Community Medicine Section

Factors Associated with Physical Inactivity among Adult Urban Population of Puducherry, India: A Population Based Cross-sectional Study

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ABSTRACT

Introduction: Physical inactivity is the fourth leading cause of death worldwide. Increase in physical activity decreases the incidence of cardiovascular diseases, Type 2 diabetes, stroke, and improves psychological wellbeing.

Aim: To study the level of physical inactivity among the adult population in an urban area of Puducherry in India and its associated risk factors.

Materials and Methods: This cross-sectional study was conducted among 569 adult participants from an urban area of Pondicherry. The level of physical inactivity was measured by using WHO standard Global Physical Activity Questionnaire (GPAQ).

Results: Overall prevalence of physical inactivity in our study was 49.7% (CI: 45.6-53.8). Among the physically active people, contribution of physical activity by work was 77.4%, leisure time activities were 11.6% and transport time was 11%. Both men and women were equally inactive {Physically inactive among women was 50% (CI:44.1-55.9)} and {Physically inactive among men was 49.5% (CI:43.8-55.2)}. Prevalence of physical inactivity was increasing with increasing age. Non tobacco users were two times more active than tobacco users {Adjusted Odds Ratio: 2.183 (1.175- 4.057)}. Employed were more active as compared to retired {Adjusted Odds Ratio: 0.412 (0.171-0.991)}, students {Adjusted Odds Ratio: 0.456 (0.196-1.060)}, house wives {Adjusted Odds Ratio: 0.757 (0.509-1.127)} and unemployed {Adjusted Odds Ratio: 0.538 (0.271-1.068)}. Non alcoholics were only 0.34 times as active as alcoholics.

Conclusion: Level of physical activity was found to be insufficient among adult urban population of Puducherry. Working adult population found to be active, that too due to their work pattern. There is a need to promote leisure time and travelling time physical activity.

INTRODUCTION

Physical inactivity is the fourth leading cause of death worldwide [1]. Physical inactivity causes nine percent of premature mortality, in other words of the 57 million deaths more than 5.3 million deaths occurred worldwide in 2008. Worldwide, it has been estimated that physical inactivity causes around 6% of the burden of disease from coronary heart disease, 7% of type 2 diabetes, 10% of breast cancer, and 10% of colon cancer [2,3]. Prevention of diseases is considered as the best strategy especially in developing and under developed countries, where the disease burden is very high and the cost of secondary and tertiary health care are unreachable to most of the population. Many studies have shown that increase in physical activity decreases the incidence of cardiovascular diseases, type 2 diabetes, stroke, and improves psychological wellbeing [4-8]. Encouraging physical activity plays an important role in reducing the burden of Non Communicable Diseases (NCDs). In 2013, Global NCD Action Plan 2013-2020 was endorsed in World Health Assembly, to promote healthy diets and physical activity, and to attain nine voluntary global targets for NCDs including ones on diet and physical activity to be achieved by 2025, by Member States, international partners and the WHO Secretariat (resolution WHA 66.10) [9]. Many developing countries don't have adequate data on physical inactivity [10].

The present study was conducted with the aim to evaluate the level of physical inactivity among the adult population in an urban area of Pondicherry in India and its associated risk factors.

MATERIALS AND METHODS

This cross-sectional study was conducted in an urban area of Puducherry. The data was collected from 1st February to 28th February 2013. The study area with an approximate population of 12000 in the field practice area of Department of Community Medicine, Pondicherry Institute of Medical Sciences, Puducherry, India.

