

## Indian Classical Dancing and Cardiovascular Health Status: A Study in Bengalee Female Adults

**Abstract :** The rapid emergence of cardiovascular diseases in countries that are undergoing nutrition and lifestyle transitions including India has become a bottleneck for the country's social and economic development. A study was conducted to find out the impact of Bharatnatyam dancing (BD), a feasible, enjoyable, accessible and appealing form of traditional recreational activity, on CV health status in respect of anthropometric markers, of adult Bengalee females. A significant ( $P < 0.05$ ) favorable impact has been found in individuals undergoing training in BD compared to their control group counterparts.

**Key words:** upper body obesity, CVD, sociocultural issues, Bharatnatyam, southern Bengal

In recent times, cardiovascular diseases (CVD) that include heart attacks, heart failure, stroke and peripheral artery diseases, are posing an enormous health challenge globally. It is the largest single cause of death among women and accounts for one-third of all deaths worldwide<sup>1</sup>. In addition, CVD also accounts for more deaths in women than from any other cause, including all types of cancers combined. It is a matter of concern that the burden is on the rise in developing nations as well<sup>2</sup>. The dual burden of persistent infectious diseases and emerging chronic non-communicable diseases (NCDs) like CVD present a serious threat to population health and limited health care resources especially in low- and middle- income countries including India. Moreover, Asian Indians have unusually high rates of Coronary Heart Disease (CHD)<sup>3</sup>. Due to socio-cultural issues that are generally prevailing in Indian society, females start leading a more of sedentary life-one of the major risk factors for CVD and all-cause mortality<sup>4,5</sup> after attaining pubertal age, increasing the chances of obesity, another independent risk factor for CVD. In adulthood also the trend is on the rise due to more mechanization and overall transition in occupational settings. It has been found that there is a high prevalence of overweight and obese

individuals engaged in sedentary occupation<sup>6,7</sup> along with other adverse health outcomes<sup>8</sup>. The detrimental impact of obesity on the incidence of subsequent CVD is partly mediated by increased levels of cardiovascular risk factors (CVRF), in particular hypertension, dyslipidemia and diabetes<sup>9</sup>. On the other hand, dance, an accessible and appealing form of widely enjoyed recreational activity<sup>10</sup>, is a demanding neuromuscular, skeletal event, a temporal, spatial, kinetic interface anchored by the universality of human motion and propelled by creative forces. It is a transient mode of expression that manifests in many styles and forms and therefore requires a delicate balance of perfection and freedom in the moving architecture of the human body. Bharatnatyam, a low impact Indian classical dance form maintains contact of one foot with the floor at all times. It involves adoption of different body postures like sitting, bending, twisting and continuous rhythmic body movements which might exert some effects on different physiological system. Hence, in addition to the aesthetic aspects, Bharatnatyam is physically demanding and also culturally accepted recreational activity, especially in females. Previous studies have reported the favorable impact of Indian classical dancing on body composition<sup>11-14</sup> including body fat aspect<sup>15</sup>, motor ability<sup>16,17</sup> and pulmonary function indices<sup>18,19</sup>. Since there had been dearth of documented information on health impacts, especially with regard to prevention of CVD/ adiposity in Bengalee females, due to being trained in Bharatnatyam dance, present study aims to find out the impact of practising Bharatnatyam dancing regularly on cardiovascular health status in terms of anthropometric indicators – both measured like NC, WC and SAD and derived like BMI, BAI, AVI, in adult Bengalee females.

