

# Assessment of Physical activity Level and Sedentary Behaviour Among Pune City Police Personnel Using Global Physical Activity Questionnaire: A Survey

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## ABSTRACT

**Background:** Policemen being an integral part of the law implementation system have long working hours with huge workloads. They may not be able to save time for regular exercise or eat timely healthy meals which may put them at high risk of developing non-communicable diseases like cardiovascular diseases, diabetes, or lifestyle disorders such as obesity. The purpose of this study was to assess their existing physical activity level and sedentary behaviour using Global Physical Activity Questionnaire version 2.0.

**Objective:** To assess the level of physical activity in police officers during work, travel and leisure-time and also determine the sedentary behaviour in them.

**Method:** A cross-sectional study was conducted on 270 policemen, 168 males and 102 females, from 16 different police station of the Pune city using Global Physical Activity Questionnaire. Along with the analysis of demographic factors, data was analysed to evaluate if the study participants met the criteria for physical activity recommended by WHO. Participants were then divided into different categories depending on their energy expenditure i.e., MET-min/week. Their sedentary behavior was calculated in terms of hours spent in sitting position.

**Result:** Out of the total study participants, 50.4% were physically active and 49.6% were physically inactive. 3.7% study participants were involved in the moderate-intensity physical activity at the workplace; 32.2% study participants were active in travel domain and 54.8% in leisure-time domain. 12.2% of study participants were involved in vigorous-intensity physical activity in leisure-time domain only. 134 participants were inactive, 132 were low-active, 4 were moderately-active with not a single participant in highly-active category. The average amount of time spent sitting in the male participants was  $6.11 \pm 3.03$  hours whereas in female participants it was  $7.50 \pm 2.62$  hours.

**Conclusion:** Even though 50.4% policemen were physically active, most of them were "low-active" and very few were "moderately-active" whereas not a single study participant was found to be "highly-active". Sedentary behaviour in terms of average amount of time spent sitting was found to be more in female than male participants. Also, 51.11% percentage of the study participants belonged to the overweight and obese category. Thus, there is huge scope for improving the physical activity level as well reducing the sedentary behavior in these professionals.

**KEY WORDS:** GPAQ, physical activity, sedentary behavior, police personnel, Pune city.

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## INTRODUCTION

Non-Communicable deaths are the leading cause of premature mortality worldwide. As stated by the World Health Organization in the year 2022, more than 41 million of the premature deaths were caused by the Non-Communicable Diseases. Among all the Non-Communicable Diseases, cardiovascular diseases rank the top followed by cancer, respiratory diseases (COPD, Asthma) and diabetes [1].

Risk factors for non-communicable diseases can be classified as modifiable and non-modifiable. As there is very less scope for altering the non-modifiable risk factors, focus should be shifted towards the modifiable risk factors. The major modifiable risk factors of Non-Communicable Diseases are tobacco use, excessive alcohol consumption, unhealthy diet and physical inactivity [2].

Out of all these factors physical inactivity is one of the factors that is increasing at an alarming rate. It has become the fourth leading cause of deaths worldwide [3]. Over the years it has taken form of a pandemic which will continue to rise unless curbed.

Owing to the rapidly changing technology, everything has become just a click away. This along with many other lifestyle related factors could have led to decrease in the physical activity and relying more on sedentary behaviour, resulting in increase in the lifestyle disorders such as obesity, Metabolic syndrome and so on.

Nevertheless, these Non-Communicable Diseases can be prevented to a great extent by modifying one's lifestyle. If one avoids tobacco and excessive alcohol consumption, consumes proper balanced nutritious diet as well as engages in regular physical activity, it might help to cut down the risk of these non-communicable diseases. The focus should be on improving the level of physical activity as well working on reduction in the sedentary time. As defined by Sedentary Behavior Research Network (SBRN), "Sedentary behavior refers to activity that do not increase energy expenditure substantially above the resting level and includes activities such

as sleeping, sitting, lying down, and watching television, and other forms of screen-based entertainment. Operationally, sedentary behavior includes activities that involve energy expenditure at the level of 1.0-1.5 metabolic equivalent units (METs)" [4].

Sedentary behaviour involves not just sitting or desk job at worksite but also engaging in long hours of sitting at home, involved in recreational activities that involve more of sitting and also the amount of time spent in sitting for commuting to and from places. One should limit the time spent sitting ideally and maintain active lifestyle to prevent its detrimental effects.

