# Prevalence of Acquired Heart Diseases and Its Relationship with Sedentary and Non-Sedentary Lifestyle among People of Patiala District

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## Abstract

**Objective**: To determine the prevalence of acquired heart diseases and its relationship with sedentary and non-sedentary lifestyle people of Patiala region.

**Background:** In recent decades, affluent population has become increasingly sedentary, in which most of adults spending 70% or more of their waking hours sitting. From an evolutionary perspective, humans were designed to move- to locomote and engage in all manner of manual labour throughout the day. Comparing with our parents or grandparents, we are spending more amount of time in environments that limits our physical activity .Work sites, schools, homes and public spaces have been re-engineered in ways that minimizes human movement, which has dual effect on human behaviour: People move less and sit more. Evidence has emerged identifying habitual sedentary prolonged sitting as a novel risk factor for cardiometabolic disease. Time in sedentary behaviour is associated with increased cardiovascular diseases and all cause of mortality. Individuals engaging in light, moderate or vigorous physical activity had significantly lower risk for cardiovascular diseases mortality.

**Methods:** A total of 100 participants, both males & females, aged between 35 to 75 years were included in the study. All participants were initially screened through Self Structured Questionnaire for demographic data and International Physical Activity Questionnaire (IPAQ short form) was used as the criteria for identifying sedentary and non-sedentary individuals to rule out inclusion and exclusion criteria. Both the questionnaires were filled by the participants.

**Results:** The present study shows that acquired heart diseases were more common among sedentary participants (59%), as compared to non-sedentary participants (41%). The participants performing physical activity as part of work had significant association with sedentary lifestyle (p<0.01). And also the time spent in sitting and standing had significant association with sedentary lifestyle (p<0.01)

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.Smoking and alcohol drinking habits also showed significant association with sedentary lifestyle (p<0.01). Individuals engaging in light, moderate or vigorous physical activity had significantly lower risk for cardiovascular diseases mortality.

**Conclusion:** The present study concludes that it will be feasible to induce people to shift some proportion of their sedentary time to higher volumes of light or moderate-intensity physical activity. People can indulge in various household chores activities, sports, meditation, yoga and asana. This is helpful in the primary prevention of chronic diseases beginning early in life.

**Key words**: Acquired Heart Diseases, Sedentary individuals, Non-Sedentary individuals, IPAQ.

## Introduction

### Sedentary Behaviour

The term sedentary comes from the Latin word 'sedere' (to sit) and can refer to any waking, sitting or lying behaviour with low energy expenditure. Technically sedentary behaviour is activity less than 1.5 metabolic equivalent units. Sedentary behaviour in modern society, such as watching TV, sitting in car or using computer are ubiquitous, as these are an important facet of human lifestyle. Although TV viewing is a common sedentary behaviour in leisure time. As an average adult spends 50-60% of their day in sedentary pursuits (Wilmot *et al*., 2012). Sedentary behaviour during leisure time like sitting, reading, meditating, relaxing, thinking, receiving a message, watching television, using a computer, listening to music or the radio, talking on the telephone, writing letters, playing cards and riding a car. These activities involve basically sitting that has a possible association with cardiovascular diseases (Ford *et al*., 2012). Work sites, schools, homes and public spaces have been re-engineered in ways that minimizes human movement, which has dual effect on human behaviour: People move less and sit more. Parallel with this change, evidence has emerged identifying habitual sedentary prolonged sitting as a novel risk factor for cardiometabolic disease and all cause of mortality (Owen *et al*., 2010).

### Cardiovascular Diseases

Cardiovascular disease (CVD) is the leading cause of death in worldwide. Acquired heart disease is much more common in adults than in children. Elevated levels of cardiometabolic (elevated serum cholesterol, smoking, hypertension, low plasma HDL cholesterol, high plasma triglyceride levels and high prevalence of non-insulin-dependent diabetes) are inflammatory biomarkers have been associated with increased risk of acquired heart diseases and premature mortality. Low-density lipoprotein cholesterol (LDL) is an atherogenic harmful lipoprotein, responsible for the atherosclerotic process and risk of cardiovascular disease. Lack of regular exercise is an established modifiable risk factor for these biomarkers as well as incident cardiovascular diseases (Healy *et al*., 2011). Coronary artery disease rates have been reported in

several parts of the world to be unusually high in people originating from the Indian subcontinent. Further studies are needed to determine whether this metabolic disturbance can account for the high rates of coronary artery disease and to identify possibilities for prevention.