**Methodology:** Present study was conducted on 66 adult unmarried Bengalee female volunteers, of age range 25-30 years, regularly receiving Bharatnatyam dancing (BD) training for at least a period of five years and practicing at least five days a week on and average for half an hour period, and 72 adult unmarried Bengalee females of comparable age, and socioeconomic background

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(basic educational status, occupational involvement, monthly family income) and not undertaking any form of exercise training including any form of dancing, leading a sedentary life. They respectively constituted the Bharatnatyam Dancing Group (BDG) and Control Group (CG). Individuals receiving BD training for less than five years, being trained in other forms of exercise and also other forms of dancing, and with any self-reported chronic illness were excluded from being considered as probable study participants. Anthropometric and background information including age (year), occupation, lifestyle status and the like were obtained for

**TABLE 1: Background characteristics of the participating volunteers**

Variables	CG	BDG
Residence	urban areas	urban areas
Select Socio-demographic characteristics		
Age (years)#^	26.6 ± 1.42	26.3 ± 1.75
Ethnicity	Bengalee Hindu	Bengalee Hindu
SES	upper middle	upper middle
Marital status	all unmarried	all unmarried
Other information		
Addiction (smoking, alcoholism or like)	nil	nil
Family history of CVD	no previous history of self and parents	no previous history of self and parents
Any regular medication for any chronic diseases	nil	nil
Lifestyle	sedentary in nature	sedentary in nature
Exercise habit	nil	only BD

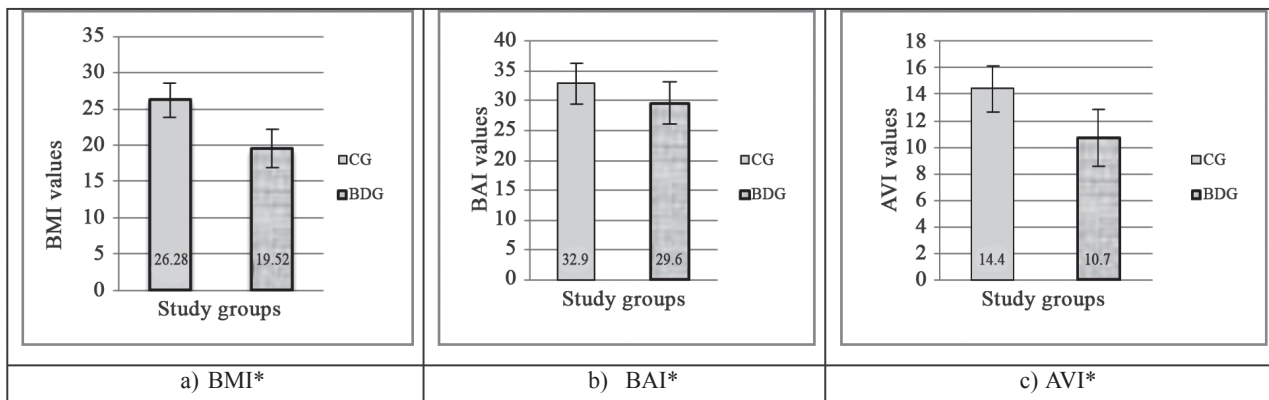
#AM±SD, ^ns

each subject on obtaining necessary ethical permission and individual consent after explaining the study requirements. Socio-economic status of the participating individuals was assessed using updated Kuppuswami socio-economic scale<sup>20</sup>. BMI was calculated using ratio of measured body weight (kg) to squared value of stature (m), with participants in light indoor clothing and without shoes. The Neck Circumference (NC)<sup>21</sup>, Waist Circumference (WC) and Hip Circumference (HC) were measured using a narrow flexible, inelastic and non-stretchable measuring tape<sup>22</sup>. Waist circumference to Hip circumference Ratio (WHR) and Waist circumference to Stature Ratio (WSR) were found out. Sagittal abdominal diameter (SAD) was measured using an abdominal caliper with the participants in supine condition<sup>23</sup>. Body Adiposity Index (BAI)<sup>24</sup> and Abdominal Volume Index (AVI)<sup>25</sup> were found out. To reduce inter-observer measurement error, the measurement

procedures were carried out by only one investigator, in morning hours. All variables were analyzed to find the significant difference, if any, and P <0.05 was considered statistically significant.