Sample Size and Sampling

A sample size of 522 was calculated assuming the 29% prevalence of physical activity with 15% relative precision, 95% confidence and 20% attrition rate based on ICMR-INDIAB study, Tamilnadu status [11]. As a field practice area of urban health training centre, in the routine surveillance from the list of households, 600 house hold selected by systematic random method and from each family one adult selected randomly. Totally 569 eligible participants were interviewed. Acutely ill patients, physically challenged and pregnant women were excluded from the study. Participant information sheet was provided. Informed written consent was obtained from the participants. This study was conducted as a part of WHO STEPS NCD risk factors surveillance. In this surveillance the NCD risk factors (physical activity, smoking, alcohol and diet) were screened using a standard pretested and validated questionnaire. Among those risk factors physical activity was captured using GPAQ is reflected in this study [12,13]. Data was collected by sixth semester MBBS student as a part of field training (Re-Orientation Medical Education posting) after training under supervision by faculty in charge and post graduates from community medicine. Ten percent of the proforma was randomly checked by faculty in charge for quality assurance.

Operational Definitions

Those who have ever consumed oral tobacco product or smoked any tobacco products for the past one year was considered as tobacco user and those who have consumed alcohol for the past one year was considered as alcohol user for operational definition [14]. For the analysis of GPAQ data, total number of minutes spend by a person on moderate and vigorous physical activity in a typical week were captured under three domains (during work, transport and leisure time) respectively using GPAQ questionnaire. Work includes activities such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment etc. Transport activities includes mode of travel around getting from place-to-place. Recreational activities include sports and exercises. This also called as leisure time activities [13]. WHO show card has been used to classify the type of work and intensity of work [15]. METs (Metabolic Equivalents) were used to calculate the intensity of physical activities. For calculation, four METS were multiplied with the number of minutes spend by a person on moderate intensity physical activity and eight METS for vigorous intensity physical activity in a typical week respectively because a person's caloric consumption is four times higher when doing moderate activity, and eight times higher when doing vigorously active, when compared to a person sitting quietly [13]. As per WHO recommendation to consider a person as physically active, an adults should do at least 75 minutes of vigorous or 150 minutes of moderate physical activity or an equivalent combination of moderate and vigorous physical activity achieving at least 600 MET-minutes throughout a week, else he will be classified as physically inactive [13]. The detailed definitions and analysis plan has been described in WHO–GPAQ analysis guide [13].

STATISTICAL ANALYSIS

Data analysis was done through SPSS 16. Association was analysed using Chi-Square. Adjusted odds ratio was calculated using logistic regression. Informed consent was obtained from all the participants after providing participants information sheet.

RESULTS

Overall prevalence of adults with physical inactivity in our study was 49.7% (CI: 45.6-53.8) (n=283) and the adults with adequate physical activity level was 50.3% (CI 46.16 - 54.37) (n=286). Contribution of physical activity by work was 77.4%, leisure time activity was 11.6% and transport time activity was 11%. Association of physical inactivity with other variables are shown in the [Table/Fig-1], METs score presented in [Table/Fig-2] and logistic regression for significant variables presented in [Table/Fig-3]. BMI, Hypertension, diabetes, Heart disease were not associated with level of physical inactivity in our study.

DISCUSSION

Puducherry is a coastal urban city in South India. This study has been conducted in the heart of the city (in our service area). Overall prevalence of physical inactivity in our study was 49.7%, which is higher than the global prevalence of physical inactivity 21.4% [16]. But is lower than the multicentric ICMR-INDIAB study done in India (physical inactivity among Indian urban population is 65% and in Tamilnadu 71%) [11].

This high level of physical inactivity is alarming in our study. India is the top in the world having highest number of diabetic patients and the number is also estimated to be increase very rapidly in near future [17]. Interventions need to be stepped up giving priority to physical activity and healthy life style.

The main contribution of total physical activity was from work (77.4%). The leisure time activities contribute only 11.6% and transport by 11%. Similar pattern was noted in other studies where the contribution of work was more when compared to leisure time and transport activities, but the proportion of contribution by work time was very

