

Correlation between the Leisure Time Physical Activity and the Physical Fitness of Normal Individuals Working in the Corporate Sector

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Abstract

This study was conducted to find out the correlation between the physical activity at work and leisure time physical activity of normal individuals working in the corporate sector. A total of 97 employees of various Banks and Institutes in Mangalore were recruited for this. International Physical Activity Questionnaire (IPAQ) was used to measure the physical activity levels and the Rockport One Mile Walk Test was used to measure their physical fitness. The result showed a weak correlation between leisure time physical activity and physical activity at work. It was also found that more than half the study population lacked leisure time physical activity. This study suggests that there should be more awareness programmes to inform the importance of physical activity during leisure time and also steps to encourage activity at work should be taken up.

Keywords: Physical Activity; Physical Fitness; Sedentary Lifestyle.

Background

Good health is an enroute to wellness and in present era it is not illness but wellness that matters. It is required to develop and maintain levels of fitness that are consistent with good health [2]. The physical activity level and the health status of the people of India may not be satisfactory. It is predicted by the end of 2015, India is to become the world's diabetic capital and is expected to suffer enormous income loss of \$ 237 billion due to rising tide of chronic diseases – heart disease, stroke, cancer, diabetes and chronic respiratory problems at work place [4]. It is also predicted that by the end of this decade India is expected to have 60% of the world's heart patients and that Indians will have a higher rate of heart diseases and at a younger age [5]. Individuals who are physically active and lead a healthy life are less prevalent for most of the non-communicable diseases [2].

The economic burden of physical inactivity has cost India a huge burden in the last few decades and even though India being a developing country the Indians are less active in their leisure time than any other ethnic group in the world [4]. Lack of leisure time physical activity and sedentary jobs have been associated with 1.5 – 2.4 fold elevation of Coronary Heart Disease risk and are responsible for 30% of the mortality rate.

Ironically, most of the health anomalies affecting the Indian population are preventable and the progress of the disease can be controlled by increasing the physical activity levels. Physical inactivity is one of the most important risk factor that can be modified at an early age only by understanding the ill effects of physical inactivity and poor fitness [14]. High cardio respiratory fitness levels through regular exercises not only help prevent but also reduces the risk of Coronary Heart Disease (CHD) [15, 16]. Therefore the gravity of the situation demands more awareness and an increase in the body of knowledge in this field.

This gives us a rationale to evaluate the physical fitness of the individuals in sedentary jobs [13]. There is overwhelming evidence from earlier epidemiological prospective studies that physical activity and physical fitness are related [17]. Therefore it is important to evaluate the impact of physical activity at work and leisure time physical activity on the fitness levels of sedentary persons.

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The IPAQ was developed for surveillance activities and to guide the development of policies by the Government related to health enhancing physical activity across various domains⁵. The IPAQ has been translated into several languages and validated. It was found to be reliable in 12 countries of the world and can be used for good research studies¹⁹. It is easy to administer and has a scoring protocol that follows International Guidelines of physical activity score according to the MET's achieved²⁰.

The cardio respiratory fitness can be quantified by Rockport One Mile Walk Test which is one of best sub maximal test used to predict VO_2 max. It provides a valid assessment for estimating maximum oxygen uptake and is considered as one of the best measures of cardiovascular health and fitness²¹. The maximal O_2 uptake is estimated based on sex and the specific prediction models including heart rate at the end of walking, age, time taken and weight of the person²².

Thus by making use of these 2 very significant and easy outcome measures this study aims at quantifying the physical activity at work and the leisure time physical activity and correlating it with the physical fitness of normal individuals working in the corporate sector. The findings of this study will substantially help to explore the knowledge of the level of physical activity of the individuals working in the corporate sector. According to WHO Online Global Database, in developing countries the differences in physical activity are consistent with less discretionary time available and this demands changes in occupational, transportation and domestic physical activity⁵. Thus the outcome of this study will also provide an additional and valuable data to the Health Professionals and broaden the horizons of its implication in a preventive role.