## Cardiovascular Diseases among Sedentary People

Cardiovascular risk included systolic blood pressure (SBP), diastolic blood pressure (DBP), total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides and glucose fasting (Park *et al*., 2016). Sedentary behaviour have also shown to be related with an increased risk of obesity, cancer, metabolic syndrome, type 2 diabetes and cardiovascular diseases in various population.

## Physical Inactivity among Sedentary People

Watching TV and hour spent playing video games is significantly associated with risks of overweight, high abdominal adiposity and low HDL cholesterol. Physical inactivity is also associated with increased risk of morbidity or worsening of many cardiovascular diseases. Sedentary behaviour and physical inactivity considered a major risk factor for clinical atherosclerosis. There are many hazards of high level of sitting such as risk of myocardial infarction. Too much sitting is an important sedentary behaviour leading to difference health hazards on metabolism, in relation to lack of exercise. Individuals engaging in light, moderate or vigorous physical activity had significantly lower risk for cardiovascular diseases mortality (Gonzalez *et al*., 2017). Now by means of small accelometer that can continuously monitor human ambulatory movements, provides better insight into the possible role of sedentary behaviour and physical inactivity is cardiovascular disease risk and in development of atherosclerosis (Kozakova *et al.,* 2010). Current public health recommendations propose engaging in at least 150 minutes per week of moderate-to-vigorous activity to help prevent and manage multiple chronic conditions, notably cardiovascular diseases (Warren *et al*., 2010). At least 10 minutes per one bout of moderate-to-vigorous-physical activity (MVPA) is recommended. Sedentary behaviour is an independent risk factor of cardiovascular diseases regardless of MVPA. Specific prescriptive guidelines relating to the frequency, intensity, duration and type of purposeful exercise necessary for health gain (Hamilton *et al.,* 2008). So the objective of the present study was to determine whether the prevalence of acquired heart diseases and its relationship with sedentary and non-sedentary lifestyle among people using the outcome measures.

## Methods

### Participants and Procedure

A total of 100 participants, both males & females, aged between 35 to 75 years were included in the study. All participants were initially screened through Self Structured Questionnaire for demographic data

and informed consent was taken from the selected participants prior to the study. International Physical Activity Questionnaire (IPAQ short form) was used as the criteria for identifying sedentary and non-sedentary individuals to rule out inclusion and exclusion criteria .The Ethical consideration was taken from Department Research Board (DRB) members, Physiotherapy Department, Punjabi University, Patiala. Both questionnaires were filled by the participants. Data was collected and analyzed by researcher with appropriate statistical tool.

**Self-structure Questionnaire**

It includes demographic data of Participants which includes such as age, gender, height, weight, body mass index, qualification and diagnosis. History of patients include smoking history, alcohol drinking history, history of cardiovascular diseases in family, any history of hypertension, diabetes, high cholesterol and swelling in legs. It also includes questions occupation related physical activity, household work related physical activity, leisure time physical activity and transportation related physical activity.

**IPAQ (International Physical Activity Questionnaire)**

IPAQ short form is an instrument designed primarily for population surveillance of physical activity among adults. It has been developed and tested for use in adults and until further development and testing is undertaken the use of IPAQ with older and younger age groups is not recommended. The items in the **short** IPAQ form were structured to provide separate scores on walking, moderate-intensity and vigorous-intensity activity. Computation of the total score for the short form requires summation of the duration (in minutes) and frequency (days) of walking, moderate-intensity and vigorous-intensity activities.

**Scoring: IPAQ Scoring Protocol (Short Form)**

**Continuous Score**

Expressed as MET-min per week: MET level x minutes of activity/day x days per week

Using these values, four continuous scores are defined:

Walking MET-minutes/week = 3.3 * walking minutes * walking days

Moderate MET-minutes/week = 4.0 * moderate-intensity activity minutes * moderate days

Vigorous MET-minutes/week = 8.0 * vigorous-intensity activity minutes * vigorous-intensity days

Total physical activity MET-minutes/week = sum of Walking + Moderate + Vigorous MET- minutes/ week scores.

**Categorical Score- three levels of physical activity are proposed**

**1. Low**

• No activity is reported **OR**

• Some activity is reported but not enough to meet Categories 2 or 3.

