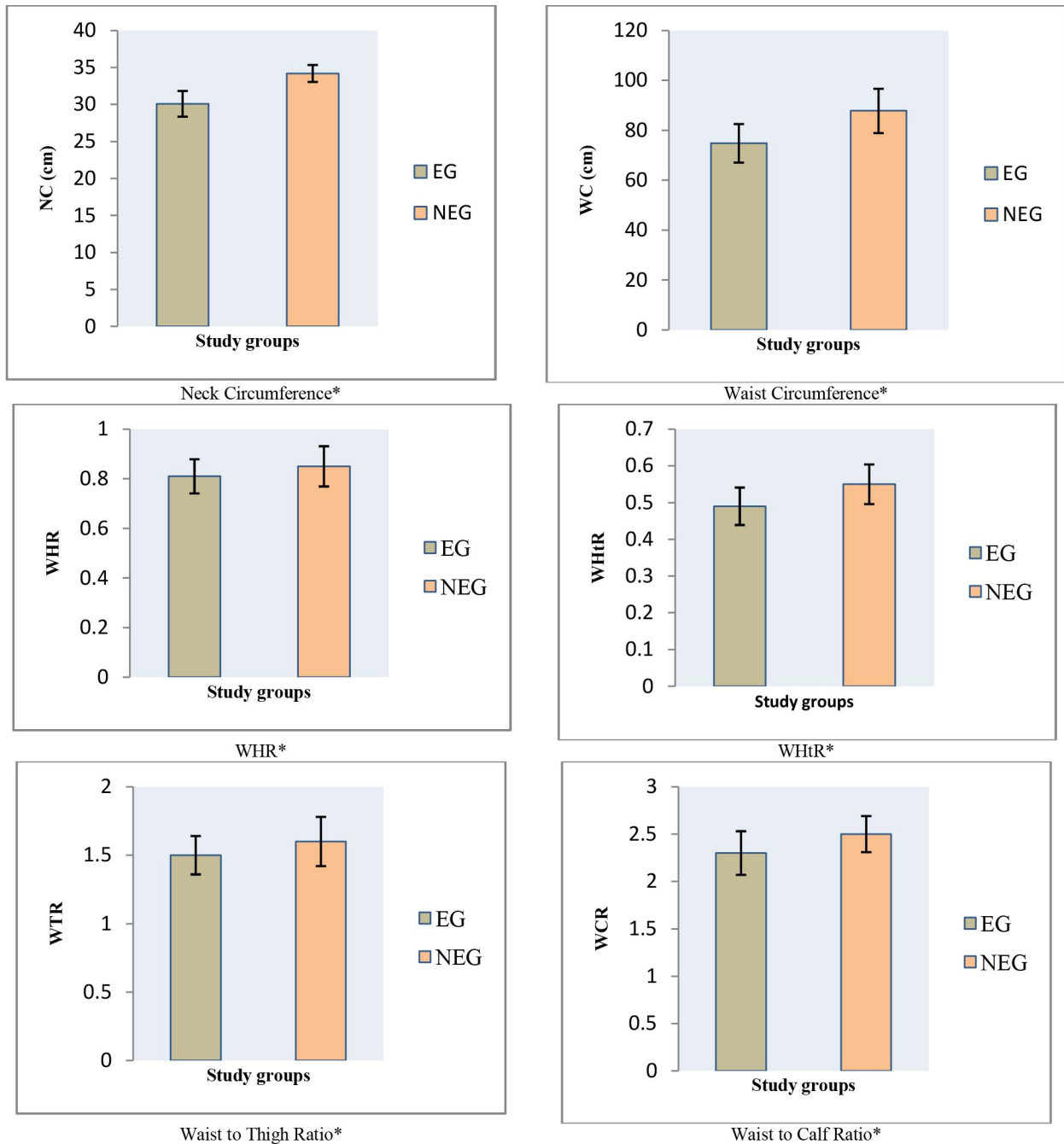
Table 1: Basic physical profile of the study participants

