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## Prevalence of physical activity across Hubli-Dharwad collegiate Bharatanatyam dancers: A cross sectional study

**Vijayalaxmi S Kathare, Dr. Pooja Kesharwani, Tulasi H Kulkarni, Namratha Shanbhag and Poojalaxmi Patil**

### Abstract

**Background:** Dance is a form of physical activity that is widely practiced as a leisure activity that is prevalent form of physical activity among girls. Bharatanatyam is an Indian classical dance which is a recreational activity since age old times. International Physical Activity Questionnaire (IPAQ) is designed specifically for adults to measure activity levels accurately and across multiple domains of physical activity.

**Aim:** To describe the prevalence of physical activity among Hubli and Dharwad Bharatanatyam dancers.

**Methodology:** A total of 126 dancers across Hubli-Dharwad of age group 18-24 years completed the official English long version of the IPAQ. The total level of physical activity was estimated and expressed as metabolic equivalent-hours per week.

**Results:** The mean age observed was  $21.47 \pm 1.64$  years. The statistical tests show significant difference in the METS over age groups.

**Conclusion:** This study found that dancers have low physical activity and there is need for additional supplemental exercise training in dancers.

**Keywords:** Physical activity, bharatnatyam dance, IPAQ, metabolic equivalent (METS)

### Introduction

Physical activity (PA) is defined as bodily movement produced by skeletal muscles resulting in energy expenditure higher than resting<sup>[1, 2]</sup>. In routine it can be divided into occupational, sports, conditioning, household, or other activities<sup>[3]</sup>. There are four main types of physical activity: aerobic, muscle-strengthening, bone-strengthening, and stretching. Aerobic activity involves large group of large muscles activities like running, swimming, walking, bicycling and dancing are examples of aerobic activity<sup>[4]</sup>.

Dance is a form of physical activity and a mode of exercise<sup>[5, 6]</sup> and is widely practiced as a leisure activity that is prevalent form of physical activity among girls<sup>[7-9]</sup>. Bharatanatyam is an Indian classical dance which is a recreational activity since age old times. It includes activities like sitting, bending, standing, twisting etc. and some complex movements like jumps and taut hand gestures<sup>[6]</sup>.

The instrument that can be used for analyzing PA in large scale studies is a questionnaire, because it is an assessment tool which is acceptable, practical, feasible and easy to administer<sup>[1, 10]</sup>. International Physical Activity Questionnaire (IPAQ) was designed specifically for adults (18–65 years old) to measure activity levels accurately and across multiple domains of physical activity<sup>[11]</sup>. The intensity of physical activity is calculated as metabolic equivalents (METs). Metabolic equivalents (METs) is defined as a unit which is used to estimate the metabolic cost or oxygen consumption of physical activity<sup>[12, 13]</sup>.

There are limited studies on overall physical activity levels of girls who participate in dance classes. There is a need to study the contribution of dance on physical activity among. This study aims at determining PA level by using a self-reported questionnaire IPAQ. It is a simple, convenient and reliable questionnaire. Therefore, this study is undertaken to describe the prevalence and patterns of physical activity among Hubli and Dharwad Bharatanatyam dancers. Data from the questionnaire will transformed into energy expenditure estimates as MET using published values.

### Methods and materials

This was a cross-sectional study aiming to find out prevalence of physical activity across Hubli-Dharwad collegiate Bharatanatyam dancers. The study started after obtaining clearance from SDM college of Dental sciences institutional ethical committee. Participants were selected randomly and the online IPAQ Questionnaire in form of Google Forms were sent to Bharatanatyam dancers of age 18 to 24 years across Hubli-Dharwad. The questionnaire was designed specifically for adults (18–65 years old) to measure activity levels accurately and across multiple domains of physical activity done during last 7 days by long IPAQ form in Google document form.

The data were analyzed using statistical software R software version 4.1.2 and Microsoft Excel.