## 2. Moderate

Either of the following 3 criteria

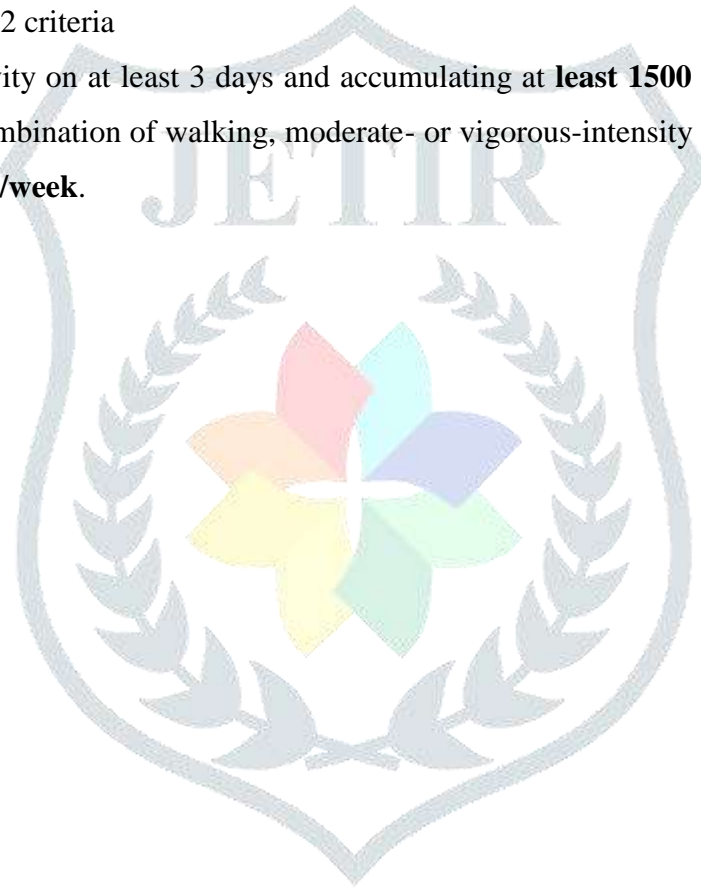• 3 or more days of vigorous activity of at least 20 minutes per day

**OR**

• 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day O**R**

• 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least **600 MET-minutes/week.**

## 3. High

Any one of the following 2 criteria

• Vigorous-intensity activity on at least 3 days and accumulating at **least 1500 MET-minutes/week OR** 7 or more days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least **3000 MET-minutes/week**.

**Enrollment**

Study Population
(n=100)

2 Private Hospitals

1 Government Hospital

Self-structure
Questionnaire

International Physical
Activity Questionnaire

Sedentary Participants
(n=59)

Non-Sedentary
Participants
(n=41)
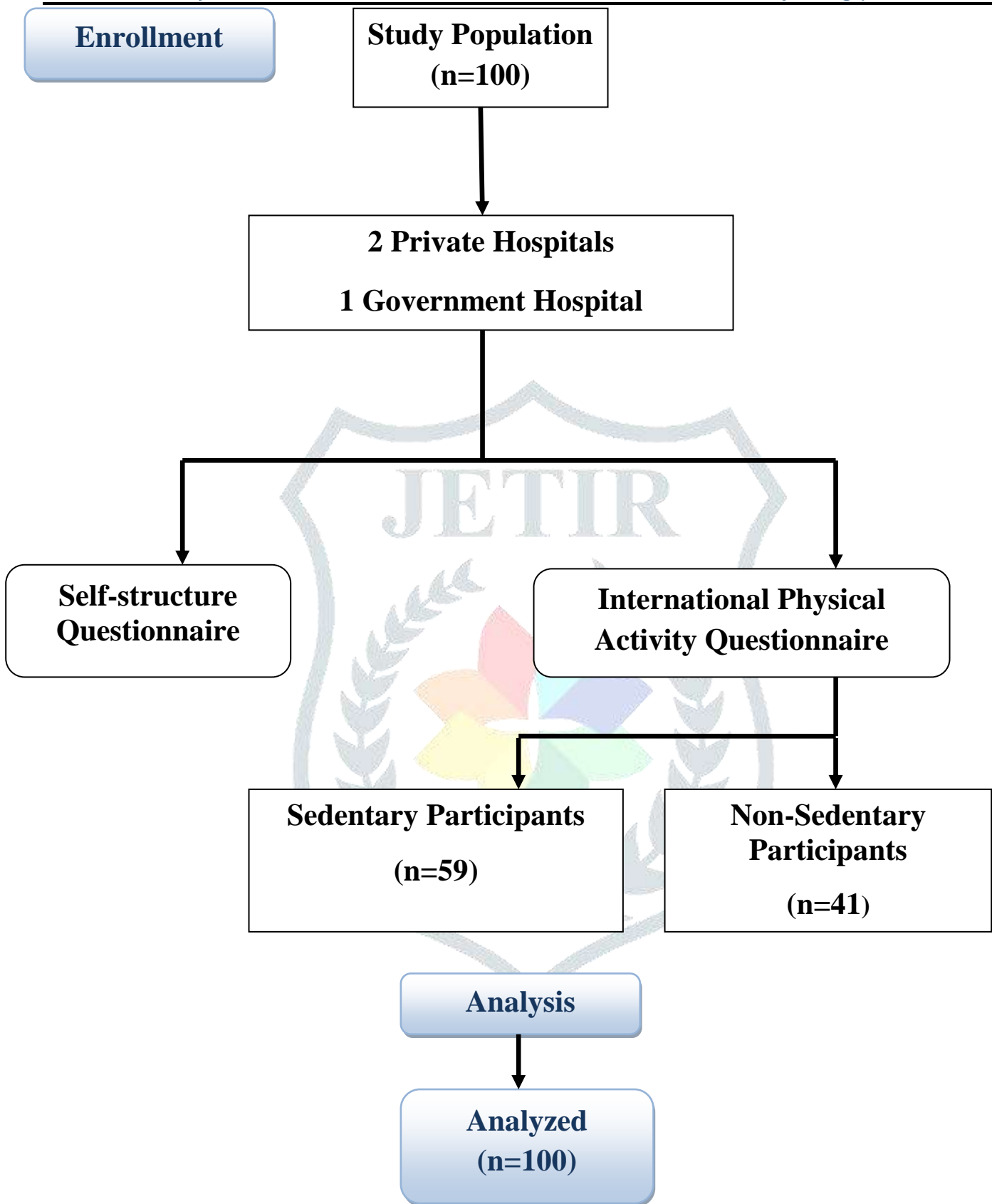
Analysis

