Original Article

Role of Physical Activity in Abating Non-Communicable Diseases: A Survey of Residents of Central Park Housing Society, Lahore

Shehnaz Khan, Mehrunisa Hassan, Mamoona Shafique, Saira Farhat, Saba Iftkhar, Shamim Akhter*

Central Park Medical College, Lahore, Pakistan.

*Corresponding Author

Saira Farhat
drsairafarhat@gmail.com

Received: 18th August, 2023
Revised: 7th November, 2023
Accepted: 13th November, 2023

DOI 10.51846/jucmd.v3i1.2714

Abstract

Objective: Regular physical activity is beneficial to both physical and emotional well-being. The present study goal is to observe how lack of physical exercise leads to various noncommunicable diseases.
Methodology: A study was conducted at Central Park Housing Society, Lahore using cross sectional study design. Data was collected from 250 residents of Lahore, Pakistan's Central Park Housing Society using the structured tool IPAQ-LF. Structured tool used in this study was applicable on age group between 15-69 years, therefore we included participants aged between 15-69 years in this study. While children, adolescences having age between 10-14 years, adults > 69 years old, pregnant women and those with existing non-communicable diseases were excluded from the study. The Kruskal-Wallis ANOVA test was used to determine whether there was a significant relationship between physical activity and non-communicable diseases.
Results: About 20.8% participants had family history of hypertension. Greater physical activity is linked to reduce hypertension risk. Lower physical activity is associated with a higher diabetes risk (18%) compared to the higher activity levels (14%). BMI and random blood sugar level is associated with physical activity.
Conclusion: Most of the participants were not involved in moderate physical activity. People who participated in physical activities are at a lower risk of developing diabetes and hypertension. In general, physical activity aids in mitigating harmful chronic diseases.

Keywords: Diabetes, Hypertension, Basal Metabolic Index , International Physical Activity Questionnaire Long Form (IPAQ-LF)

Introduction

Physical activity is the process whereby skeletal muscles consume energy to produce voluntary movement.[1] It is the primary factor driving community health improvement. Physical activity should be done on a regular basis to improve both mental and physical health and to prevent a variety of health problems.[2] According to the recommendations given by World Health Organization (WHO), "children and adolescents aged 5 to 17 should engage in 60 minutes of moderate to intense physical activity every day."[3]

According to different studies, lack of physical activity is commonly recognized as a significant factor for premature mortality and a wide array of non-communicable illnesses. Physical inactivity was estimated to be responsible for 6%-10% of premature death in 2008, as well as type II diabetes, obesity, hypertension, coronary heart disease and cancers worldwide. In 2012, cardiovascular illness was the leading cause of noncommunicable disease (NCD) mortality, accounting for 17.5 million deaths, or 46% of all NCD-related deaths.[1,3]

The global growth in chronic non-communicable diseases is directly connected to lifestyle changes such as decreased physical activity during relaxation time. Inadequate physical activity is a major community health concern. It is critical to determine the personal and environmental elements that influence physical activity behavior in order to treat this issue. Certain life events can contribute by producing emotional anguish and disturbing people's everyday routines.[4]

The combination of balanced nutrition and frequent physical activity produces a healthy life style that enhances overall health throughout one's life.[5] The World Health Organization (WHO) recommends 150 minutes of moderate to strenuous physical exercise once a week as a global standard for achieving and maintaining good health.[6]

Physical inactivity prevalence and patterns vary significantly across the globe. Rate of occurrence of physical inactivity doubled in high salaries nations (36.8%) compared to low-salaries countries (16.2%) in 2016. The rise in physical inactivity rates in high-income nations became apparent between 2001 and 2016. The burden of noncommunicable diseases has shifted noticably, with low and middle-income nations currently accounting for 80% of global noncommunicable disease fatalities.[7]

Physical activity has a number of possible benefits, including a 30% reduction in overall mortality. Even a 10-minute brisk walk can potentially cut mortality by up to 15%. It is associated with a 30-40% reduction in metabolic syndrome and type 2 diabetes, a 20% reduction in breast cancer risk, 20-50% reduction in cardiovascular disease risk, a 22-83% reduction in osteoarthritis incidence, a 20-30% reduction in depression, and a 30% reduction in falls among older adults. Walking has also been shown to provide better relief from low back discomfort.[8]

As per directions of World Health Organization, community-level physical activity

is a basic sign of health.[9] Chronic illnesses such as type II diabetes, obesity, hypertension, cardiovascular disorders and cancer can be prevented by regular exercise.[10] This study aims to investigate the relationship of physical activity with numerous non-communicable diseases.