Variables		n (%)	Physically active (%)	Physically inactive (%)	p-value*
Sex	Male	295 (51.8)	149 (50.5)	146 (49.5)	0.90
	Female	274 (48.2)	137 (50.0)	137 (50.0)	
Marital status	Single	88 (15.5)	51 (58.0)	37 (42.0)	0.092
	Married	447 (78.6)	224 (50.1)	223 (49.9)	
	Widow/Widower	31 (05.4)	10 (32.3)	21 (67.7)	
	Separated / Divorced	3 (00.5)	1 (32.3)	2 (66.7)	
Education	Graduate and Above	124 (21.8)	62 (50.0)	62 (50.0)	0.092
	Secondary School	130 (22.8)	63 (48.5)	67 (51.5)	
	High School	196 (34.4)	110 (56.1)	86 (43.9)	
	Primary School	52 (09.1)	18 (34.6)	34 (65.4)	
	Illiterate	67 (11.8)	33 (49.3)	34 (50.7)	
Employment	Employed	233 (40.9)	138 (59.2)	95 (40.8)	<0.001
	Students	28 (04.9)	13 (46.4)	15 (53.6)	
	House Wife	225 (39.5)	109 (48.4)	116 (51.6)	
	Retired	37 (06.5)	9 (24.3)	28 (75.7)	
	Un-employed	46 (08.1)	17 (37.0)	29 (63.0)	
Percapita income in rupees/ month	<3000	272 (47.8)	132 (48.5)	140 (51.5)	0.713
	3000-10000	223 (39.2)	120 (53.8)	103 (46.2)	
	10001-20000	57 (10.0)	29 (50.9)	28 (49.1)	
	20001-30000	13 (02.3)	4 (30.8)	9 (69.2)	
	30001-40000	3 (00.5)	1 (33.3)	2 (66.7)	
	40001-50000	1 (00.2)	0 (00.0)	1 (100)	
Age (Years)	18-25	76 (13.4)	43 (56.6)	33 (43.4)	<0.001
	25-35	138 (24.3)	82 (59.4)	56 (40.6)	
	35-45	121 (21.3)	62 (51.2)	59 (48.8)	
	45-55 years	101 (17.8)	47 (46.5)	54 (53.5)	
	55-65 years	73 (12.8)	36 (49.3)	37 (50.7)	
	>65	60 (10.5)	16 (26.7)	44 (73.3)	
Tobacco user	Yes	76 (13.4)	33 (43.4)	43 (43.6)	0.2
	No	493 (86.6)	253 (51.3)	240 (48.7)	
Alcohol consumer	Yes	81 (14.2)	54 (66.7)	27 (33.3)	<0.001
	No	488 (85.8)	232 (47.5)	256 (52.5)	

[Table/Fig-1]: Association between physical inactivity and various risk factors.
*p value calculated using chi-Square test, significant results are shown in bold.

Domain	Men		Women		Overall	
	Mean	Median (25th-75th)*	Mean	Median (25th-75th)*	Mean	Median (25th-75th)*
Work	958	240 (0-1440)	739	480 (0-1200)	853	480 (0-1200)
Travel	178	0 (0-120)	60	0 (0-60)	121	0 (0-120)
Leisure	186	0 (0-0)	65	0 (0-0)	128	0 (0-0)
Total	1322	720 (0-1920)	864	660 (0-1440)	1102	720 (0-1490)

[Table/Fig-2]: METs score among study participants in different domains.
*Inter quartile range

Variables	Adjusted OR (CI)	p-value
Age	0.982 (0.970 - 0.995)	**0.006**
Non tobacco users	2.183 (1.175- 4.057)	**0.014**
Employment		
Employed	1 (reference)	
Student	0.456 (0.196-1.060)	0.068
House wife	0.757 (0.509-1.127)	0.170
Retired	0.412 (0.171 - 0.991)	**0.048**
Un-employed	0.538 (0.271 – 1.068)	0.076
Non alcoholics	0.342 (0.184- 0.635)	**<0.001**

[Table/Fig-3]: Logistic regression for adequate physical activity with significant predictive factors.
*significant results are shown in bold.

high in our study when compared to leisure time and transport time physical activity. There is a hope to sensitize the general public during leisure time and transport time physical activity [11,18,19].