Analyzed
(n=100)

**Figure : CONSORT flow chart of the study.**

## Statistical analysis

The data was analyzed with the help of SPSS version 22.0. A Correlation Study was carried out on 100 participants. The demographic characteristics and the baseline criterion measures were shown by Mean ± SD . Results were calculated by Chi-square test for independence compares two variables in a contingency table to see if they are related. Statistical significance was set as $p<0.05$.

## Results

The present study shows that acquired heart diseases were more common among sedentary participants (59%), as compared to non-sedentary participants (41%). The participants performing physical activity as part of work had significant association with sedentary lifestyle (p<0.01). And also the time spent in sitting and standing had significant association with sedentary lifestyle (p<0.01) .Smoking and alcohol drinking habits also showed significant association with sedentary lifestyle (p<0.01). Individuals engaging in light, moderate or vigorous physical activity had significantly lower risk for cardiovascular diseases mortality.

**Table 1: Demographic characteristic (Gender) of the sedentary and non-sedentary population**

| Gender | Category | |
|---|---|---|
| | LOW (SEDENTARY) | MODERATE (NON-SEDENTARY) |
| Female | 16 | 21 |
| Male | 43 | 20 |
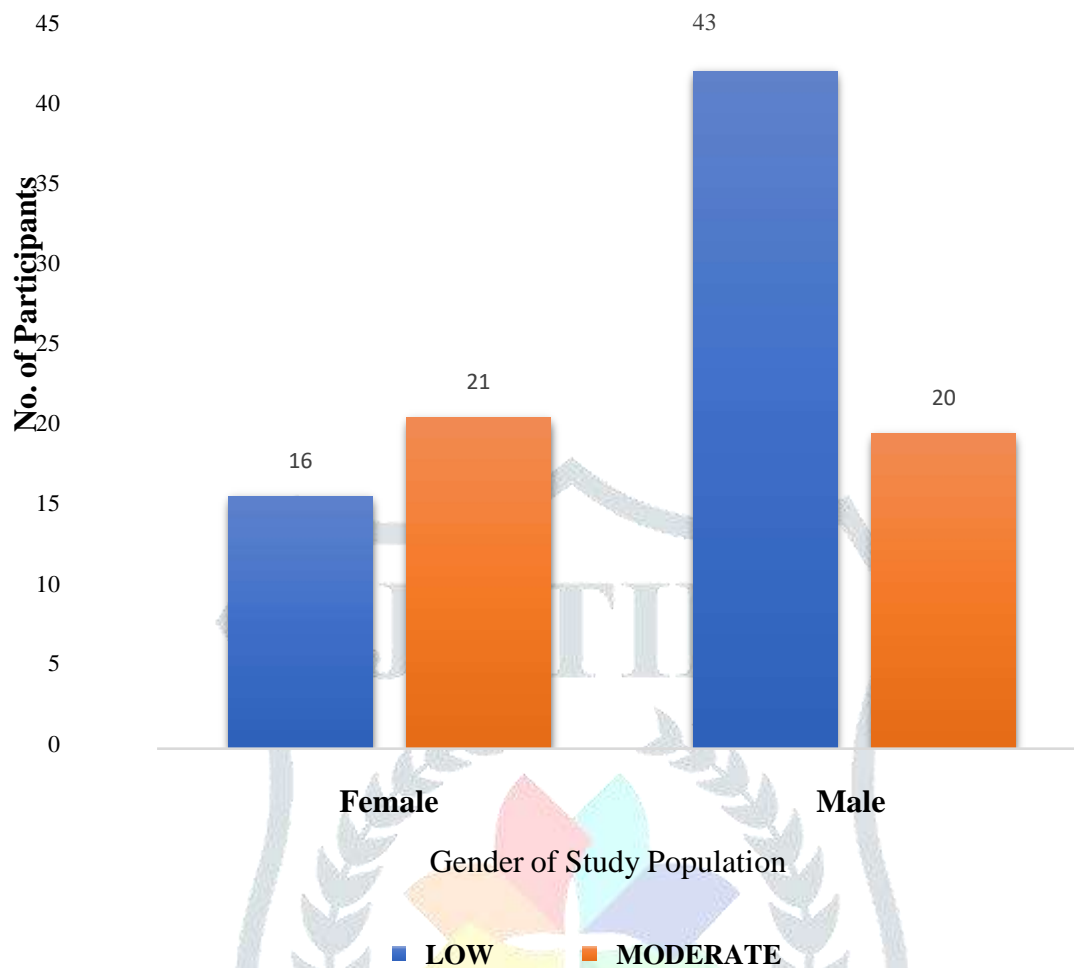
Graph 1: Demographic characteristics (Gender) of study population