The WHO defines "physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure" [5].

Physical activity plays a crucial role in ones physical as well as overall development. Physical activity is an umbrella term that encompasses not just form of exercise we do but also activities performed as a part of recreational sports or energy expenditure required in commuting to and from places as well as form of activities required to be performed at one's workplace.

Physical activity can be classified as light, moderate and vigorous depending on the energy expenditure. The energy expenditure is calculated in terms of Metabolic Equivalents (METs). "MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1kcal/kg/hour" [5].

Regular physical activity helps to maintain healthy weight, reduce adiposity, reduces the risk of cardiovascular and cerebrovascular diseases. One can maintain normal blood sugar level and blood pressure with regular exercise. Daily exercise may also help to enhance one's mental well-being as well as cognition. It helps to improve the quality of life. It helps in cancer prevention and improves balance and co-ordination [6]. Exercises helps to improve energy levels throughout the day and also promotes better sleep at night.

The people who are physically inactive or do

not meet the recommended level of physical activity, are at-risk of developing heart diseases, they may have high blood pressure, blood cholesterol and develop obesity as well as high blood sugar level. They may become lethargic and have poor quality sleep. They may also become prone to cerebrovascular accidents and certain cancers. Basically, physical inactivity contributes in the increase of the overall all-cause mortality [5].

American College of Sports Medicine (ACSM) and Centers for Disease Control and Prevention (CDC) guidelines state that all healthy adults aged between 18-65 years should perform at least 30 minutes of moderate-intensity aerobic physical activity on five days a week, or 20 minutes of vigorous-intensity aerobic-physical activity on three days a week or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity throughout the week. Every adult should participate in the activities that maintain or enhances his muscular strength and endurance for at least two days a week [7].

In a recent study conducted by the WHO, it was found that 1.4 billion adults of the world's population were insufficiently active; with no increase in the global physical activity level since 2001 [5].

The work of a policemen in the state of Maharashtra generally includes patrolling, registering First Information Report, maintaining chargesheets, visiting and securing the crime scenes, collecting evidences, escorting criminals to court proceedings, and participating in weekly drill sessions and so on. Most of these activities fall under the light to moderate intensity of physical activities and also occasionally include vigorous intensity of physical activity.

Various questionnaires are available or can be self-designed for the evaluation of physical activity in this population. GLOBAL PHYSICAL ACTIVITY QUESTIONNAIRE version 2.0 proposed by the World Health Organization however is an excellent tool to evaluate the physical activity level as well as assess the sedentary behaviour. GPAQ was proposed by WHO in the year of 2002 to measure the extent of physical activity in the population above the age of

18-69. GPAQ is specially designed for the population of the developing countries. The major strength of GPAQ is that it is Domain-specific. There are 3 Domains-work, leisure-time and transport. 16 questions are included in GPAQ which are designed to estimate the level of physical activity during the Domain stated above. For example: Work domain involves questions directed towards the moderate or vigorous level of physical activity done at one's workplace. The travel domain has questions about their mode of transport, time spent travelling on a typical day. Leisure domain evaluates any moderate- vigorous intensity of recreational activities [8].

There are a few studies which are done overseas to evaluate the physical activity levels in police officers using International Physical Activity Questionnaire and Global Physical Activity Questionnaire, but there is dearth of literature regarding this in the Indian policemen. Thus, this study aims to evaluate the level of physical activity and sedentary behaviour in police officers of the Pune region.

This study will thereby help to assess their level of physical activity and sedentary behaviour which once determined will help in designing specific strategies to improve their level of physical activity.

## METHODOLOGY

This was an interview-based cross-sectional study. It was done using Global Physical Activity Questionnaire by WHO. The sample size was calculated with  $p$  as 31.8%; using the data published in Police officers in Croatia [9]. Confidence level was set as 95%, absolute precision ( $E$ ) was 8% and power was considered to be 80%. The sample size was found by using the formula  $n = (Z\alpha + Z\beta)^2 pq/E^2$ . The calculated sample size was 266. Institutional ethics committee's clearance was sought, once the protocol was finalized. Data was collected over a period of 6 months. The list of all the police stations in Pune region was obtained from the official website of the Pune police. Out of the total 32 police stations in Pune city, 16 were selected randomly. All of the 16 police stations were approached by the

principal investigator. All the participants available at that time in the station were approached for participation in this study. They were screened for the inclusion and exclusion criteria. The participants were approached individually and explained about the nature of the study. Subject information sheet was provided to these participants and their consent was taken prior to participation in the study.

