



## Epidemiological determinants of the physical activity among the urban community of Ahmedabad, India: A cross sectional study

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### ABSTRACT

**BACKGROUND:** Physical activities (PA) and proper nutrition are the most important measures in preventing lifestyle related disorders. Study was performed to describe the pattern of physical activity and its association with the health problems.

**METHODS:** A cross sectional community based study was carried out in the six zones of Ahmedabad Municipal corporation areas. Information was collected in predesigned and pretested standard proforma by house to house survey. Results- Overall prevalence of physical activity was only 18% while 82% people were physically inactive. Males were more engaged in PA than of Females (26% Vs 10.9%,  $P < 0.0001$ ). People with sedentary occupation were significantly more engaged in PA than moderate activity occupation (19.3% vs. 8.5%,  $P < 0.001$ ). Out of those performing PA, majority were educated up to college (39.3%), married (78.5%), from upper socioeconomic class (44.2%) & consuming 1600-1900 kcal/day (31.9%). PA was performed daily by 86.5% & once a day by 79.1%. Out of those performing PA, 30.1% had Hypertension ( $P > 0.05$ ), 25.2% had Diabetes ( $P < 0.001$ ) & 44.8% had obesity ( $P > 0.05$ ).

**CONCLUSION:** PA is significantly associated with male gender, education, sedentary occupation, higher SES, high calorie consumption and people with diabetes. Sensitisation of population for lifestyle modification is recommended to curtail modern epidemic of lifestyle related disorders.

**Key words:** Physical activities, prevalence, socio-demographic profile, pattern, Non-communicable diseases.

### INTRODUCTION

Physical activities (PA) and proper nutrition are the most important measures in preventing lifestyle related disorders. Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure. Physical inactivity is an independent risk factor for chronic diseases, and overall it is estimated to cause 1.9 million deaths globally. Regular physical activity – such as walking, cycling, or dancing – can reduce the risk of cardiovascular disease, diabetes and osteoporosis, help in controlling weight, and promote

psychological well-being.<sup>1</sup> People who are usually inactive can improve their health and well-being by becoming even moderately active on a regular basis. Greater health benefits can be achieved by increasing the amount (duration, frequency or intensity) of physical activity.<sup>2</sup> Regular physical activity, performed on the most days of the week, reduces the risk of developing some of the leading causes of illness and death. Increasing physical activity may substantially reduce the incidence of type 2 diabetes & hypertension in high-risk individuals.<sup>3</sup> The protective effect of physical activity

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was observed among both the sexes regardless of the level of obesity.<sup>4</sup>The long-term complications of diabetes can be prevented with appropriate interventions, including drug treatment, physical activity (PA), nutrition therapy, and body weight management.<sup>5,6</sup>

India is currently experiencing a rapid epidemiological transition from communicable to non communicable diseases due to rapid industrialization and urbanization. India leads the world with largest number of diabetic subjects hence being termed the "diabetes capital of the world". Number of people with diabetes in India currently around 40.9 million, which is expected to rise up to 69.9 million by 2025 unless urgent preventive steps will be taken.<sup>7</sup>

Because of the increasing burden of the chronic diseases, their iceberg nature, complications and potential to prevent these complications with earlier diagnosis and treatment; efforts should be required for primary prevention of these diseases. Physical activity is one of the cost effective measures for primary prevention of diabetes.

People of Gujarat are prone to develop chronic diseases because of genetically susceptibility, sedentary lifestyle, and dietary preference for sweet and oily foods. So, the present study was conducted to describe the prevalence and patterns of physical activities, association between PA & socio-demographic profile & health problems, and sensitize the people for their own health & motivate them for physical activities to reduce the chronic diseases burden.

## METHODS

A cross sectional community based study was carried out by house to house survey in municipal corporation areas of Ahmedabad city (AMC). This study was done along with an epidemiological study of diabetes in urban areas of Ahmedabad. Sample size for the diabetes survey was 900 (assuming 10% prevalence and 20% allowable error in  $n=4PQ/L^2$ ). So, the data for the Physical activities was collected from all the respondents of the diabetes research. AMC has six zones namely, south, north, central, east, west and new west covering population of around 3.5 million and,

which is expected to double by 2011.<sup>8</sup>Each zone is further divided into 9-11 wards. Sample was stratified proportionately in each zone depending on the population of the respective zone. After the stratification, one ward was randomly selected from each zone for the survey. There were 157 people from South, 166 from North, 116 from Central, 170 from East, 135 from West and 156 from New west zone, selected. Study was carried out during May 2007 to July 2008. Initially, a pilot study was carried out to reformulate the questionnaires and to prepare the final proforma. All people above 20 years of age and who had given written informed consent were included in the study. Information was collected in a pre-designed and pre-tested proforma from each respondent in detail regarding socio-demographic parameters, history of diabetes and hypertension, and the frequency and pattern of physical activities which they were practicing.