Variables	DG	NDG
Age [^]	22.9 ± 2.47	22.6 ± 2.19
marital status	Unmarried	Unmarried
occupation	College and university students, sedentary working women	College and university students, sedentary working women
lifestyle	Sedentary in nature	Sedentary in nature
Family history of diabetes	No previous history of self and parents	No previous history of self and parents
BMI (kg.m ⁻²)*	22.0 ± 5.22	25.5 ± 3.58

* $P < 0.05$, [^]ns

In figure-1 comparison between EG and NEG individuals has been presented in terms of anthropometric markers of diabetes mellitus

Fig. 1: Comparison between EG and NEG individuals in terms of anthropometric markers of diabetes mellitus



*P<0.05

Significantly (P < 0.05) favorable values of anthropometric parameters which are established markers for diabetes have been found in EG individuals compared to NEG individuals.

Discussion

In present day scenario Type 2 diabetes has become a global epidemic health problem worldwide, and it is closely related to numerous cardio-metabolic complications [22]. Overall obesity in addition with

excess accumulation of adipose tissue in particular body regions contribute to metabolic complications [9, 8]. It has also been found that those who have fat predominantly accumulated in the upper body rather than the lower body are more susceptible to metabolic disturbances. Therefore different anthropometric

parameters come into play a major role in the occurrence of different metabolic diseases including diabetes mellitus. BMI is the most popular measure of generalized obesity and in the present study it has been found that NEG individuals belonged to obese category as per WHO Asian classification where as EG individuals belonged to normal weight category; similar finding has been found in previous study also [2]. Recent studies have focused on the cardio-metabolic correlates of the upper trunk fat and upper trunk-related anthropometric indices, such as NC [19, 4]. In the present study it has been found that the EG individuals have lower mean value of NC compared to NEG individuals. Previous study has found that higher NC is correlated positively with the factors of the metabolic syndrome [5]. Waist circumference, an extensively studied central obesity marker, has also been found to be a predictor of diabetes. In the present study significantly lower value of WC in EG individuals has been found compared to their NEG counterparts; which could be attributed to different postures adopted for the *Bharatnatyam* dancing. Present finding is in agreement with previous studies [15, 16]. Similar trend of result has been found in case of WHtR and WHR; other previous studies are also in consonance with the present findings [17, 6]. WTR is a relative new alternative index for abdominal adiposity. Epidemiological studies have demonstrated that an increased WTR is a strong predictor for type 2 diabetes [7, 10]. In the present study it has been found that NEG individuals have significantly ($P < 0.05$) higher value of WTR than EG individuals. In a study conducted on US adults it has been found that individuals with diabetes have higher mean value of WTR compared to their non diabetic counterpart [13]; it has also been found that WTR may be superior to traditional anthropometric indices such as WHtR, WHR, WC, and BMI in the association with prevalent diabetes in men whereas in women WTR appeared to perform similarly to WHtR, WHtR, and WC, but better than BMI in women. WCR, which is an index generally used to assess the disproportion between abdominal fat and leg muscle mass has also been studied in context of association with diabetes. Present study has found significantly ($P < 0.05$) lower mean value of WCR in EG individuals compared to their age matched NEG counterparts. Previous study has found that individuals with a higher quartile of WCR were more obese (both generally and centrally), had longer duration of diabetes, had a lower insulin sensitivity, and were likely to have more adverse metabolic profiles as compared with those who had a lower quartile of WCR [11]. Overall results indicate that individuals receiving the *Bharatnatyam* dancing

training for a period of minimum five years and practicing it for at least three days a week for on and average half an hour period have favorable values of anthropometric markers of diabetes.

Conclusion

In conclusion, present study has shown that *Bharatnatyam* dancing are associated with a significantly lower risk of diabetes adjudged by different anthropometric markers in the adult Bengalee female population.

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