Methodology

A cross-sectional research was conducted at the Community Medicine Department of Central Park Medical College in L hore, Pakistan from December 2022 to March 2023. The study obtained ethical permission from the institutional review board of Central Park Medical College and obtained informed written consent from all participants with reference number CPMC IRB-NO/1391.

Sample

A convenient sampling technique was used. Sample size was 250, calculated by using Raosoft calculator taking 90% confidence interval, 5% margin of error and as 29.3% as sedentary activity.[11]

Inclusion and Exclusion criteria

Structured tool i.e. International Physical Activity Questionnaire long form (IPAQ-LF) we employed in this study was applicable on age group between 15-69 years, subsequently, we included participants that were within the specific age bracket. While children, adolescences having age between 10-14 years, adults>69 years old, pregnant women and those with existing non-communicable diseases were excluded from the study.

Protocol

A self-designed questionnaire was used to record the demographic profiles of all the participants, which encompassed information such as age, marital status, and number of children, number of family members, anthropometric measurements, blood pressure and blood sugar levels. The assessment of physical activity involved the utilization of the structured tool International physical activity questionnaire long form (IPAQ-LF) among a sample of adults between age 15-69 years who reside within the community. Questionnaire can be download fromhttps://www.sralab.org/rehabilitation-measures/international-physical-activity-questionnaire-long-form. Data on the interval of mild, moderate and vigorous physical activity was collected in different categories, such as work, transportation, domestic activities, and recreational time.

Scoring Criteria

Score of each category (work, transportation, house work and leisure time) was calculated individually. All questions were based on the previous seven days physical activity. The findings were given in the form of an estimate of energy consumption in metabolic equivalent-minutes per week (MET hours/week).

Based on the IPAQ-LF scoring protocol,[12] the MET hours/week for various activities (such as work, active transportation, domestic/garden and leisure time) are determined by multiplying the corresponding MET value assigned to each activity (3.3 for walking minutes, 4.0 for moderate intensity activity, and 8.0 for vigorous intensity activity) by the number of hours devoted to that specific activity (e.g.; walking MET minutes/ week at work =3.3 × walking minutes × walking days at work). Afterwards, the overall physical activity score was computed along with individual scores for each of the four physical activity domains.[12]

Data Analysis

Various demographic variables are examined in relation to varying levels of physical activities. The normality was assessed using the Kolmogorov-Smirnov test. The Kruskal Wallis ANOVA was used to examine the relationship between NCD's and physical activity levels. The data analysis was carried out using SPSS 26.0.

Results

Data collected from 250 participants residing in Central Park Housing Society, Lahore, aged between 15 to 69 years, revealed that approximately two-thirds of the participants were females. Most of the participants were married and over half of them had a graduate degree. Nearly half of the individuals had a family history of hypertension and diabetes, while a smaller percentage had heart diseases. The data indicates that 20.8% of the participants have a family history of hypertension and are involved in low physical activity. However, engaging in high physical activity is related to less likelihood of hypertension. Additionally, participants who engage in moderate physical activity have a higher risk of diabetes (20%) compared to those with higher physical activity levels (14.4%). Moreover, raised levels of physical activity are linked to a minimized the risk of heart disease ($p<0.05$). The Table 1 showing physical activity.