The participants were asked to report their age, height, weight, co-morbidities and also years of experience. Body Mass Index was calculated using the reported height and weight and the study participants were graded according to the BMI categories as underweight ( $<18.5 \text{ kg/cm}^2$ ), healthy ( $18.5\text{-}24.9 \text{ kg/cm}^2$ ), overweight ( $25\text{-}29.9 \text{ kg/cm}^2$ ), obese class 1 ( $30\text{-}34.9 \text{ kg/cm}^2$ ) and obese class 2 ( $35\text{-}39.9 \text{ kg/cm}^2$ ) [10].

They were explained about activities that could be considered as moderate- and vigorous- intensity activities with the help of flashcards described in the GPAQ – generic show cards [11]. Global Physical Activity Questionnaire was then administered on an interview basis. The vigorous-intensity activities and moderate intensity activities were considered to have MET values 8 and 4 respectively [12].

The energy expenditure is the product of the MET value of the activity and time spent doing it. Thus, the calculation of MET-Minutes per week helped in categorizing the study participants as being inactive (less than 600MET- mins/week), low active (600-3999 MET- mins/week), moderately active (4000-7999MET- mins/week) and highly active ( $>8000\text{MET- mins/week}$ ) [13]. GPAQ also evaluated the sedentary behaviour of the study participants in terms of hours spent in sitting position at work, during travel or as form of leisure. Demographic data was analysed and represented as descriptive statistics. Data analysis of GPAQ components was performed as per the GPAQ analysis guide [12].

## RESULTS

The calculated sample size was 266. Total of

315 policemen were approached for the participation in the study; out of which 270 participated in the study, the response rate being 85.71%. In this study, the number of male and female participants was 168 (62.2%) and 102 (37.8%) respectively.

Mean age of the study participants was  $38 \pm 9.2$  years (median;35 years). We also calculated the mean of years of work experience in the study participants which was found to be  $15.06 \pm 8.90$  years (median;12 years). The mean height of the study participants was found to be  $168.22 \pm 7.96\text{cm}$  (median;168 cm) and weight was found to be  $72.24 \pm 12.64\text{kg}$  (median;72 kg). Body Mass Index of the participants were also calculated using their reported height and weight. They were distributed in different groups depending on their BMI as underweight, healthy, overweight and obese [10].

**Table 1.** demonstrates the distribution of the study participants according to the BMI categories. Out of the total participants, 239 policemen reported that they were free of any co-morbidities while remaining 31 had co-morbidities as listed in **Table 2**. Some of the participants had more than one comorbidity.

The study participants were assessed for their level of physical activity and were graded into two categories of being physically active and physically inactive. This was done in accordance with the guidelines given by WHO wherein, an individual performing physical activity of more than 600 MET- minutes/ week is considered to be physically active or else is to be considered as physically inactive.

Out of the total study population, 136 (50.4%) participants were found to be physically active whereas 134(49.6%) were physically inactive. Gender-wise distribution of study participants according to their physical activity level is shown in **Figure 1**.

The participants were divided into different categories depending on their MET- minutes/ week of physical activity [13].

**Table 3** demonstrates the distribution of the study participants in different categories of “inactive”, “low-active”, “moderately-active”, “highly-active” and **Figure 2** demonstrates the



gender-wise distribution of different categories of physical activity. In this study, female participants were more “inactive” and majority of the male participants have been found to be in “low-active” and “moderately-active” category with not a single participant falling under “highly-active” category.

