Are the Urban Slum Population Physically Inactive? A Descriptive Study from Urban Puducherry

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Abstract

Context: Physical inactivity is an important modifiable behavioral risk factor for noncommunicable diseases (NCDs). However, adequate attention has not been paid to it, especially in low- and middle-income countries like India as like other risk factors due to challenges in the administration of tools to measure physical activity. Aims: This study was conducted to assess the level of physical inactivity and contributing factors in an urban slum of Puducherry. Settings and Design: Urban community, cross-sectional study design. Materials and Methods: After obtaining consent, relevant information on sociodemographic details and physical inactivity was collected, during the house-to-house survey, using a pretested semistructured questionnaire from each household of the study areas. A total of 3300 adults (aged 30 years or above) were included in the study. Physical inactivity was defined as <150 min of leisure time moderate exercise in a week. Statistics: The results were summarized as means and proportions. Results: Nearly three-fourth of the participants were physically inactive. About 79% of the females against 70% of the males were found to be physically inactive. Physical inactivity was found to be decreasing with increase in age: 30–44 years age (77.2%), 45–59 years age (75.3%), and 60 years and above (72.2%). Individuals with chronic diseases and obesity were found to be less physically inactive. Gender, age, education, socioeconomic status, occupation, alcohol use, and obesity were found to be associated with physical inactivity. Conclusion: Physical inactivity was very high in the study population, especially among young adults and females. Health education intervention targeting these populations can decrease the level of physical inactivity and in the long-run burden of NCDs in the study population.

Keywords: Noncommunicable diseases, physical inactivity, population-based study, urban slum

Introduction

Every year about 38 million deaths occur due to noncommunicable diseases (NCDs) globally. About four-fifth of the 16 million premature deaths (before age 70 years) due to NCDs that occur globally are from low- and middle-income countries.[1] The four most common behavioral risk factors for NCDs are tobacco use, alcohol consumption, unhealthy diet, and physical inactivity. Insufficient physical activity, which is the 4th leading risk factor for all-cause mortality, accounts for 3.2 million deaths and 32.1 millions of disability-adjusted life years every year.[2] In India, according to the Global Monitoring Framework for NCD, every year, around 5.8 million deaths occur due to NCDs, which accounts for nearly 60% of all-cause mortality.[3] Physical inactivity leads to 20%–30% higher probability of all-cause mortality, and 30 min of regular physical activity on most of the days of a week can reduce the probability of mortality due to ischemic heart diseases, diabetes, and cancers by 30%, 27%, and 21%–25%, respectively.[4] Nearly one-fourth of the individuals aged 18 years or above lack sufficient physical activity, globally, with a higher number of women (27%) than men (20%).[4] NCD global monitoring framework (2013) envisages to achieve relative reduction in physical inactivity by 10% by 2025.[5]

Physical activity has been linearly correlated with health status of an individual.[6] Regular physical activity leads to large health benefits at population level, for both primary and secondary prevention of NCDs.[7-10] Up to 10% of major NCDs can be reduced by increase in physical activity alone.[11]

After 2009, the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke has been rolled out in various districts after the pilot phase. Under this program including the recent National Health Policy, major thrust was given for health and wellness activities related to NCDs. Under the National Programme for Prevention and Control of Non-communicable Diseases (NCDs), 2022 was declared as the year of the national action plan for NCDs. The health policy of the government of India also encourages the promotion of physical activity through various initiatives like ‘fighting obesity’, ‘walking campaign’ etc.,

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in the form of physical activity and healthy diets. A large-scale study in India reported the prevalence of physical inactivity to be 65% in an urban area.\cite{12} However, other studies have reported varied level of physical inactivity across India (9.5%–73%).\cite{13-16} The prevalence of physical inactivity was reported to be 71% in urban Tamil Nadu.\cite{12} Puducherry, one of the union territories in India, comprises more than 60% of urban population. Despite having one of the high density of health-care institutions in India, Puducherry falls among the high NCD burden states in terms of the prevalence of obesity, hypertension, and diabetes mellitus.\cite{17} Studying the level of physical activity in this kind of population, where the access to recreation-related physical activity is more, can help understand the barriers. Hence, this study was conducted with the aim to find the prevalence of physical inactivity and its contributing factors in urban Puducherry.