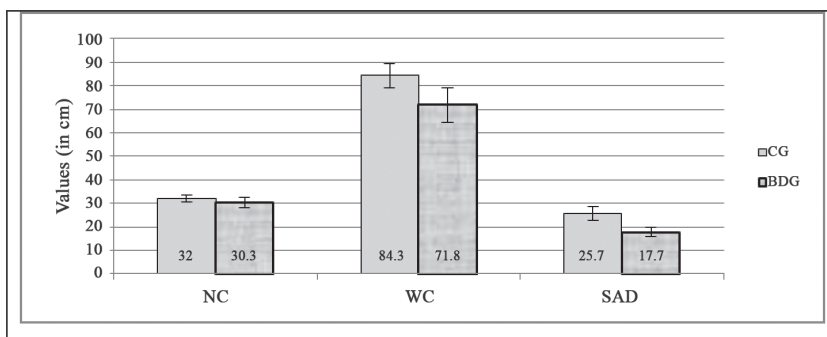
**Results and Discussions:** In the present study, participants were adult Bengalee females, with age in year in BDG: 26.3 ± 1.75 and in CG: 26.6 ± 1.42 (AM ± SD) residing in and around Kolkata metropolitan Area. All the individuals belonged to upper middle class, as obtained score from modified Kuppuswamy scale was in the range of 16-25 corresponding to upper middle class strata of the society.

In Figure 1-3, comparisons between CG and BDG individuals in terms of anthropometric indicators of CVD have been presented graphically. In Figure 1, comparisons between CG and BDG individuals in terms of BMI, BAI



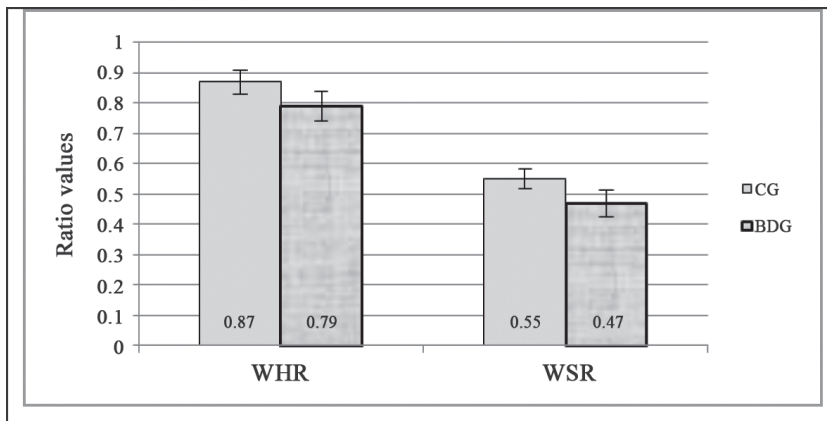
\*P<0.05

**Figure 1:** Comparison between CG and BDG individuals in terms of BMI, BAI and AVI



\*P<0.05

**Figure 2:** Comparison between CG and BDG individuals in terms of NC, WC and SAD



\*P<0.05

**Figure 3:** Comparison between CG and BDG individuals in terms of WHR and WSR

and AVI have been graphically presented. In Figure 2, comparison between CG and BDG individuals in terms of WC, NC and SAD have been presented graphically. In Figure 3, comparison between CG and BDG individuals in terms of WHR and WSR have been graphically presented.

Sedentary behavior, persistent low levels of physical activity and poor cardio-respiratory fitness (CRF) are known to predict progression toward Type 2 Diabetes, metabolic syndrome and CVD in adults<sup>26-28</sup>. The most immediate impact of physical inactivity is obesity, and as obesity has been reclassified by American Heart Association as a 'major, modifiable risk factor' for CVD, different preventive strategies are being attempted to address it. Favorable impacts of structured exercise on physical and physiological system have been reported from earlier studies<sup>29-31</sup> which may not always be applicable or feasible especially in Bengalee females. On the other hand, dancing has been a popular recreational activity for centuries. But across the world, only a few studies have examined the effect of dancing, that too mainly western type, on factors contributing to CVD in females. The present study was planned in this backdrop. Significantly (P <0.05) lower body weight in BDG individuals compared to their CG