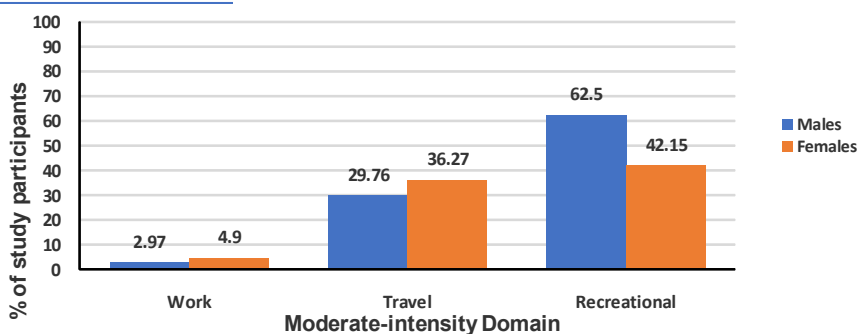
**Table 4** gives the distribution of study participants according to vigorous and moderate-intensity physical activities in terms of work, travel and recreational domains. **Figure 3** shows gender-wise distribution of study participants in moderate intensity physical activity domain. And as it can be seen in **Table 4**, none of the participant was involved in vigorous-intensity of physical activity in the work and travel domain with only 17.85% of male participants involved in recreational activities of vigorous-intensity. As seen in **Figure 3**, an equal percentage of male and female participants perform moderate-intensity physical activity at the workplace. In leisure-domain, the number of male participants performing moderate-intensity physical activity is far more than the female participants.

In this study we also evaluated their sedentary behaviour. The female participants seem to have more sedentary behaviour than the male participants. The average amount of time spent sitting in the male participants was  $6.11 \pm 3.03$  hours whereas in female participants it was  $7.50 \pm 2.62$  hours.

**Table 1:** Distribution of the study participants according to BMI categories.

BMI (kg /cm <sup>2</sup> )	Number of study participants	Percentage
<18.5	6	2.2
18.5 – 24.99	126	46.7
25 – 29.99	106	39.3
30 & above	32	11.9
Total	270	100

**Figure 3:** Gender wise distribution in Moderate - intensity physical activity domain.



**Table 2:** Distribution of study participants in relation to reported comorbidities.

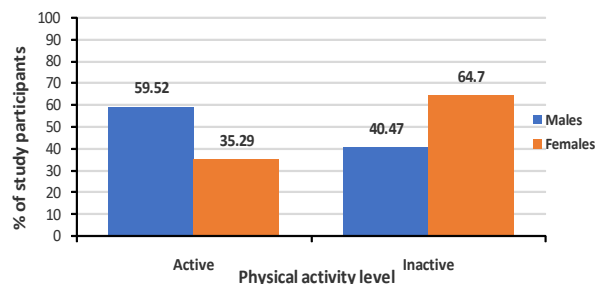
Comorbidity	Number of study participants	Percentage
Hypertension	12	4.44
Diabetes Mellitus	14	5.19
Ischemic Heart Disease	2	0.7
Asthma	1	0.4
Hypothyroidism	6	0.22

**Table 3:** Distribution of study participants in different categories of physical activity.

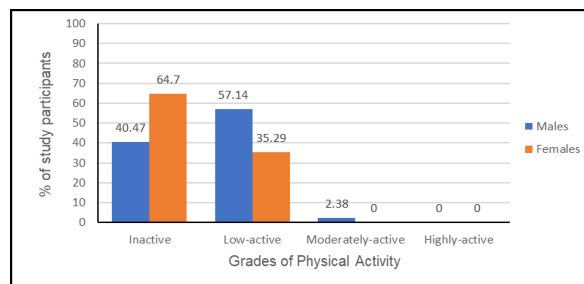
Physical activity grade	Number of study participants	Percentage
Low	132	48.9
Moderate	4	1.5
High	0	0
Inactive	134	49.6
Total	270	100

**Table 4:** Domain-wise distribution of study participants according to intensity of the physical activity.

Domain	Vigorous Intensity in (%)	Moderate Intensity in (%)	Total (n=270) %
Work	0	3.7	0
Travel	0	32.2	0
Recreational activity	12.2	54.8	67



**Fig. 1:** Gender-wise distribution of study participants according to their physical activity level.



**Figure 2:** Gender – wise distribution of study participants in different categories of physical activity.

## DISCUSSION

World Health Organization has recommended, moderate intensity of physical activity for around 150 minutes/week or vigorous intensity physical activity of 75 minutes/week or a combination of both. This regular physical activity will help in maximizing the positive effects of regular physical activity and decline the hazards of physical inactivity. In our study, 49.6% of the study participants were found to be physically inactive, which surely needs to be addressed. It is believed that various activities on the work profile of policemen requires them to be physically active through most of their working hours, but the results demonstrated quite a percentage of study participants being physically inactive.