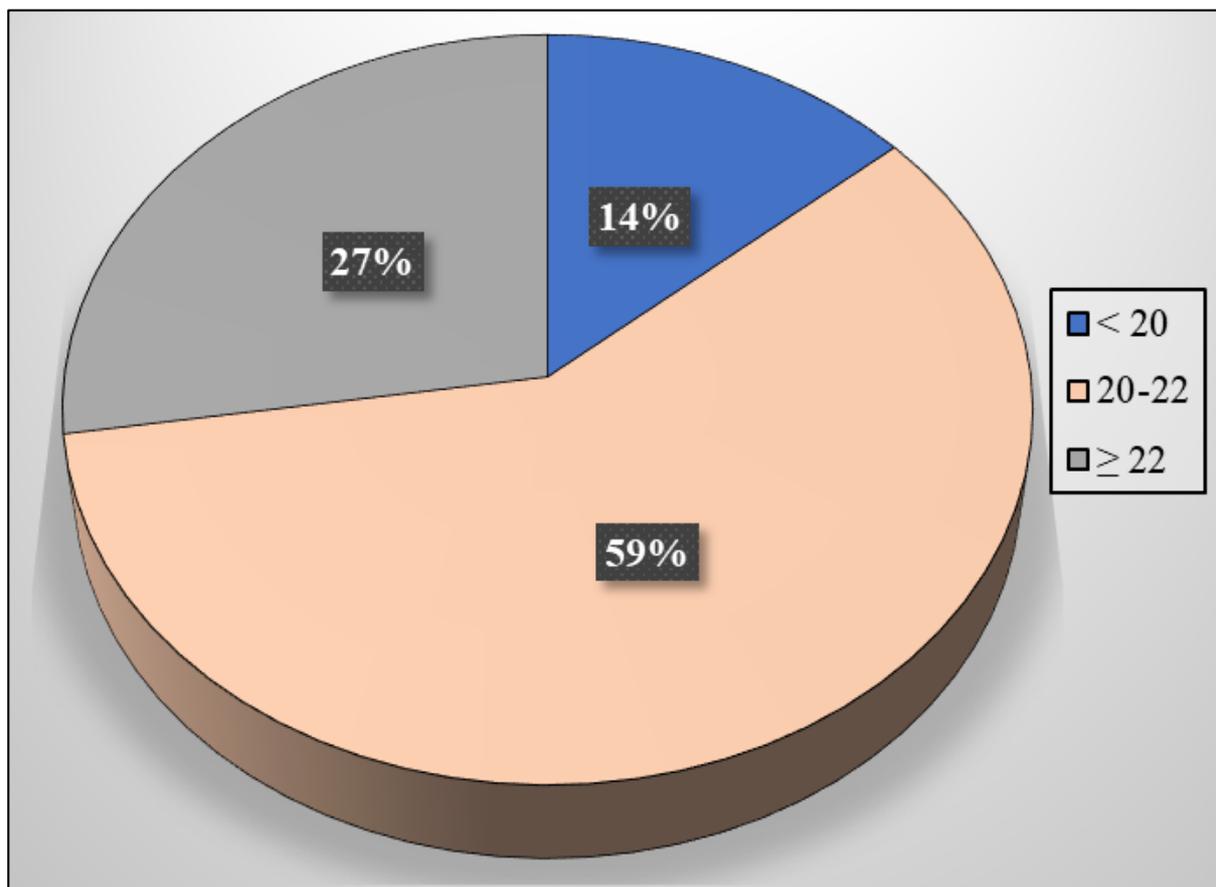
### Results

In present study mean age observed was  $21.47 \pm 1.64$  years and minimum, maximum age observed was 18 years and 25 years respectively.