As has been eloquently pointed out by K. S. Reddy, "an empowered community, an enlightened policy and an energetic coalition of Health Professionals must ensure that the development of (developing countries) is not accompanied by distorted nutrition and distorted health²³". Hence the objective of this study was to evaluate the leisure time physical activity and its correlation with physical fitness of the normal individuals working in the corporate sector including banks.

Materials and Methods

In this cross sectional study ninety seven subjects with in the age of 30 – 45 without cardio respiratory, musculoskeletal and neurological impairment were

included for this study through purposive sampling. Subjects with the history of recent hospitalization and under medication for hypertension and diabetes were excluded. All the subjects were able to read English language. Out of the 97 subjects 61 were female while only 36 were males.

All the subjects had sedentary jobs involving sitting for more than 4 -5 hrs as the study population. This study was approved by the institutional ethical committee. Written informed consents were obtained from the participants prior to the commencement of the study.

Data collection started during the mid-week of July and continued upto the 1st week of October. The study was done after 4.30 pm on windless days. Everyday a minimum of 2 subjects completed the walk test. A total of 97 subjects completed the study including 36 males and 61 females. They were requested to sign the consent form as their willingness to participate in the study before the start of the study.

A thorough medical history was taken and brief assessment of the Neurological, Musculo-Skeletal and Cardio-Vascular Systems was done to exclude subjects falling in the exclusion criteria. The subjects were given prior timings for the test and were instructed not to have any substances eg. Tea, coffee, hot water prior to the walk as it could affect the performance of the walk. They were requested to wear comfortable clothing (loose and unrestrictive) and suitable footwear for the walk.

Subjects were asked to fill the International Physical Activity Questionnaire [long form] consisting of 27 questions regarding their physical activity at work, transport, leisure and home in the last 7 days. The IPAQ consists of instructions how to complete the questionnaire and the subjects were allowed to clarify their queries with the researcher while filling it.

The study area selected for the study was a by lane of Father Muller Medical College premises. A distance of 200 meters was measured with ground measuring tape and 2 cones of different colors were placed at the 2 ends. The selected area of study was a level terrain with hard ground surface area. Same starting position was maintained for all subjects.

After filling in the questionnaire the subjects were given specific instructions about the walk. Demographic data was obtained in the Performa which measured specific baseline measurements of height, weight, blood pressure and resting heart rate in standing was taken and noted down. Subjects were given precaution about signs or symptoms of any

distress, breathlessness, palpitations or giddiness during the walk and were instructed to terminate the walk immediately.

The subjects were instructed that they have to cover a distance of 1 mile by walking the distance between the 2 cones 8 times as fast as possible. At the "GO" signal the participants began the walk and the stopwatch was started immediately by the researcher and the researcher was steady at the starting point. Constant motivation was provided to the subject by the researcher and information of the time taken and the laps covered were given when the subject approached the starting point.

On completion of the 1 Mile walk, the heart rate was measured immediately through pulsatory method for complete 60 secs in standing and the stop watch was stopped to the nearest second. The heart rate for the next 1 min, 2 min and after 5 mins respectively were measured and noted down in the post assessment chart. The subjects were made to sit and were made to do deep breathing exercises for cool down for a period of 10 – 15 mins. Any discomfort or distress experienced by the subject was noted down.

The VO₂ max was calculated by using the regression equation with other parameters of age, gender and weight from the Pre – Assessment Performa. The heart rate immediately after the walk and the time taken to complete the test were also used in the equation. The body weight measured in kilograms was converted to pounds and gender score of 0 = females and 1= males was put into the regression equation. The calculation was done by

the VO₂ max calculator.

Regression Equation

$$\text{Maximal oxygen uptake in ml per kg per min} = 132.853 - (0.0769 * \text{body weight in pounds}) - [0.3877 * \text{age in years}] + [6.315 * (\text{gender score})] - [3.2649 * (\text{time in minutes to walk a mile})] - [0.15655 * (\text{heart rate at end of walk})]$$

With reference of the IPAQ scoring protocol the physical activity at work and the leisure time physical activity was categorized in High , Moderate and Low groups according to the MET'S achieved during the activity. The data was entered into an Excel sheet and analysis of the required variables was done.