In our study, both men and women were equally inactive {women – 50% (44.1-55.9) and men - 49.5% (43.8-55.2)} and the prevalence of inactiveness was very high when comparing to the world wide estimate {women - 23.7% (CI: 20.4–27.1) and men - 18.9% (CI:16.2–1.7)} [16]. One of the study conducted among adult women in thiruvananthapuram city in India has shown 26.6% physical activity which is also lower than our study [20]. Prevalence of physical inactivity was increasing with increasing age group. Similar finding was also noticed in many other studies [10,21]. Non tobacco users were two times more active than tobacco users (Adjusted Odds Ratio - 2.183 (1.175-4.057)). This is a positive finding. Similar findings were noticed in other studies [22,23]. Studies have also shown that refraining from smoking and doing regular physical activity predict a long and healthy life [24].

In our study, those who are working were more active when comparing to retired (Adjusted OR: 0.412 (0.171-.991), students (Adjusted OR: 0.456 (0.196-1.060)), House wives (Adjusted OR: 0.757 (0.509-1.127)) and unemployed (Adjusted OR: 0.538 (0.271-1.068)). Leisure time activities and transport activities need to be promoted among house wives, retired people and school students. Studies have proven that physical activities in school environment have short term as well as long term benefits over health [25,26]. Encouraging physical activity from school days should be promoted in India, which will prevent the children from many risk factors including childhood obesity.

Non alcoholics were only 0.34 times as active as alcoholics. Limited number of studies were available to reason out this relationship between alcoholics and physical activity [11]. One reason may be the working population who were considered physically active, also consumed more alcohol due to peer pressure, work pressure and financial stability to afford. This leads to the concept of confounding which needs to be proved by research. One of the study have shown that the risk of losing mobility was positively associated with current smoking, not consuming alcohol [23].

LIMITATION

This study has been done in an urban area of south India. Generalisation from our study should be done with caution, which is a limitation of this study.

CONCLUSION

Physical activity was insufficient among urban population both male and female in Puducherry. Only the working adult population was active, that too during their working time. Overall physical activity can be promoted by increasing leisure time and commuting activities. Special attention to promote physical activity is needed among elderly, unemployed, students and house wives.

REFERENCES

[1]   Kohl HW, Craig CL, Lambert EV, Inoue S, Alkandari JR, Leetongin G, et al. The pandemic of physical inactivity: Global action for public health. The Lancet. 2012;380(9838):294-305.

[2]   Lee I-M, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT, et al. Effect of physical inactivity on major non communicable diseases worldwide: An analysis of burden of disease and life expectancy. The Lancet. 2012;380(9838):219-29.

[3]   Paffenbarger RS, Wing AL, Hyde RT. Physical activity as an index of heart attack risk in college alumni. American Journal of Epidemiology. 1978;108(3):161-75.

[4]   Carlos CM, Carlos S, Cristian A, Nicolas AF, Rodrigo RC, Jaime L, et al. Higher physical activity levels are associated with lower prevalence of cardiovascular risk factors in Chile. Rev med Chile. 2015;143(11):1435-43.

[5]   Dickie K, Micklesfield LK, Chantler S, Lambert EV, Goedecke JH. Meeting physical activity guidelines is associated with reduced risk for cardiovascular disease in black South African women; A 5.5-year follow-up study. BMC Public Health. 2014;14(1):1.

[6]   Do Lee C, Folsom AR, Blair SN. Physical activity and stroke risk a meta-analysis. Stroke. 2003;34(10):2475-81.

[7]   Netz Y, Wu M-J, Becker BJ, Tenenbaum G. Physical activity and psychological well-being in advanced age: a meta-analysis of intervention studies. Psychology and Aging. 2005;20(2):272.

[8]   Löllgen H, Böckenhoff A, Knapp G. Physical activity and all-cause mortality: An updated meta-analysis with different intensity categories. International Journal of Sports Medicine. 2009;30(3):213-24.

[9]   WHO: Diet and physical activity: A public health priority. Geneva [Accessed 05 May 2016]; Available from: http://www.who.int/dietphysicalactivity/background/en/.