| Pearson | Value | Degree of freedom | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Chi-Square | 6.028[a] | 1 | .014 |

*Statistical significance at $p < 0.05$, df=1

**Table 2: Distribution of participants according to type of acquired heart diseases in sedentary and non-sedentary population**

| Type of Acquired Heart Diseases | Category | |
|---|---|---|
| | LOW (SEDENTARY) | MODERATE (NON-SEDENTARY) |
| Coronary Artery Disease (CAD) | 46 | 28 |
| Congestive Cardiac Failure (CCF) | 3 | 3 |
| Myocardial Infarction (MI) | 2 | 2 |

| Rheumatoid Heart Disease (RHD) | 8 | 8 |
|---|---|---|
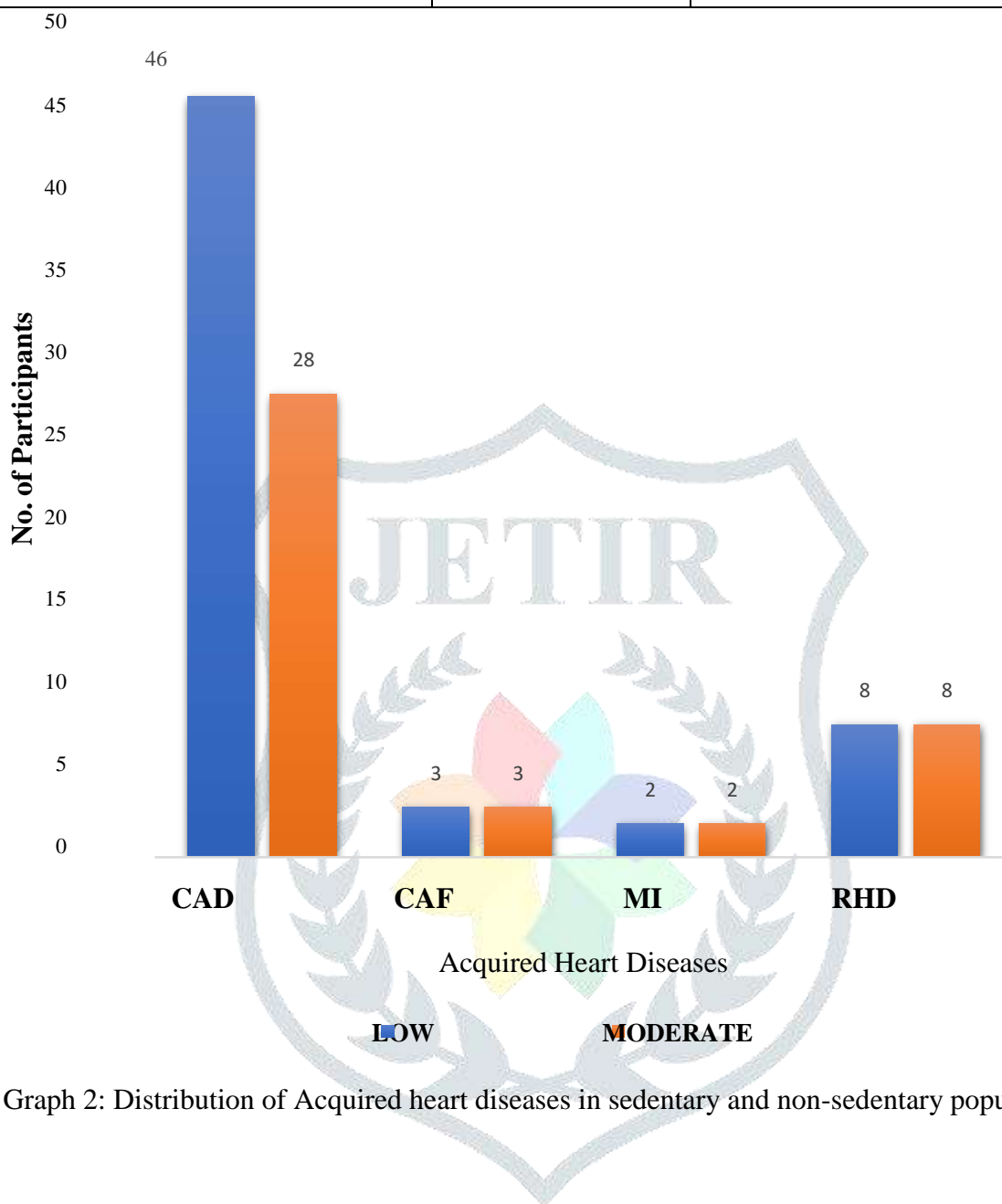