The data of physical activity during work and the leisure time physical activity was correlated with physical fitness and analyzed.

Statistical Analysis

The data of physical activity and fitness were in category namely High, Moderate and Low and therefore the appropriate test selected for the analysis was Chi Square test. This test is a statistical measure used in the context of sampling analysis to make comparisons between theoretical populations and actual data when categories are present. It is also a test of choice when the sample is large.

The data were analyzed using the SPSS – 18 software which is an inbuilt program used for analyzing such a diverse data.

Results

Table 1: Distribution of subjects according to gender

		No. of subjects	Percent
Gender	Female	61	62.9
	Male	36	37.1
	Total	97	100.0

Distribution of subject as per leisure time physical activity

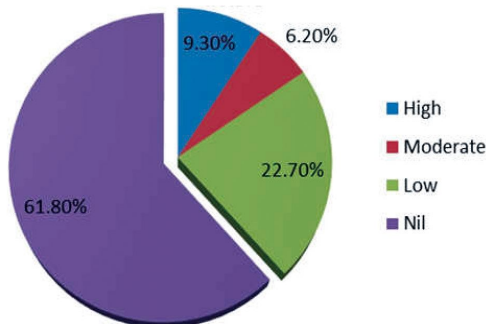


Fig. 1:

Table 2: Distribution of subjects according to Age

AGE (yrs)	No. of subjects	Percent
30 - 35	34	35.1
36 - 40	33	34.0
41 - 45	30	30.9
Total	97	100.0

Distribution of subject as per physical activity during work

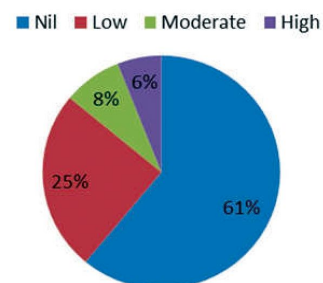
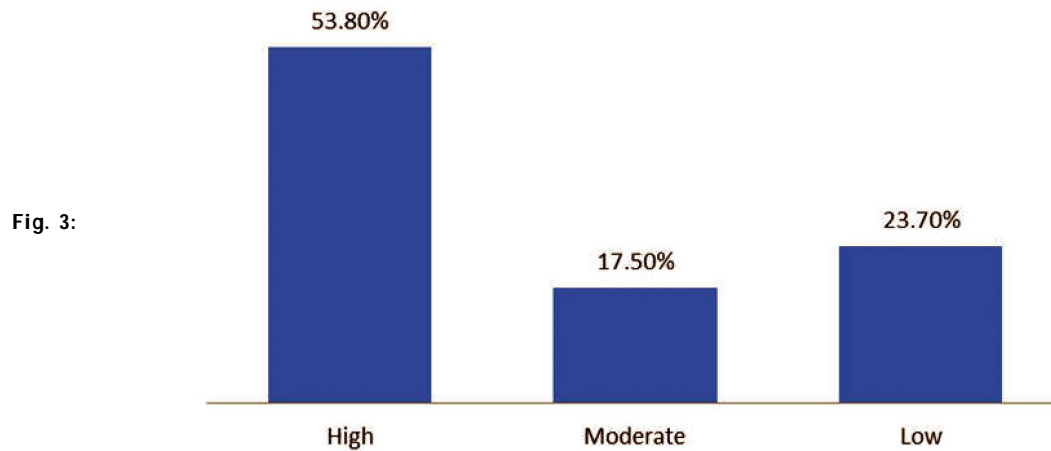


Fig. 2:

Distribution of subject as per the fitness Level**Table 3:** Correlation between Physical Fitness and Physical Activity at Work

		PHYSICAL ACTIVITY at work				Total
		High	Low	Moderate	Nil	
PHYSICAL FITNESS	High	5 8.8%	10 17.5%	7 12.3%	35 61.4%	57 100.0%
		83.3%	41.7%	87.5%	59.3%	58.8%
	Low	1 5.9%	4 23.5%	1 5.9%	11 64.7%	17 100.0%
		16.7%	16.7%	12.5%	18.6%	17.5%
Moderate		0 .0%	10 43.5%	0 .0%	13 56.5%	23 100.0%
		.0%	41.7%	.0%	22.0%	23.7%
	Total	6 6.2%	24 24.7%	8 8.2%	59 60.8%	97 100.0%
		100.0%	100.0%	100.0%	100.0%	100.0%