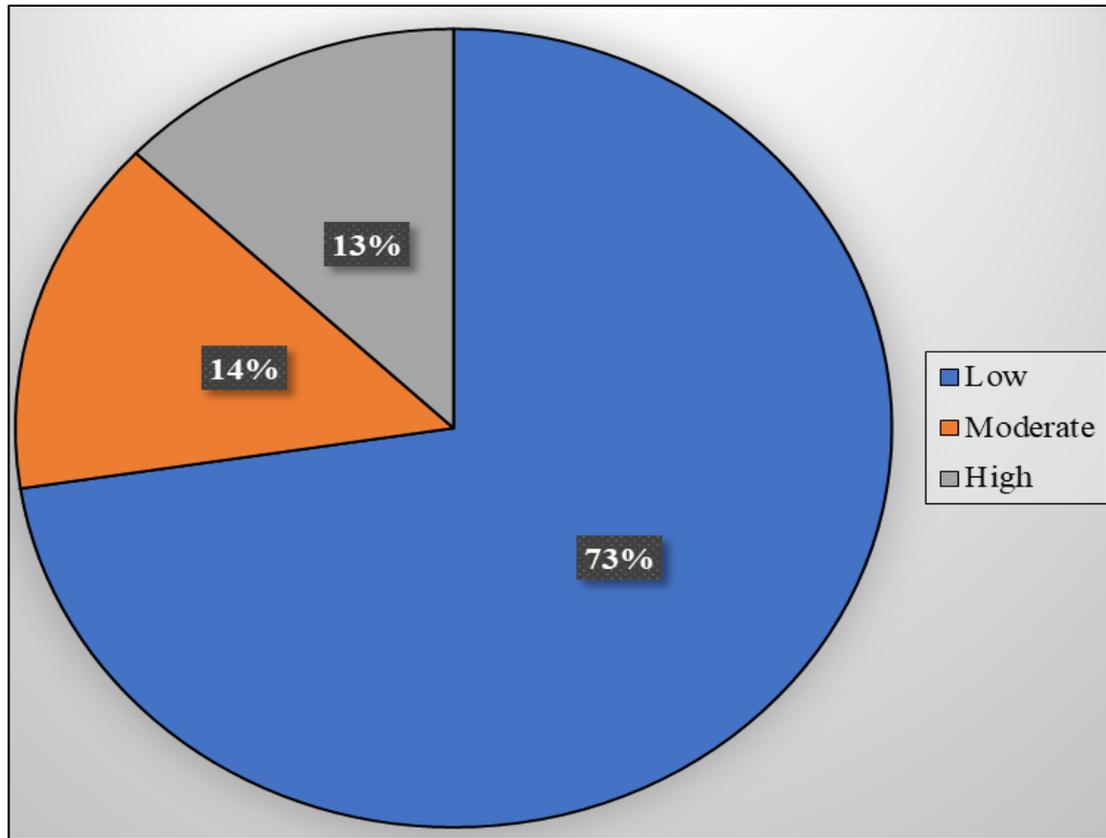
By Kruskal-Wallis test, there was significant difference in the Work Domain Walking, moderate METS, Vigorous

METS, Total METS, Moderate Yard MET over age group. Dunn's test used for post-hoc analysis and observed that, there was difference in the Work Domain Walking score between age group  $< 20$  years-  $\geq 22$  years ( $p$ -value:  $< 0.0001^*$ ),  $20-22$  years-  $\geq 22$  years ( $p$ -value:  $0.00041^*$ ). Dunn's test used for post-hoc analysis and observed that, there was difference in the Moderate METS score between age group  $< 20$  years-  $\geq 22$  years ( $p$ -value:  $< 0.0001^*$ ),  $20-22$  years-  $\geq 22$  years ( $p$ -value:  $0.0008^*$ ). Dunn's test used for post-hoc analysis and observed that, there was difference in the Vigorous METS score between age group  $< 20$  years-  $\geq 22$  years ( $p$ -value:  $< 0.0001^*$ ),  $20-22$  years-  $\geq 22$  years ( $p$ -value:  $0.0033^*$ ). Dunn's test used for post-hoc analysis and observed that, there was difference in the Total METS score between age group  $< 20$  years-  $\geq 22$  years ( $p$ -value:  $< 0.0001^*$ ),  $20-22$  years-  $\geq 22$  years ( $p$ -value:  $< 0.0001^*$ ). Dunn's test used for post-hoc analysis and observed that, there was difference in the Moderate Yard MET score between age group  $20-22$  years-  $\geq 22$  years ( $p$ -value:  $0.0253^*$ ).

All other variables turned out to be non-significant over age group by Kruskal-Wallis test.