**Materials and Methods**

We conducted this community-based cross-sectional study in the field practice areas of an Urban Health Training Centre (UHTC) of a tertiary health-care institution in Puducherry. The UHTC provides family folder-based comprehensive primary health care to a population of around 9000 residing in four urban wards. Apart from providing routine outpatient and outreach health services, the UHTC provides specialty care under fixed-day approach with NCD clinic on Wednesday afternoon. The NCD clinic which is linked with the parent tertiary care institution provides comprehensive health care including follow-up services to NCD patients. More than 90% of the beneficiaries of NCD clinic included people with diabetes mellitus, hypertension, and cardiovascular diseases singly or in combinations. A regular yoga session (open to all) under the guidance of a qualified yoga instructor has been attached to the UHTC NCD clinic since 2013. Public places such as Promenade Beach and Bharathi Park with well-defined pedestrian track and other recreational facilities are available within 1 kilometer distance from the study setting for recreational activities.

This study was conducted as a part of community diagnosis (CD) training program for the 2nd year MBBS students during October–November 2013. A total of seventy 2nd year MBBS students who were part of CD posting were briefed and trained on basics of survey methodology. All students were trained on the study interview technique and tool for uniformity. The students made house-to-house visits and collected information under the supervision of residents from the Department of Community Medicine. All the adults aged 30 years or above in a household were contacted, and information was collected using the pretested semistructured questionnaire. Repeat visits were made to the household found locked and individuals who were absent during previous visits. Relevant information was collected from the wife of the head of the household for eligible individuals who were still unavailable on the third visit. Severely ill individuals and individuals with physical deformity or disease of bones/joints (self-reported) which limits their movement were excluded from the study. Using the pretested study tool, the relevant information was collected from the households for eligible participants after obtaining consent from the head of the household. The study tool was prepared in reference to the standard National Family Health Survey III users’ manual and WHO-STEPS questionnaire.\cite{18,19} The study tool had two components: the first component to collect information on sociodemographic details and the second component to collect information on physical activity including other NCD risk factors.

**Operational definitions**

The inadequate physical activity or physical inactivity was defined as any person doing moderate physical activity less than the prescribed duration that is 30 min/day for at least 5 days or 150 min a week during leisure time. Tobacco use and alcohol consumption were determined with reference to preceding 1 month from the date of interview. Body mass index (BMI) of ≥25 kg/m² was considered as obese as per the WHO BMI classification for Asian population.\cite{20} Due to difficulty in eliciting the reliable accurate income of the family, color of the ration card was taken as proxy for socioeconomic status; red given to below poverty line family was considered as low socioeconomic status and yellow given to above poverty line family was considered as higher socioeconomic status.

**Statistical analysis**

We used EpiData version 2.3 (The EpiData Association, Odense, Denmark) for data entry and SPSS 20.0 for statistical analysis (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). All the categorical variables were presented as proportions and percentages. The association of physical inactivity with sociodemographic variables and other NCD risk factors was determined using Chi-square test. \( P < 0.05 \) was considered statistically significant.

**Results**

Out of the total of 3300 individuals included in the study, 53% were female and 46% belonged to the age group of 30–44 years. About half of the study population had studied up to class 10. Nearly 70% of participants belonged to nuclear family. Approximately 40% each of the total study population were unemployed and belonged to low socioeconomic status [Table 1].

Almost one-third of the study population had at least one chronic disease. Tobacco use, alcohol consumption, and obesity were found among 9.8%, 12.8%, and 12% of the study population, respectively [Table 2].