$\chi^2(\text{exact}) p = 0.126, \text{Ns}$

Table 5: Correlation between Physical Fitness and Leisure Time Physical Activity

		PHYSICAL FITNESS			
		High	Low	Moderate	Total
LTPA	High	7 77.8%	0 .0%	2 22.2%	9 100.0%
		12.3%	.0%	8.7%	9.3%
	Low	12 54.5%	6 27.3%	4 18.2%	22 100.0%
		21.1%	35.3%	17.4%	22.7%
Moderate		4 66.7%	0 .0%	2 33.3%	6 100.0%
		7.0%	.0%	8.7%	6.2%
	Nil	34 56.7%	11 18.3%	15 25.0%	60 100.0%
		59.6%	64.7%	65.2%	61.9%
Total		57 58.8%	17 17.5%	23 23.7%	97 100.0%
		100.0%	100.0%	100.0%	100.0%

$\chi^2 = 7.54, p=0.274, \text{NS}$

Discussion

This study was conducted to evaluate the correlation between physical activity at work and leisure time physical activity with physical fitness. The tools used to measure the cardio respiratory fitness was the Rockport One Mile Walk test or Rockport Fitness Walking test (RFWT) and the physical activity was calculated using the International Physical Activity Questionnaire (IPAQ).

In this study of the total participants; 61 i.e. 62.9% were females while the rest were males. This could be well suited for the fact that the researcher was a female and thus it was easier to approach and get more number of female participants. The female participants were more interactive among themselves after the test and could therefore motivate more number of female subjects to participate in the study.

The age group between 30 – 45 was selected for this study as it is the vital age group which has the preventive effect of Leisure time Physical Activity on Coronary Heart Disease, Hypertension and Diabetes[41]. Barengo N. C concluded that moderate and high levels of leisure time and occupational activity were associated with a decreased risk of cardiovascular disease and all cause mortality among both sexes from 30 – 59 years [7]. The target age group of 30 – 45 years would include the deleterious effects of a sedentary job to set in and also exclude other factors such as menopause and age related changes in the system as co morbidities to prevent physical activity or decreased fitness.

This study showed that of the total population studied only 9.3% had high Leisure Time Physical Activity and 61.8% had No Leisure Time Physical Activity. The similar result was also suggested by Carroll S et al who found that 16.5% were physically inactive during leisure time and only 11.1% had vigorous leisure time physical activity. That study was conducted in United Kingdom, which included 740 men who self reported about their leisure time physical activity with a questionnaire. The maximum oxygen consumption was indirectly predicted with modified sub maximal cycle ergometer. Their results showed that there is an inverse association between predicted $VO_{2\max}$, leisure time activity and plasma fibrinogen concentrations. They considered the confounding influence of age, obesity or BMI and social class on the fitness level [37].

The similar fact was also suggested by Alteiri et al where Leisure Time Physical activity between the age group of 30 -39 was only 8.6%. This case control

study was conducted in Italy for 4 years which focused on the role of occupational and leisure time physical activity on the risk of myocardial infarction. It had 507 patients of which 378 were men and 129 women. Their study concluded an inverse association for occupational activity at any age but its strongly exerted at this age group [26].

Most of the studies were all conducted in Western countries with a different set of population and study design. To the best of the researcher's knowledge this study was the first of its kind in India measuring the physical activity levels of the people in the Southern part of the country. The potential sources of unexplained variance of activity and fitness could be related to the genetic heterogeneity in the Indian population [42].

The International Physical Activity Questionnaire IPAQ that was used to measure the physical activity levels was designed for surveillance purpose for a large sample. The categories of physical activity mentioned in IPAQ depended on the MET's achieved. Household chores and daily activities for 4- 5 hrs are equivalent to the MET'S achieved in an hour of aerobic session [30]. This criterion of classification of the category into High, Moderate and Low does not match the Indian population set up. This could be one of the reasons for a reduced level of leisure time physical activity but high fitness in Indians [43].