In our study, we employed rigorous statistical analyses to examine the distribution of our data. The Kolmogorov-Smirnov test, yielding a p-value of 0.00, strongly suggests a departure from normality. Consequently, recognizing the limitations of parametric assumptions, we opted for the robust non-parametric Kruskal-Wallis ANOVA to explore the relationship between physical activity levels and various non-communicable diseases.Our findings, as presented in Table 2, unveil compelling insights into the association between physical activity and specific health indicators. Notably, we observed a statistically significant association between random blood sugar levels and BMI across different levels of physical activity.The nuances of these associations become clearer when examining Figure 1, which vividly illustrates that individuals with high levels of physical activity tend to exhibit a normal BMI. This visual representation enhances our understanding of the interplay between physical activity, BMI, and health outcomes. It not only reinforces the statistical significance found in our analyses but also provides a tangible and accessible representation of the observed trends. Our comprehensive approach, combining robust statistical tests and clear visualizations, strengthens the validity of our findings. This study contributes valuable

insights into the complex relationship between physical activity, BMI, and non-communicable diseases, the importance of promoting physically active lifestyle for improved health outcomes.

Table 1: Cross tabulation of demographic variables with Physical activity

Factor	Categories	Physical Activity			p-value
		Low n (%)	Moderate n(%)	High n(%)	
Gender	Male	34 (13.6)	28 (11.2)	15 (6.0)	0.36
	Females	66 (26.4)	59 (23.6)	48 (19.2)	
Marital Status	Married	88 (35.2)	73 (29.2)	51 (20.4)	0.45
	Single/Unmarried	12 (4.8)	14 (5.6)	12 (4.8)	
Educational Level	Illiterate	18 (7.2)	9 (3.6)	18 (7.2)	0.16
	Primary or less	14 (5.6)	14 (5.6)	8 (3.2)	
	Secondary or High School	33 (13.2)	25 (10.0)	21 (8.4)	
	Graduation	21 (8.4)	26 (10.4)	10 (4.0)	
	Post Graduation or above	14 (5.6)	13 (5.2)	6 (2.4)	
Family History of hypertension	Yes	52 (20.8)	53 (21.2)	32 (12.8)	0.36
	No	48 (19.2)	34 (13.6)	31 (12.4)	
Are you Hypertensive?	Yes	26 (10.4)	19 (7.6)	13 (5.2)	0.68
	No	74 (29.6)	68 (27.2)	50 (20.0)	
Family History of Diabetes	Yes	45 (18.0)	50 (20.0)	36 (14.4)	0.16
	No	55 (22.0)	37 (14.8)	27 (10.8)	
Are you diabetic Type-II?	Yes	22 (8.8)	20 (8.0)	7 (2.8)	0.14
	No	78 (31.2)	67 (26.8)	56 (22.4)	
Family history of ischemic heart disease	Yes	32 (12.8)	27 (10.8)	26 (10.4)	0.03
	No	68 (27.2)	60 (24.0)	37 (14.8)	
Have you ever had a heart attack or chest pain?	Yes	4 (1.6)	1 (0.4)	4 (1.6)	0.23
	No	96 (38.4)	86 (34.4)	59 (23.6)	

p-< 0.05 statistically significant, chi-square test

The Table 2 summarizes mean values for health-related variables across low, moderate, and high levels of Total Physical Activity (MET min/per week). Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) show no significant differences

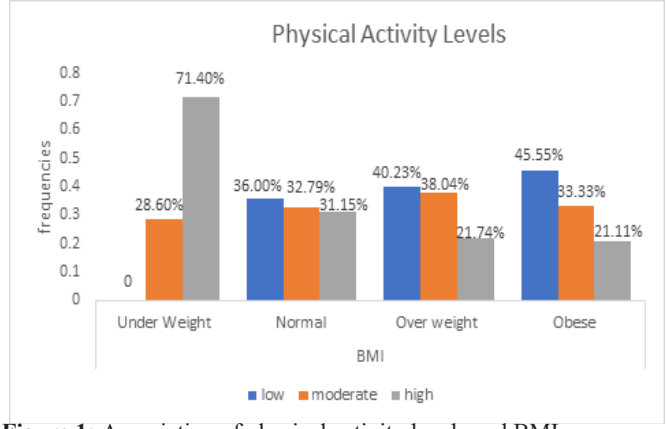

Figure 1: Association of physical activity levels and BMI

Table 2: Association of physical activity with NCD's

Variables	Total Physical Activity (MET min/per week)			
	Low	Moderate	High	P-Value
SBP	134.10 (58.38)	125.75 (16.93)	130.65 (63.159)	0.46
DBP	82.50 (11.83)	79.92 (11.89)	78.97 (10.70)	0.21
BMI	36.610 (37.70)	29.75(12.78)	27.7505 (7.45)	0.00*
Waist Circumference	100.64 (25.64)	100.21 (18.46)	95.48 (23.91)	0.12
RBS	131.10 (56.54)	125.10 (57.69)	113.59 (52.55)	0.03*
Heart Rate	82.67 (8.54)	80.89 (7.72)	81.05 (7.57)	0.19