The prevalence of physical inactivity among the study population was found to be 74.9% (95% confidence interval: 73.4–76.4). Proportionately more females than males were physically inactive (79.4% vs. 69.8%, \( P = 0.000 \)). The physical inactivity showed decreasing trend with advancement of age and lowest proportion was reported among the elderly (72.2%). Individuals who did not have formal education, unemployed, and belonged to lower socioeconomic status were more physically inactive than their counterparts [Table 3]. Physical inactivity was more common among individuals without chronic disease (75.4%)
The level of physical inactivity was found to be significantly more among females compared to males (79% vs. 70%). However, this pooled analysis study included younger population (aged 15 years and above) as well. With a median level of 38%, the physical inactivity ranges from 7% to 93% across the world. The diversity in population and differences in tools used were the reasons behind the wide variation in the level of physical inactivity. A study on pooled data from 368 population-based surveys in 168 countries reported age-standardized physical inactivity prevalence to be 27.5%. In India also, the level of physical inactivity showed wide variation as reported by many population-based studies. Similar to our findings, the ICMR-INDAB study conducted in four major states reported very high level of physical inactivity (65%) among urban population. In urban Tamil Nadu, having population similar to our study, the level of physical inactivity was reported to be 71%. An NCD risk factors’ study in Tamil Nadu reported 63% of urban population to have low level of physical activity. In a study from North India, as high as 85% of the study participants were reported to be physically inactive. Another study among school teachers of Mysuru city reported 67.7% physical inactivity level. Physical inactivity level was reported to be <10% in a tribal population of Kerala, which could be due to their forest-based occupation. However, earlier study like World Health Survey has reported very low level of physical inactivity among Indian population (<20%). This clearly indicates increasing trend of physical inactivity among urban population. Socioeconomic development and decrease in labor intensive jobs could be the reason behind such trend. The higher level of physical inactivity in our study population could be due to the occupation, as majority of the population are involved with fish business which demands less labor intensive works.

In our study, nearly three-fourth of the participants were physically inactive. This is very high compared to global level of physical inactivity, which was reported to be 21.4%. However, this pooled analysis study included younger population (aged 15 years and above) as well. With a median level of 38%, the physical inactivity ranges from 7% to 93% across the world. The diversity in population and differences in tools used were the reasons behind the wide variation in the level of physical inactivity. A study on pooled data from 368 population-based surveys in 168 countries reported age-standardized physical inactivity prevalence to be 27.5%. In India also, the level of physical inactivity showed wide variation as reported by many population-based studies. Similar to our findings, the ICMR-INDAB study conducted in four major states reported very high level of physical inactivity (65%) among urban population. In urban Tamil Nadu, having population similar to our study, the level of physical inactivity was reported to be 71%. An NCD risk factors’ study in Tamil Nadu reported 63% of urban population to have low level of physical activity. In a study from North India, as high as 85% of the study participants were reported to be physically inactive. Another study among school teachers of Mysuru city reported 67.7% physical inactivity level. Physical inactivity level was reported to be <10% in a tribal population of Kerala, which could be due to their forest-based occupation. However, earlier study like World Health Survey has reported very low level of physical inactivity among Indian population (<20%). This clearly indicates increasing trend of physical inactivity among urban population. Socioeconomic development and decrease in labor intensive jobs could be the reason behind such trend. The higher level of physical inactivity in our study population could be due to the occupation, as majority of the population are involved with fish business which demands less labor intensive works.

The level of physical inactivity was found to be significantly more among females compared to males (79% vs. 70%). Similar results have been reported by other studies. A NCD risk factors’ study from Northern India among urban slum population has reported higher physical inactivity level among females (77%) than males (66%). In contrast, Gupta et al. from a study conducted in Jaipur reported higher physical inactivity among males. ICMR INDAB study has also reported higher percentage of females (71%) being inactive compared to males (59%). A multiregion study by

### Table 1: Sociodemographic details of the study population (n=3300)

| Variable       | Categories                      | Frequency (%) |
|----------------|---------------------------------|---------------|
| Gender         | Females                         | 1769 (53.6)   |
|                | Males                           | 1531 (46.4)   |
| Age (years)    | 30–44                           | 1537 (46.6)   |
|                | 45–59                           | 1014 (30.7)   |
|                | 60 and above                     | 749 (22.7)    |
| Education      | No formal education              | 813 (24.6)    |
|                | Studied up to class 10th         | 1642 (49.8)   |
|                | Studied more than class 10th     | 845 (25.6)    |
| Occupation     | Unemployed                       | 1318 (39.9)   |
|                | Employed                        | 1982 (60.1)   |
| Family type    | Nuclear                         | 2283 (69.2)   |
|                | Joint                           | 1017 (30.8)   |
| Ration card    | Red                             | 1314 (39.8)   |
|                | Yellow                          | 1779 (53.9)   |
|                | Not aware of color of the card   | 207 (6.3)     |
| Marital status | Married                         | 2544 (77.1)   |
|                | Unmarried                        | 285 (8.6)     |
|                | Previously married               | 471 (14.3)    |