Graph 2: Distribution of Acquired heart diseases in sedentary and non-sedentary population

**Table 3: Distribution of participants according to smoking habits in sedentary and non-sedentary population**

| Smoking habits | CATEGORY | |
|---|---|---|
| | LOW (SEDENTARY) | MODERATE (NON-SEDENTARY) |
| NO | 41 | 36 |
| YES | 18 | 5 |
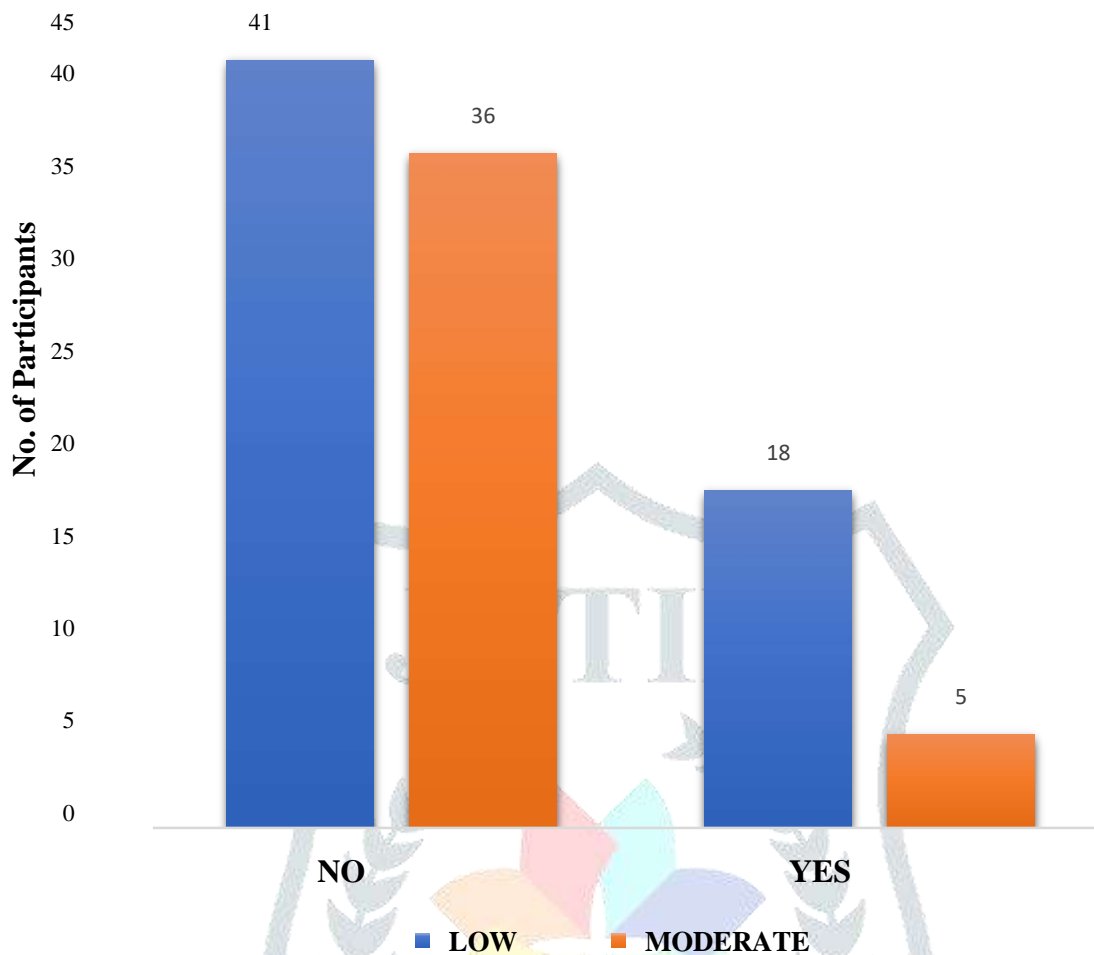
Graph 3: Distribution of smoking habits in sedentary and  non-sedentary population