Even though 50.4% of the study participants were found to be physically active, there was none meeting the category of "Highly-Active" as per the classification based on MET-minutes per week. 132 participants were found to be in low-active category and only 4 participants in moderately-active category. Thus, even if numbers suggest good proportion of participants being physically active, they are still under "Low-active" and "Moderately-active" category with not a single study participant falling under "Highly-active" category.

Sedentary Behaviour, that is time spent sitting at work, or during travel or during leisure was found to be around 6 hours in males and 7 hours in female which needs to be modified considerably, as sedentary behaviour is similar to being physically inactive thereby increasing the risk of developing lifestyle disorders like obesity. Obesity in turn is a risk factor for plethora of conditions. In our study females depicted more sedentary behaviour than males.

One of the reasons for this gender-based variability in sedentary behaviour given by the female participants was that they are involved in more desk related jobs than their male counterparts. Another factor reported by the female participants for their reduced physical activity is lack of time owing to the household

chores that they need to take care of after a 12-hour shift which might not be the case for male participants. It was also found that male study participants were more actively involved in the recreational activities as compared to the female participants, especially on their non-working days.

The percentage of the overweight and obese participants (51.11%) in our study altogether exceeds the percentage of the participants belonging to the normal BMI range (46.7%). Thus, almost half of the study participants belonged to the overweight and obese category which might increase their risk of developing cardiovascular diseases. Though there are many factors that contribute towards obesity, physical inactivity in these participants can surely be considered as an attributable factor for obesity.

Some of the factors that can be attributed to decreased physical activity level and increased sedentary behaviour in these professionals, could be their duty hours, which is usually a 12-hour shift, thus leaving very little time for them to utilize for exercise. They also have alternate day and night shift which changes every week, affecting their biological clock and making it difficult to exercise. Another factor that might be contributing to this could be that they need to rely on vehicles for commuting between places owing to the time constraints, thereby eliminating the scope of improving physical activity in the travel domain.

None of the participant in our study was involved in vigorous intensity of physical activity in the travel and work domain with only 12.2 % of the study participants engaged in recreational activities of vigorous intensity. As far as moderate intensity physical activities are concerned, only 3.7% of the participants were involved in it at work, with 32.2% in travel domain and 54.8% being involved in recreational activities of moderate intensity. This study also points out that the participants have markedly reduced physical activity in the recreational domain thus highlighting the scope of appropriate intervention in order to improvise physical activity in this domain. Police officers can be encouraged to at least participate in the moderate

vigorous-intensity based recreational sports at least on the weekends, thereby helping in working on their physical activity levels.

These results demonstrate the need for intervention in order to improve the physical activity level in police officers in Pune city. Some of the reasons cited by them that have contributed towards decreased physical activity could be valid and barriers in true sense, but one really needs to overcome those barriers and work towards increasing physical activity. This study can serve as a baseline data for determining the level of physical activity among police officers, thereby helping in implementing specific strategies directed towards improvement in their physical activity level. Strategies need to be implemented not just to promote the increase in physical activity level but also reducing the sedentary behaviour.

The strength of our study was that it was conducted using the standardized questionnaire, GPAQ developed by WHO for the assessment of moderate and vigorous intensity of physical activity level as well as sedentary behaviour. Limitation was that we could not ensure inclusion of equal number of male and female participants in the study. The future scope of our study would be objective assessment of physical activity using pedometers, accelerometers which can also be done along with this questionnaire-based evaluation of physical activity. The clinical implication would be that this study can be used as a baseline for developing and implementing strategies to improve the level of physical activity in the police officers of Pune region.

## CONCLUSION

Our study concludes that nearly half of the study population met the criteria of being physically active, but none of the study participants qualified under the category of “Highly-active” based on MET minutes/week. Majority of the participants belonged to the “Low-active” and “Moderately-active”. It was also found, that half of the study participants belonged to the overweight and obese categories, thereby highlighting the need of

increasing physical activity level at work place, while travelling to and from places and also in form of recreational activities. It also suggests the need to reduce the sedentary behaviour in these participants.

## AUTHORS CONTRIBUTION

Both the authors have contributed in the conception and design of the study, analysis and interpretation of data and preparing of manuscript. First author has additionally contributed towards collecting the data.

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**Conflicts of interest: None**

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