Education about the importance of adopting the healthy lifestyle and other health promotional measures was imparted to the community to sensitize them about the importance of Physical activities. Total three revisits were paid to increase overall response rate. Pattern of different exercises were categorised in to Aerobic, Anaerobic and stretching exercise.<sup>9</sup>

Data was collected, compiled and analysed in Excel sheet. Categorical variables were analysed with Chi-square while qualitative data was analysed with the help of Z test. We analyzed data with the help of SPSS17 demo version for comparison of socio-demographic characteristics of the two groups, i.e. those doing PAs and those not doing PAs. Independent factors associated with PAs were identified using univariate linear regression analysis. Significance was tested at  $P < 0.05$ .

## RESULTS

Total 904 subjects were covered during the study. The prevalence of physical activity in the present study was only 163 (18 %) while the majority 741 (82%) were not practicing any type of PA. 427 (47.2%) were males and 477 (52.8%) were females. Female were less involved in PA than males (10.9% vs. 26%) and this difference was statistically significant ( $Z = 2.55$ ,  $P < 0.05$ ).

**Table 1: Association of Physical Activities (PAs) with socio-demographic profile and presence of Diabetes/ Hypertension**

Parameters	Persons doing PAs	Persons not doing PAs	Adjusted Odds Ratio(95% Confidence Interval)
<b>Age(Years)</b>			
20 – 29	28(17.2%)	157(21.2%)	1.0 (Reference)
30 – 39	22(13.5%)	182(24.6%)	0.039(-0.033 - 0.120) (P=0.262)
40 – 49	41(25.2%)	150(20.2%)	0.039(-0.141 - 0.014) (P=0.108)
50 – 59	33(20.2%)	114(15.4%)	0.042(-0.156 - 0.010) (P=0.083)
60 – 69	24(14.7%)	78(10.5%)	0.047(-0.176 - 0.009) (P=0.075)
70 – 79	14(8.6%)	40(5.4%)	0.059(-0.224 - 0.008) (P=0.068)
80 & above	1(0.6%)	20(2.7%)	0.088(-0.069 - 0.276) (P=0.239)
<b>Sex</b>			
Male	111(68.1%)	316(42.6%)	1.0 (Reference)
Female	52(31.9%)	425(57.4%)	0.025(0.102 – 0.200) (P=0.000)
<b>Educational status</b>			
Illiterate	4(2.5%)	35(4.7%)	1.0 (Reference)
Literate	159(97.5%)	706(95.3%)	0.063(-0.205 – 0.042) (P=0.197)
<b>Occupation</b>			
Moderate	9(5.5%)	97(13.1%)	1.0 (Reference)
Sedentary	154(94.5%)	644(86.9%)	0.040(0.030 – 0.186) (P=0.007)
<b>Socio-economic class</b>			
I and II(Higher class)	122(74.8%)	464(62.6%)	1.0 (Reference)
III and IV (Lower and Middle class)	41(25.2%)	277(37.4%)	0.027(0.027 – 0.132) (P=0.003)
<b>Marital status</b>			
Married	128(78.5%)	601(81.1%)	1.0(Reference)
Separated/Divorcee / unmarried/widow	35(21.5%)	140(18.9%)	0.032(-0.089 – 0.038) (P=0.068)
<b>Presence of Chronic morbidities</b>			
Diabetes	41(32.8)	84(67.2)	-0.168(-0.258- -0.079) (P=0.000)
Hypertension	49(21.4)	180(78.6)	-0.161(-0.231- -0.090) (P=0.000)

Table1 displays the selected socio-demographic characteristic of people with & without PAs & association of PA with co-morbidities. Among the

people who were not doing PA, Majority 182(24.6%) were belonged to 30-39 years of age group. While out of those performing PA, majority

41(25.2%) were belonged to 40-49 years. Mean age of the people doing and not doing PA, was 47.1 ±15.6 and 43.6 ±15.8years respectively ( $Z = 7.06$ ,  $p < 0.001$ ). Out of those doing PA, majority 159(97.5%) were literate while only 4 (2.5%) were illiterate. Difference of physical activity prevalence, among person from the sedentary occupation [154,(19.3%)] and moderate activity occupation [9, (8.5%)], was statistically highly significant ( $Z = 4.54$ ,  $P < 0.001$ ). Difference in the prevalence of PA

amongst the person from SES class I & II and class III & IV was statistically significant ( $X^2 = 8.8$ ,  $P < 0.01$ ). Difference between Marital status and PAs was statistically insignificant ( $X^2 = 0.41$ ,  $P > 0.05$ ). Mean calories consumption was 1872.2 ± 369.3 & 1725.5 ± 357.1 calories respectively among people with & without PA. This difference of mean calorie consumption among both groups was statistically highly significant ( $Z = 4.6$ ,  $P < 0.0001$ ).