| Pearson Chi-Square | Value | Degree of freedom | p value |
|---|---|---|---|
| | 4.581ᵃ | 1 | .032 |

*Statistical significance at p<0.05, df=1

**Table 4: Distribution of participants according to alcohol drinking habits insedentary and non-sedentary population**

| Alcohol drinking habits | CATEGORY | |
|---|---|---|
| | LOW (SEDENTARY) | MODERATE (NON-SEDENTARY) |
| NO | 38 | 37 |
| YES | 21 | 4 |
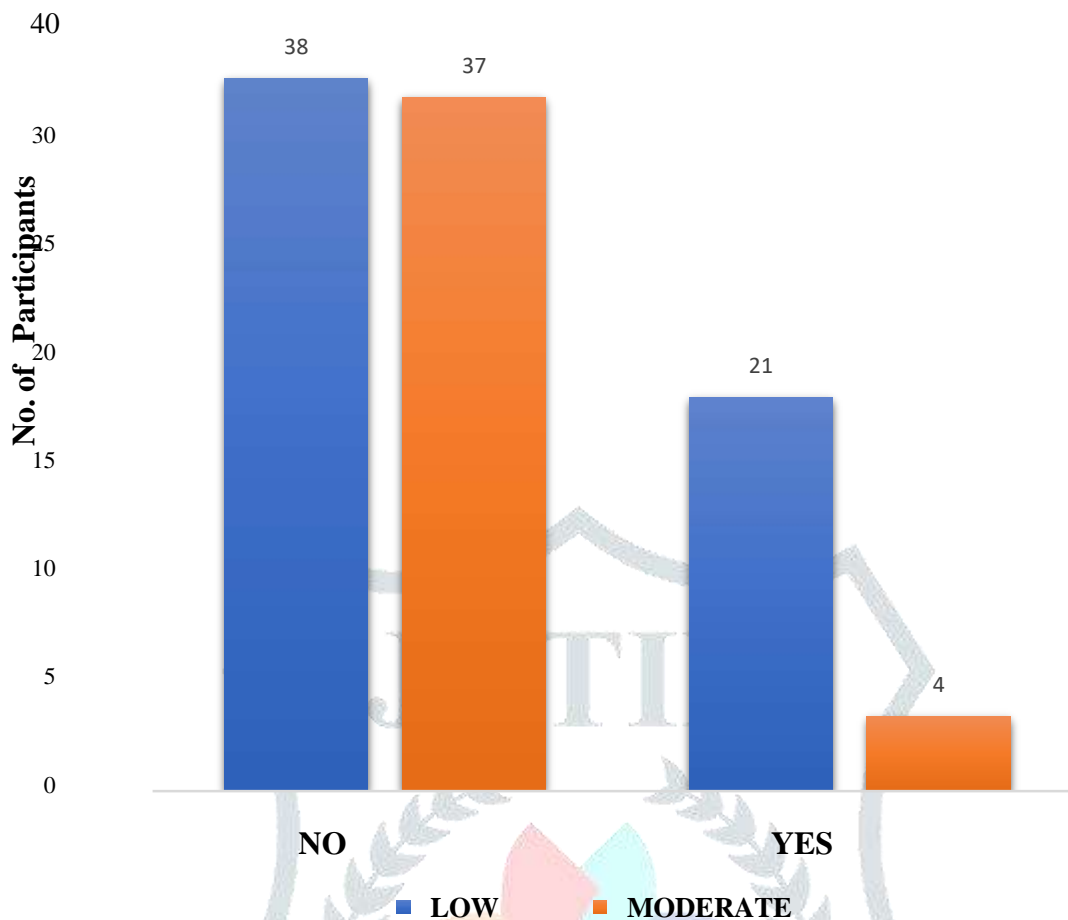
Graph 4: Distribution of Alcohol drinking habits in sedentary and non- sedentary population

| Pearson | Value | Degree of freedom | p value |
|---|---|---|---|
| Chi-Square | 8.612[a] | 1 | .003 |