[10] Guthold R, Ono T, Strong KL, Chatterji S, Morabia A. Worldwide variability in physical inactivity: A 51-country survey. American Journal of Preventive Medicine. 2008;34(6):486-94.

[11] Anjana RM, Pradeepa R, Das AK, Deepa M, Bhansali A, Joshi SR, et al. Physical activity and inactivity patterns in India–results from the ICMR-INDIAB study (Phase-1)[ICMR-INDIAB-5]. International Journal of Behavioral Nutrition and Physical Activity. 2014;11(1):1.

[12] Bull FC, Maslin TS, Armstrong T. Global physical activity questionnaire (GPAQ): nine country reliability and validity study. Journal of Physical Activity and Health. 2009;6(6):790.

[13] Global Physical Activity Questionnaire (GPAQ), Analysis Guide, World Health Organization. 2012 [Accessed 01 Jan 2017]; Available from: http://www.who.int/chp/steps/resources/GPAQ_Analysis_Guide.pdf.

[14] The STEPS instrument and Support Materials. 2016 [Accessed 08 Jul 2016]; Available from: http://www.who.int/chp/steps/instrument/en/.

[15] Physical Activity Show Card, World Health Organization. [Accessed 02 Jan 2017]; Available from: http://www.who.int/chp/steps/GPAQ_GenericShowCards.pdf?ua=1.

[16] Dumith SC, Hallal PC, Reis RS, Kohl HW, 3rd. Worldwide prevalence of physical inactivity and its association with human development index in 76 countries. Prev Med. 2011;53(1-2):24-28.

[17] King H, Aubert RE, Herman WH. Global burden of diabetes, 1995–2025: Prevalence, numerical estimates, and projections. Diabetes Care. 1998;21(9):1414-31.

[18] Aslesh OP, Mayamol P, Suma RK, Usha K, Sheeba G, Jayasree AK. Level of physical activity in population aged 16 to 65 years in rural Kerala, India. Asia Pac J Public Health. 2016;28(1 Suppl):53s-61s.

[19] Moniruzzaman M, Mostafa Zaman M, Islalm MS, Ahasan HA, Kabir H, Yasmin R. Physical activity levels in Bangladeshi adults: Results from STEPS survey 2010. Public Health. 2016;137:131-38.

[20] Mathews E, Pratt M, Jissa VT, Thankappan KR. Self reported physical activity and its correlates among adult women in the expanded part of Thiruvananthapuram city, India. Indian Journal of Public Health. 2015;59(2):136.

[21] Van Bui T, Blizzard CL, Luong KN, Le Van Truong N, Tran BQ, Otahal P, et al. Physical activity in Vietnam: Estimates and measurement issues. PloS One. 2015;10(10):e0140941.

[22] Paavola M, Vartiainen E, Haukkala A. Smoking, alcohol use, and physical activity: A 13-year longitudinal study ranging from adolescence into adulthood. Journal of Adolescent Health. 2004;35(3):238-44.

[23] LaCroix AZ, Guralnik JM, Berkman LF, Wallace RB, Satterfield S. Maintaining mobility in late life. II. Smoking, alcohol consumption, physical activity, and body mass index. American Journal of Epidemiology. 1993;137(8):858-69.

[24] Ferrucci L, Izmirlian G, Leveille S, Phillips CL, Corti M-C, Brock DB, et al. Smoking, physical activity, and active life expectancy. American Journal of Epidemiology. 1999;149(7):645-53.

[25] Myers L, Strikmiller PK, Webber LS, Berenson GS. Physical and sedentary activity in school children grades 5-8: The Bogalusa Heart Study. Medicine and Science in Sports and Exercise. 1996;28(7):852-59.

[26] Strong WB, Malina RM, Blimkie CJ, Daniels SR, Dishman RK, Gutin B, et al. Evidence based physical activity for school-age youth. The Journal of Paediatrics. 2005;146(6):732-37.

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