### Table 2: Prevalence of existing chronic diseases, status of tobacco use, alcohol consumption, and obesity among the study population (n=3300)

| Variable                     | Frequency, n (%) |
|------------------------------|------------------|
| Presence of chronic disease  |                  |
| Present                      | 1010 (30.6)      |
| Absent                       | 2290 (69.4)      |
| Tobacco use                  |                  |
| Yes                          | 324 (9.8)        |
| No                           | 2976 (90.2)      |
| Alcohol use*                 |                  |
| Yes                          | 421 (12.8)       |
| No                           | 2875 (87.2)      |
| Obesity*                     |                  |
| Yes                          | 392 (12)         |
| No                           | 2904 (88)        |

*For four individuals in each category, data could not be obtained

compared to individuals with at least one chronic disease (74%) and normal/underweight (75.6%) compared to obese individuals (69.9%). However, individuals who were using tobacco products and alcohol reported less physical activity compared to their counterparts [Table 3]. Gender, age, education, socioeconomic status, occupation, alcohol use, and obesity were found to be associated with physical activity, whereas tobacco use and chronic disease status did not show statistical association with physical inactivity [Table 3].

**DISCUSSION**

With slow but constant increase in the number of NCDs in the study area, assessment of level of physical inactivity is an important risk factors for NCDs is imperative. Health promotion is one of the integral parts of primary health care and should be promoted in family care practices. Lack of exercise is a major risk factor for chronic NCDs. Majority of diseases for which patients visit frequently to primary care physician / family physician (who are first level of contact) require lifestyle modifications, one being physical activity. Family/primary care physicians are in a unique position to promote simple intervention like counseling for engaging in physical activity because of their long-term relationship with the patients with chronic diseases.

A recently published study from urban Puducherry reported half of the adult population to be physically inactive. As compared to our study, this study had smaller sample size and had included individuals aged ≥18 years. In our study, nearly three-fourth of the participants were physically inactive. This is very high compared to global level of physical inactivity, which was reported to be 21.4%. However, this pooled analysis study included younger population (aged 15 years and above) as well. With a median level of 38%, the physical inactivity ranges from 7% to 93% across the world. The diversity in population and differences in tools used were the reasons behind the wide variation in the level of physical inactivity. A study on pooled data from 368 population-based surveys in 168 countries reported age-standardized physical inactivity prevalence to be 27.5%. In India also, the level of physical inactivity showed wide variation as reported by many population-based studies. Similar to our findings, the ICMR-INDAB study conducted in four major states reported very high level of physical inactivity (65%) among urban population. In urban Tamil Nadu, having population similar to our study, the level of physical inactivity was reported to be 71%. An NCD risk factors’ study in Tamil Nadu reported 63% of urban population to have low level of physical activity. In a study from North India, as high as 85% of the study participants were reported to be physically inactive. Another study among school teachers of Mysuru city reported 67.7% physical inactivity level. Physical inactivity level was reported to be <10% in a tribal population of Kerala, which could be due to their forest-based occupation. However, earlier study like World Health Survey has reported very low level of physical inactivity among Indian population (<20%). This clearly indicates increasing trend of physical inactivity among urban population. Socioeconomic development and decrease in labor intensive jobs could be the reason behind such trend. The higher level of physical inactivity in our study population could be due to the occupation, as majority of the population are involved with fish business which demands less labor intensive works.

The level of physical inactivity was found to be significantly more among females compared to males (79% vs. 70%). Similar results have been reported by other studies. A NCD risk factors’ study from Northern India among urban slum population has reported higher physical inactivity level among females (77%) than males (66%). In contrast, Gupta et al. from a study conducted in Jaipur reported higher physical inactivity among males. ICMR INDAB study has also reported higher percentage of females (71%) being inactive compared to males (59%). A multiregion study by...
Table 3: Association of physical inactivity with sociodemographic characteristics of the study population (univariate analysis)