**Fig 1:** Distribution of subjects by age group



**Fig 2:** Distribution of subjects by physical activity level

**Table 1:** Distribution of subjects by age group

	Age groups (in years)			Overall	p-value
	< 20	20-22	≥ 22		
Work Domain Walking	174.71±504.23 0 (0, 1782)	256.99±884.86 0 (0, 5940)	1358.82±2799.11 264 (0, 9702)	543.44±1680.53 0 (0, 9702)	<0.0001*
Moderate METS	82.35±249.99 0 (0, 960)	247.4±947.57 0 (0, 5760)	1050.59±2320.97 200 (0, 11760)	441.44±1451.27 0 (0, 11760)	<0.0001*
Vigorous METS	305.88±1056.12 0 (0, 4320)	265.21±1382.21 0 (0, 11520)	2911.76±5132.08 80 (0, 17280)	988.48±3107.51 0 (0, 17280)	<0.0001*
Total METS	562.94±1781.41 0 (0, 7062)	769.6±2652.39 0 (0, 18550.5)	5321.18±8881.24 1486.5 (0, 34902)	1973.36±5451.24 0 (0, 34902)	<0.0001*
Active Transportation Domain Walking	1516.06±1816.44 1270.5 (132, 6930)	1830.37±2157.85 742.5 (0, 8316)	1518.49±2349.81 503.25 (0, 9702)	1697.65±2150.5 742.5 (0, 9702)	0.7556
Cycle METS	1415.29±3006.5 0 (0, 8640)	964.93±2069.6 0 (0, 9000)	952.94±2942.15 0 (0, 15120)	1026.72±2445.99 0 (0, 15120)	0.4542
Total Transportation MET	2931.35±4682.62 1270.5 (330, 15570)	2795.3±3560.24 1228.5 (0, 13950)	2471.43±4810.76 907.5 (0, 24822)	2724.37±4046.57 1188 (0, 24822)	0.552
Vigorous Yard MET	1297.35±2160.2 0 (0, 6600)	1166.6±2350.51 110 (0, 13860)	1080.59±3176.97 0 (0, 16170)	1158.92±2549.72 0 (0, 16170)	0.3563
Moderate Yard MET	1743.76±2396.08 400 (0, 6720)	1559.51±2221.09 440 (0, 10080)	978.24±2653.08 40 (0, 11760)	1425.5±2357.5 220 (0, 11760)	0.0220*
Moderate Inside Chores MET	2179.41±1719.21 1620 (240, 5040)	1500.21±1587.39 990 (0, 6480)	1721.47±2432.75 420 (0, 8820)	1653.72±1863.48 1080 (0, 8820)	0.1052
Total Yard And Chores	5220.53±4404.9 5360 (300, 13020)	4226.32±5134.23 2520 (0, 25620)	3780.29±7292.12 1277.5 (0, 36750)	4238.14±5670.23 1925 (0, 36750)	0.095
Leisure-Time Walking MET	1557.79±2197.75 462 (0, 8316)	1378.32±1623.29 792 (0, 7128)	1379.21±2187.26 429 (0, 9702)	1396.3±1853.69 544.5 (0, 9702)	0.6802
Leisure-Time Moderate MET	897.65±1741.81 0 (0, 5760)	1204.44±1897.55 220 (0, 10080)	1378.82±2737.92 0 (0, 11760)	1212.03±2121.03 160 (0, 11760)	0.3815
Leisure-Time Vigorous MET	1440±2968.64 0 (0, 11520)	2013.15±3090 480 (0, 14400)	1725.88±4485.4 0 (0, 23520)	1856.32±3475.39 320 (0, 23520)	0.0629
Leisure-Time Total MET	3895.44±6520.06 1188 (0, 25596)	4595.9±5618.44 1752 (0, 27540)	4483.91±8601.33 1459 (0, 44982)	4464.65±6600.05 1562 (0, 44982)	0.401
Sitting Total Minutes/week	2073.82±746.09 2220 (710, 3360)	1797.6±929.24 1800 (0, 3360)	2041.32±965.34 2040 (265, 3360)	1893.8±919.79 1980 (0, 3360)	0.3134
Average Sitting Total Minutes/day	296.26±106.58 317.14 (101.43, 480)	256.8±132.75 257.14 (0, 480)	291.62±137.91 291.43 (37.86, 480)	270.54±131.4 282.86 (0, 480)	0.3134

## Discussion

The study reported the prevalence of physical activity across Hubli-Dharwad collegiate Bharatanatyam dancers from 18-24 years. The items in the long IPAQ form is structured to provide domain specific scores Work Domain, Active Transportation Domain, Domestic and Garden [Yard Work] Domain, Leisure-Time Domain. A benefit of IPAQ's assessment of several physical activity categories as part of global surveillance is that it may result in greater estimates of overall PA than prior surveys that just included leisure-time activity [14].