counterparts was found, and this could be attributed to regular dancing exercise of Bharatnatyam form as the BDG and CG individuals were not otherwise differing in terms of their socio-economic background and dietary energy intake and neither any dietary modification was suggested. The trend is affirmed from BMI values, the most commonly used indicator of obesity. BMI value of CG individuals is significantly higher (P <0.05) than BDG individuals. An earlier study has also revealed that regular exercising with Indian classical dancing is beneficial in achieving and maintaining favorable BMI<sup>32</sup>. It has been found that the average BMI of CG individuals was falling into overweight (25.0-29.9 kg.m<sup>-2</sup>) class, as per the WHO Standard classification<sup>33</sup>, but on consideration of the Asian standards it falls into obese category<sup>34</sup>. BMI has also been reported to be higher in individuals with type 2 diabetes mellitus<sup>35</sup>, another predictor of CVD. It has been established that at a given BMI, Asians have significantly higher body fat content than westerns<sup>36</sup>, and hence it is a matter of concern. But in spite of the usefulness of BMI as a surrogate for adiposity, it has been criticized as it does not discriminate between the different components of the body and is unable to describe the fat distribution over the body. In adults, it has been found that a more central fat distribution is associated with an increased risk of ill health<sup>37</sup>. The central obesity parameter is all the more important in Asian population, as they possess high levels of abdominal fat and are particularly prone to diabetes mellitus and cardiovascular diseases<sup>38</sup>. Another new index - Body Adiposity Index (BAI) - was proposed to reflect the picture of adiposity relatively recently, and in the present study, lower values of BAI in BDG individuals compared to CG individuals, which is in consonance of our earlier finding<sup>39</sup>, further affirm the trend. Abdominal Volume Index (AVI) estimates overall abdominal volume between symphysis of pubis and xiphoid appendix and theoretically includes intra-abdominal fat and adipose tissue volumes. Although AVI did not cross the cut-off 25 for being high, significantly higher mean value has been found in CG individuals compared to BDG, reflecting much higher abdominal tissue volume. The finding of the present study is in agreement with an earlier

work<sup>40</sup>. Recent studies have focused on the cardio-metabolic correlates of the upper trunk fat and upper trunk-related anthropometric indices, such as NC<sup>41</sup>. In the present study, it has been found that the BDG individuals have lower mean value of NC compared to their CG counterparts; present finding is in agreement with an earlier report from our group<sup>42</sup>. A greater cardiovascular risk has been found to be associated with increased values of WC, a popular anthropometric indicator of central or abdominal obesity<sup>43</sup>. Present study has found significantly lower values of WC in BDG individuals compared with CG counterpart. The present finding is in line with previous studies<sup>44-46</sup>. SAD has been found to be an important and strong predictor of CV risk<sup>47</sup> and has correlation with cardiovascular risk factor even better than WC and BMI<sup>48</sup>. In the present study, it has been found that mean SAD value of BDG individuals, which is lower than the reported cut off value<sup>49</sup>, is significantly lower compared to the CG individuals. WHR, an indicator of abdominal obesity, has been reported to be significantly associated with the risk of incident CVD events<sup>50</sup>. A significantly favorable trend has been found in BDG individuals in terms of WHR compared to their CG counterparts, which is in consonance with our earlier finding conducted on individuals being trained in creative dance<sup>51</sup>. WSR, another novel anthropometric index, has been reported to be a strong predictor of a wide range of CVD risk factors<sup>52</sup>. In the present study, it has been found that BDG individuals have significantly lower value of WSR compared to CG individuals, indicating a reduced chance of suffering from CVD. Regular exercising with enjoyable form of physical exercise has been reported to be beneficial for cognitive fitness<sup>53</sup> -physical as well as mental wellbeing including anxiety, depression and like<sup>54</sup> of the participating individuals which may also indirectly influence cardiovascular health status<sup>55,56</sup>.

**Conclusion:** From the present study, it may be concluded that training and practising of Bharatnatyam dancing, one of the most popular Indian traditional classical dance forms, has significant favorable impacts on cardiovascular health status adjudged in terms of established anthropometric markers of CVD. Since Bharatnatyam is an enjoyable form of physical activity, health promotion and prevention of chronic lifestyle diseases such as CVD, may be achieved through proper and structured practice of Bharatnatyam dancing.

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