This study also shows a poor response to physical activity at work. The data analyzed concluded that 6.2% of the subjects had high activity at work while 60.8% possess No physical activity at work. The similar findings were supported by Barengo N and colleagues suggesting that sedentary lifestyle were responsible for more than 30% of the Coronary Heart Disease. They also stated that sedentary individuals could increase their physical activity in leisure time but may gain more benefit from being more active on their way to work or at work [7].

Occupational activity accounts for approximately 41% of the daily energy expenditure. In both sexes physical activity at work was the single largest contributor to daily energy expenditure [33]. In this study with a data stating that more than 50% of the subjects have no activity at work the corporate sector justifies being the target group.

Analysis of this study revealed a weak correlation of physical activity at work with physical fitness. In a similar study done by Talbot, Laura A et al at Baltimore the cardio respiratory fitness was determined from a maximal treadmill test. Their study included a large sample of 1116 normal individuals with 619 men and 497 women. Their study revealed

a very strong correlation between LTPA and physical fitness [10]. Using the sub maximal test of Rockport One Mile walk test may have influenced the parametric measurement of $VO_{2\max}$ or maximal oxygen uptake.

This study justified the use of the RFWT as it doesn't require much equipments, simple to administer and can be used for larger population as well. In a similar study to this by Stewart K et al they measured the aerobic fitness with the maximal oxygen uptake using treadmill testing and muscle strength. There was a significant correlation between activity and fitness [36]. Thus we can conclude that the results would have been altered if this study also used a maximal exercise testing to quantify the cardio respiratory fitness.

Furthermore the normative values for the maximal oxygen consumption for the population in the West cannot be compared with the Indian population. These confounding factors may have reduced the sensitivity of the Rockport Walk test.

The study also showed a weak correlation between LTPA and fitness unlike other studies. Here, the females predominated the sample and very few females have leisure time physical activity. Indian females have a very poor attitude to exercise and they are mostly engaged in household work. Research back up says that women have 4 fold greater energy expenditure related to household chores while the men have 3 fold greater discretionary exercise related energy expenditure. In the study by Mario Vaz and Bharathi they have said that in developing countries the contribution of household activity to overall physical activity status maybe substantial. It also states that the relative contributions of various domains of activity are likely to vary between countries [33].

This study consisted mainly women who are engaged in more than 3 - 4 hrs of domestic work. Only 2 % of the female subjects had housemaids. The correlation of the domain of domestic work was not included in this study. Therefore it is likely to have the results blunted and not find a good correlation between fitness and leisure time physical activity.

This valuable data is of prime importance to physiotherapists who have a preventable and a curable role in many of the non communicable problems affecting India. With such significant results about lack of activity among the study population the physiotherapists need to bring about an awareness, alertness and assertiveness towards exercise and physical activity.

Simple measures of increasing physical activity

at work like encouraging to use stairs than lift, keeping vehicle parking area at quite a distance from the work area and using audio visual displays to encourage leisure time physical activity can be taken up.

Moreover a different track selected for the walking test might have helped to improve the specificity of Rockport One Mile walk test.

A similar study can be taken up in the future with a larger population of sedentary people using a simple maximal exercise testing tool feasible for Indian population.

Conclusion

The findings of this study concluded that there is a weak correlation between physical activity at work and leisure time activity with physical fitness. The proposed hypothesis can neither be accepted nor could be rejected. This study also pointed out that most of the subjects lacked or had no physical activity at work. Future studies in this field with a larger sample and equal distribution of both genders would help to prove the association between physical activity and cardio respiratory fitness.

It also found that more than half the study population lacked leisure time physical activity. There is a moderate to fair correlation between leisure time physical activity and physical fitness. Thus there is an immediate need to bring about awareness about the significance of physical activity during leisure time.

Further studies in this regard are recommended and measures to improve physical activity at work should be taken up.

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