A study conducted provides baseline information about the physical activity levels and patterns including sitting hours among Indian young adults using IPAQ. It concluded that the subjects were already meeting the recommended physical activity levels [15].

Total 126 dancers participated in this study, out of which 14% population was below 20 years of age, 59% were between 20-22 years and 27% were above 22 years. In the study, mean age observed was  $21.47 \pm 1.64$  years and minimum, maximum age observed was 18 years and 25 years respectively. 54.8% were intermediate or diploma holders, 37.9 were graduated and post-graduates, 2.4% were school students and 5.6 were professional degree/honors.

Computation of the total scores from the long form show 73% are involved in low physical activity, 14% are involved in moderate physical activity and 13% are involved in high physical activity. The statistical tests show significant difference in the METS over age groups. And according to the results, the dancers across Hubli-Dharwad have low physical activity.

Studies have shown that cardiorespiratory requirements, e.g., heart rate (HR) and oxygen consumption, during classes and rehearsals were not sufficient to prepare dancers for the physical demands of performances. Because of the differences between dance classes, rehearsals, and performances, the need for supplementary aerobic training of dancers has been brought to the forefront. There are often no cardiopulmonary training effects after long periods of dancing alone, since the dance impulse of classes is too low due to a high amount of recovery time and a low overall heart rate [16, 17].

Therefore, dancers present with low aerobic capacity and strength levels when compared to other athletes, taking part in similar activities mostly due to fitness plateaus maintained during their daily dance training, which emphasizes on technical development, usually not following any development in volume and intensity of work. For this reason, discrete amounts of extra fitness training, incorporated into dancers' routine of classes and rehearsals, have been suggested in order to compensate for dancers' lack of conditioning work [16].

To determine aerobic fitness in dancers a dance-specific aerobic fitness test (DAFT) was developed. The DAFT comprises of a contemporary dance sequence of five stages. HR and oxygen consumption was measured at the end of each stage. It can be used to measure the effect of supplemental training on aerobic fitness and aesthetic competence. It was intended to be used as an easy-to-administer field-based evaluation of aerobic fitness. It was concluded from the study that the DAFT is a valid tool to determine aerobic fitness in dancers since HR frequency and oxygen uptake during stage 3 reflect those of contemporary dance classes and at the end of the 5<sup>th</sup> stage mirrors to those

of performances. So, the test can be used as a pre-requisite for dancers returning from holiday to predict maximal oxygen uptake. At the end of the DAFT the supplemental training resulted in lower HR frequency [17].

Dancers must focus on aerobic conditioning to handle quick, high-intensity dance movements so they can perform for extended periods of time efficiently and without losing their body expression, which will help them recover from exhaustion more quickly. Prolonged sub maximal exercise like DAFT an excellent mode of training to enhance long duration Bharatanatyam performance. So there is need to change dancers' attitudes towards cardiovascular activities and the amount of physical activity that they perform daily and to investigate and give supplementary training to enhance the physical demands of dance in terms of cardiorespiratory fitness. Study on DAFT was done in Texas, US along with plyometric HIIT; in The Netherlands DAFT was used for Movement Quality on Heart Rate while performing it.

Also, research studies have shown the benefits of supplemental exercise training, including increased strength and active flexibility in dancers and integration of the exercise sessions must be carefully introduced into dancers' schedules [18]. A study has indicated that supplementary off-studio exercise training can increase key fitness-related parameters without interfering with artistic and dance performance requirements [19]. And there is increasing evidence supporting that dancing improves functionality, metabolic health, cardiorespiratory fitness and reduction in cardio vascular risk factors [16, 17].

## Conclusion

The study intended to find prevalence of physical activity among Hubli and Dharwad Bharatanatyam dancers. This study found that dancers have low physical activity and the statistical tests show significant difference in the METS over age groups there is need for additional training apart from regular dance classes.

## Limitations of the study

- The study population were recruited from 2 cities.
- Dancers were not willing to fill the Google document.
- Lengthy Google document.

## Future scope of study

- Multi-cantered study must be conducted so that the results can be generalized to a larger population.
- A larger age group should be considered.
- Further studies should be done with comparison of dance training.

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