| Variable                  | Categories                        | Physical inactivity absent, n (%) | Physical inactivity present, n (%) | P      |
|---------------------------|-----------------------------------|----------------------------------|-----------------------------------|--------|
| Gender                    | Male                              | 463 (30.2)                       | 1068 (69.8)                       | 0.000  |
|                           | Female                            | 364 (20.6)                       | 1405 (79.4)                       |        |
| Age (years)               | 30–44                             | 350 (22.8)                       | 1187 (77.2)                       | 0.015  |
|                           | 45–59                             | 269 (26.5)                       | 745 (73.5)                        |        |
|                           | 60 and more                       | 208 (27.8)                       | 541 (72.2)                        |        |
| Education                 | No formal education               | 97 (11.9)                        | 716 (88.1)                        | 0.000  |
|                           | Studied up to class 10<sup>b</sup> | 355 (21.6)                       | 1287 (78.4)                       |        |
|                           | Studied more than class 10<sup>b</sup> | 375 (44.4)                      | 470 (55.6)                        |        |
| Occupation                | Unemployed                        | 274 (20.8)                       | 1044 (79.2)                       | 0.000  |
|                           | Employed                          | 553 (27.9)                       | 1429 (72.1)                       |        |
| Ration card* (proxy for socioeconomic status) | Red                              | 182 (13.9)                       | 1132 (86.1)                       | 0.000  |
|                           | Yellow                            | 552 (31)                         | 1227 (69)                         | 0.389  |
| Chronic diseases          | At least one chronic disease      | 263 (26)                         | 747 (74)                          |        |
|                           | No chronic disease                | 564 (24.6)                       | 1726 (75.4)                       |        |
| Tobacco use               | Present                           | 69 (21.3)                        | 255 (78.7)                        | 0.100  |
|                           | Absent                            | 758 (25.5)                       | 2218 (74.5)                       |        |
| Alcohol use**             | Present                           | 88 (20.9)                        | 333 (79.1)                        | 0.038  |
|                           | Absent                            | 736 (25.6)                       | 2139 (74.4)                       |        |
| Obesity**                 | Present                           | 118 (30.1)                       | 274 (69.9)                        | 0.014  |
|                           | Absent                            | 708 (24.4)                       | 2196 (75.6)                       |        |

*207 individuals were not sure of color of ration card, hence removed from Chi square statistics, **For four individuals in each category, data could not be obtained.

Shah et al. (as cited by Anjana et al.) also reported higher level of physical inactivity among females than males.[12] In contrast to other studies, the elderly were found to be more active physically than young individuals in our study.[26,29,38] However, Trinh et al. from Vietnam have reported similar decreasing trend for physical inactivity with age especially among women.[39] The high intensity of health education sessions in the community directed against NCDs, which is mostly attended by the elderly, could have influenced their behavior. Physical inactivity was found to be less among people educated more than 10<sup>b</sup> standard, belonged to higher socioeconomic status, and employed. Probably, access to information on prevention and control of risk factors as well as NCDs has influenced their behavior to adopt healthy lifestyles. However, few studies from the West reported more physical inactivity among low-educated individuals probably due to lack of work or no jobs.[40,41] Lack of physical activity generally lands people into chronic diseases and obesity.[33,34,42] In our study, however, proportionately lesser number of individuals with chronic diseases and obesity has physical inactivity compared to individuals without chronic diseases and obesity. The individuals after being diagnosed with chronic disease or developing obesity would have changed their behavior to be physically more active. Literature records negative association between alcohol consumption and physical inactivity.[43] Individuals who were using tobacco products or consuming alcohol were found to be more physically inactive in our study.

The health benefits of physical activity are well documented. Despite high intensity health education, the level of physical inactivity was very high. Hence, focused need-based intervention including provision of conducive environment should be planned. This may include recreation facilities in the area.

**Strength and limitation**

This population-based study adopted the validated shorter version of the standard WHO STEP questionnaire. However, this does not include other dimensions of physical activity such as work- and transport-related activity. For the same reason, this study did not define the physical inactivity based on metabolic equivalents. The study involved a large population. Data quality was ensured by cross-checking 10% of forms every day by the residents. The eligible people who could not be contacted might have different lifestyles. However, they were found to be similar to studied population in terms of gender and age structure. Approximated responses especially among elderly could not be avoided completely despite taking adequate precaution.

**Conclusion**

Three out of every four adults in our study population were found to be physically inactive. Physical inactivity was found to be more among young adults, which is a matter of concern. Although individuals with chronic diseases and obesity have become more physically active, individuals with other risk factors such as alcohol consumption and smoking need health education intervention with special focus on individuals belonging to lower socioeconomic status and those who have no or lower formal education. Health education intervention targeting these populations can decrease the level of physical inactivity and in the long-run burden of NCDs in the study population.
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Conflicts of interest

There are no conflicts of interest.

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