* P-value <0.05 statistically significant,* Krushkal-Wallis ANOVA

Discussion

Scientific literature widely confirms the beneficial impacts of physical activity on health. Recent studies indicate that doing regular physical activity remarkably decreases the risk of premature mortality and over 25 chronic medical conditions. However, despite this evidence, a substantial portion of the global population continues to lead a sedentary lifestyle. According to our research, it was found that approximately 40% of the participants performed low physical activity, while around 25.2% were involved in intense exercise. These results are close to another research done by Ullah *et al.* (2021) which shows 48.2% of the participants were physically inactive, 42.8% had a moderate activity level and only 9.1% exhibited a high level of physical activity.[13] In contrast, a different study done in Karachi reported the prevalence of physical inactivity to be 72.6%.[14]

According to our findings, female participants demonstrated higher levels of physical activity (48%) compared to males (15%). These findings are contrary to a research done among undergraduate pupils in Peshawar, Pakistan, where physical activity was observed more in male participants compared to females.[15] Based on our research findings, 31.15% of individuals who engaged in vigorous physical activity were

found to have a normal BMI. These results are comparable to other study done by Satti *et al.* (2019) which reported that 54.6% of respondents had a normal BMI in participants in the age group 18-65 years.[16] A study conducted in Colombia to find the relationship between physical activity and weight status showed that there was no improvement in health of obese and underweight adults following the physical activity guidelines status. Our results do not match with this study.[17]

Our research findings show that physical activity helped in improving blood sugar levels and BMI. In comparison to another survey conducted in India, where it was seen that physical activity did not have significant effect on weight and obesity but was positively associated with reduction in diabetes and hypertension.[18] Interestingly, a cross sectional study conducted in Puducherry, India, showed no betterment in diabetes, hypertension or BMI with increased levels of physical activity.[19] A study conducted in Saudi Arabia in middle-aged showed similar results to our study regarding association of physical activity with non-communicable diseases.[20]

Conclusion

Based on the findings, individuals who engaged in physical activities were not affected by diabetes or hypertension. Morover, those who maintained a high level of physical activity exhibited a low BMI, indicative of a favorable state of health. These rsults shows that physical activity is beneficial in reducing these chronic diseases which are harmful for health.

Limitations

First of all, the sample size for our study should have been much larger. Secondly, although our investigation was cross-sectional and had a short duration, it could be done using a longitudinal study design with longer duration, such as a cohort study in order to obtain more exact and accurate results.

Recommendations

It is highly recommended that multiple studies are require for different population groups. Awareness programs and campaigns in community should be conducted about physical activity and its relation with non-communicable diseases. These issues should be highlighted and the legislations should made on government levels.

Acknowledgement: We would like to thank Mian Tahir Mehmood (CEO of Central Park Society) for his kind act of benevolence as he allowed us to conduct this study smoothly. My heartfelt gratitude also goes to Principal Mian Amir for his significant support in our work, urban developers who made this study feasible for us by providing street maps and security for our survey.

Authors' Contribution: SK is responsible for the initiation and design of the study, MH and MS conducted the data collection, SF and SI performed the analysis and interpretation of the obtained results, and SA prepared the initial draft of the manuscript.

Conflict of Interest: All authors declare no conlfict of interst.

References

1.Bopp M, Fallon E. Community-based interventions to promote increased physical activity: a primer. Applied health economics and health policy. 2008 Oct;6:173-87.

2.Laar RA, Shi S, Ashraf MA, Khan MN, Bibi J, Liu Y. Impact of physical activity on challenging obesity in Pakistan: a knowledge, attitude, and practice (KAP) study. International Journal of Environmental Research and Public Health. 2020 Sep;17(21):7802-7806.