**Table 2: Pattern of physical activity (PA) practices among study population**

Types of PA	n	%
Aerobic exercise	139	85.3
Anaerobic exercise	3	1.8
Stretching Exercise	21	12.8
<b>Duration of PA</b>		
Less than 1 year	20	12.3
1-5 year	81	49.7
5-10 year	26	15.9
More than 10 year	36	22.1
<b>Frequency of PA/day</b>		
Less than 20 min	18	11.0
20-40 min	82	50.3
40-60 min	7	4.3
>60 min	56	34.4

Table 2 shows pattern of physical activity. Out of those practicing PA (163), majority of people 139(85.3%) were involved in Aerobic exercise while only 3(1.8%) were involved in Anaerobic exercise. Maximum 140(85.9%) person were practicing physical activities daily, while only 1 (0.6%) was doing it once a week. Out of them, 139 (85.3%) were doing PA once a day while only 1(0.6%) had three times a day. Most of them 82 (50.3%) were

doing it for 20-40 min. /day. Mean frequency of PA per week was 6.46 ± 1.5 days for females & 6.43 ± 1.5 days for males. Mean frequency per day was 1.3 ± 0.8 & 1.1 ± 0.4 times, while the mean duration per day was 33 ± 15.3 & 40.9 ± 23.5 minutes, for male & female respectively. Majority 81 (49.7%) were doing PA since 1-5 years. Maximum 81 (49.7%) were doing PA for fitness followed by 57(35%) due to advice by doctor while only 3(1.8%) had performed PA because of friend's advice. Maximum

682(55.9%)were performing exercise during usual daily activities like using staircase, using stairs instead of elevators, parking vehicle away from destinations etc. About 224 (20.2%) people had work pattern in office involving some sort of physical activities. Majority 789 (67.9%) were involved in routine household activities.

Association of physical activities with obesity( $X^2=0.26$ ,  $P=0.61$ ) and hypertension ( $X^2=2.06$ ,  $P=0.15$ ) was found statistically not significant while association of having diabetes and practicing PA was statistically highly significant( $X^2=20.26$ ,  $P<0.0001$ ). Univariate regression analysis revealed that males, person with sedentary occupation, literacy, higher class community and married person were independently associated with PA while person suffering from diabetes and hypertension were independently associated with physical inactivity.

## DISCUSSION

Physical inactivity is proven to be an important risk factor for non communicable diseases like diabetes, hypertension, obesity, cancer, etc.<sup>10</sup>We observed higher prevalence of physical inactivity and different patterns by gender and age, with elder person were more physically active than the younger, further, age-related declines in physical activity was much more frequently observed among males than females. Study revealed physical inactivity as important risk factors for the diabetes and hypertension. W.H.O. prediction for India regarding increasing prevalence of Diabetes, CHD and other non communicable disease would be true in near future if the trend of physical inactivity would continue in similar pattern.

More than 80% of chronic diseases deaths occur within low and middle income countries (LMC).<sup>11</sup> The most recent estimates suggest that almost 2 million worldwide deaths per year are attributable to inactivity, leading to physical activity being described as 'the best buy in public health'.<sup>10, 12</sup> Only few countries are doing proper monitoring and surveillance of physical activity, despite increasing trend of obesity, rapid changes in patterns of work, transport and recreation and global concerns about non-communicable disease in LMC.<sup>13, 14</sup>

Euro barometer study (2002) had used IPAQ as an instrument and identified low prevalence estimates for Belgium and Sweden while Netherlands and Germany reported the maximum levels of physical activity.<sup>15, 16</sup> A Pan-European Union Survey on consumer attitudes to physical activity had found a similar low prevalence of activity in Belgium and Portugal, but reported a high prevalence rate in Sweden.<sup>16</sup> WHO survey 2002-03 from 51 countries to collect IPAQ short-form physical activity data, inactivity rates were low for China and the Czech Republic [10%], for Brazil [30% inactive], and 25% for Spanish adult as compared to our study [82%].<sup>17</sup> It appears total physical activity in majority of countries remains insufficient to ensure energy balance and prevent obesity or that the ratio of energy expenditure to dietary intake is unbalanced to maintain weight stability.<sup>18</sup>

The findings from our study explored that the majority of the study population appeared not to undertake any physical activity pattern when assessed using the multi-domain PAQ. This suggests that most adults in these regions are not engaged in any physical activity which in turn has increased the problem of obesity and associated non communicable diseases among study population.

The present study described population-level prevalence estimates and patterns of physical activity in Ahmedabad city, using a comparable, reliable and validated survey instrument. The sample was large-scale population sample, but entire sample was from one city, not national sample, so the prevalence estimate cannot be generalised to the country level. But, such high prevalence of physical inactivity in growing metro city like Ahmedabad may reflect the worst hidden situation and higher prevalence can exist in other metro cities of India. Therefore, one large multi-centric study should be carried out to describe health promotion measures practicing by the people of developing country. Present study of physical activity may provide useful baseline data to the health authority for making necessary policy action for the prevention of non-communicable diseases, to sensitise the community to promote physical activity and improve the public health at large.

Prevalence of Physical activity was less among study population (18%) which is serious concern and major hurdle for prevention & control activities of non communicable diseases in the developing country like India. Poor attitude of community towards physical activity can be possible risk factor for the increasing prevalence of diabetes in India and other developing country. Sensitisation of community for lifestyle modification and motivation for increasing physical activity is strongly recommended to curtail modern epidemic of lifestyle related disorders.

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