3. Singh R, Javed Z, Yahya T, Valero-Elizondo J, Acquah I, Hyder AA, *et al*. Community and social context: an important social determinant of cardiovascular disease. Methodist Debakey Cardiovascular Journal. 2021 Sep;17(4):15.

4. Engberg E, Alen M, Kukkonen-Harjula K, Peltonen JE, Tikkanen HO, Pekkarinen H. Life events and change in leisure time physical activity: a systematic review. Sports Medicine. 2012 Jul;42:433-447.

5. OZkan A. The relationship between physical activity level and healthy life-style behaviors of distance education students. Educational Research and Reviews. 2015 Jun;10(4):416-422.

6. González K, Fuentes J, Márquez JL. Physical inactivity, sedentary behavior and chronic diseases. Korean journal of family medicine. 2017 May;38(3):111.

7. Haddad PS, Azar GA, Groom S, Boivin M. Natural health products, modulation of immune function and prevention of chronic diseases. Evidence-Based Complementary and Alternative Medicine. 2005 Dec 1(2):513-520.

8. Saqib ZA, Dai J, Menhas R, Mahmood S, Karim M, Sang X, *et al*. Physical activity is a medicine for non-communicable diseases: a survey study regarding the perception of physical activity impact on health wellbeing. Risk Management and Healthcare Policy. 2020 Dec:2949-2962.

9. Sadrollahi A, Hosseinian M, Alavi NM, Khalili Z, Esalatmanesh S. Physical activity patterns in the elderly kashan population. Iranian Red crescent Medical Journal. 2016 Jun;18(6).

10. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. Canadian Medical Association Journal. 2006 Mar;174(6):801-809.

11. Brownson RC, Boehmer TK, Luke DA. Declining rates of physical activity in the United States: what are the contributors? Annu Rev Public Health. 2005 May;26:421-443.

12. Khoramrooz M, Zare F, Sadeghian F, Dadgari A, Chaman R, Mirrezaie SM. Socioeconomic inequalities in employees' health-enhancing physical activity: Evidence from the SHAHWAR cohort study in Iran. Plos one. 2023 May 15;18(5).

13. Ullah I, Islam MS, Ali S, Jamil H, Tahir MJ, Arsh A, et al. Insufficient physical activity and sedentary behaviors among medical students during the COVID-19 lockdown: findings from a cross-sectional study in Pakistan. International Journal of Environmental Research and Public Health. 2021Aug;18(19):1025.

14. Samir N, Mahmud S, Khuwaja AK. Prevalence of physical inactivity and barriers to physical activity among obese attendants at a community health-care center in Karachi, Pakistan. BMC Research Notes. 2011 May;4(1):1-7.

15. Alam S, Khan SB, Khattak QW, Abidin SZ, Farooqi S, Khan Z, Kazmi A. Level of physical activity in undergraduate students in Peshawar, Pakistan. Asian Journal of Health Sciences. 2021 Feb 9(7)20-21.

16. Satti MN, Khalid M. Prevalence and Determinants of Overweight

and Obesity Among Adults in Pakistan. Accessed on 21st January. 2019. https://file.pide.org.pk/pdfpideresearch/phwps-002-prevalence-and-determinants-of-overweight-and-obesity-among-adults-in-pakistan.pdf .

17. Chen S, Ling J, Cheng Y. Physical activity and body mass index were interactively related to health-related quality of life among older adults. Archives of Gerontology and Geriatrics. 2023 Jan 1;104:104833.

18. Pengpid S, Peltzer K. Prevalence and associated factors of physical inactivity among middle-aged and older adults in India: results of a national cross-sectional community survey. British Medical Journal Open 2022 Mar;12:058156-058156.

19. Kaur P, Singh S, Mathur A, Makkar DK, Aggarwal VP, Batra M, *et al*. Impact of dental disorders and its influence on self esteem levels among adolescents. Journal of Clinical and Diagnostic Research: 2017 Apr;11(4):ZC05.

20.AlFaris NA, Alshwaiyat NM, AlTamimi JZ, Alagal RI, Al-Jamal HA, AlKehayez NM. Physical activity levels of a multi-ethnic population of middle-aged men living in Saudi Arabia and factors associated with physical inactivity. International Journal of Public Health. 2022 Jun;66:1604328.