*Statistical significance at $p<0.05$, df=1

**Table 5: Distribution of participants according to performing physical activityas a part of your work in sedentary and non-sedentary population**

| Physical activity as a part of your work | CATEGORY | |
|---|---|---|
| | LOW (SEDENTARY) | MODERATE (NON-SEDENTARY) |
| NO | 56 | 5 |
| YES | 3 | 36 |
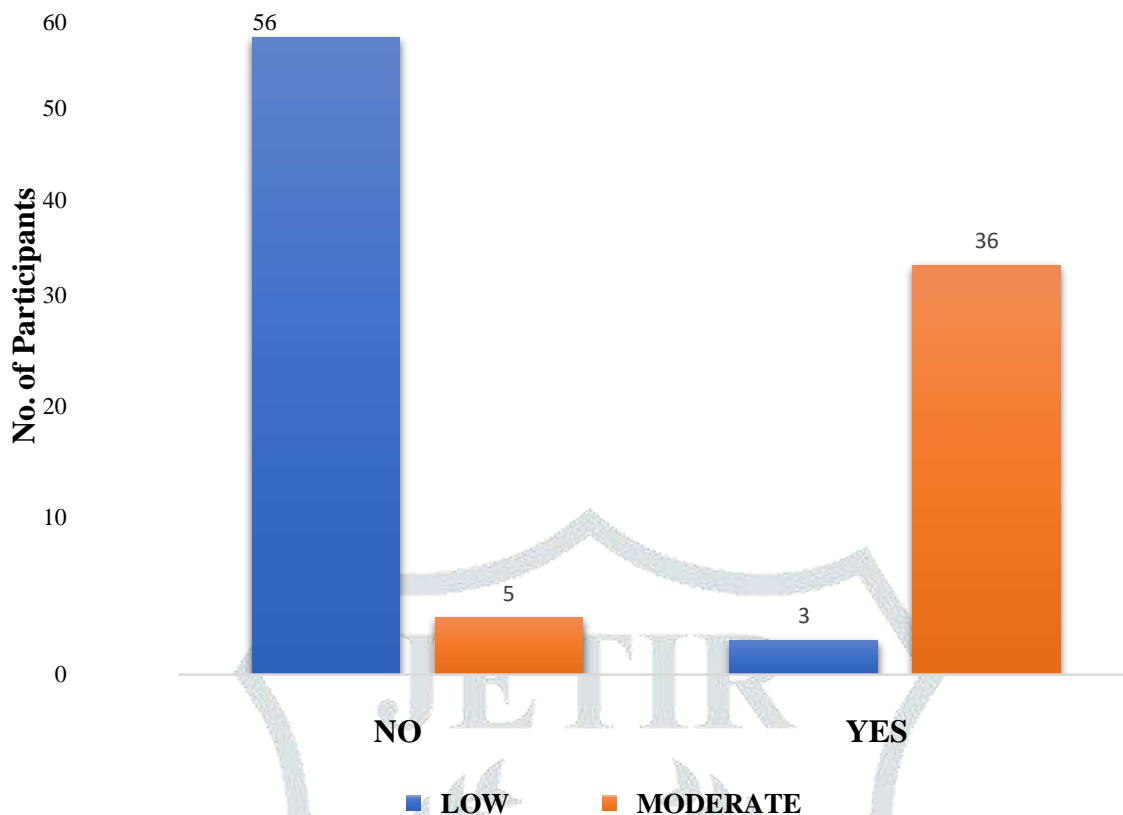
Graph 5: Distribution according to performing physical activity as a part of your work in sedentary and non-sedentary population

| Pearson | Value | Degree of freedom | p value |
|---|---|---|---|
| **Chi-Square** | 69.577[a] | 1 | .000 |

*Statistical significance at $p < 0.05$, df=1

**Table 6: Distribution of participants according to time spent during sitting of the sedentary and non-sedentary population**

| How much time spend sitting | CATEGORY | |
|---|---|---|
| | **LOW (SEDENTARY)** | **MODERATE (NON-SEDENTARY)** |
| **2 hours** | 0 | 1 |
| **2-4 hours** | 3 | 39 |
| **More than 4 hours** | 56 | 1 |
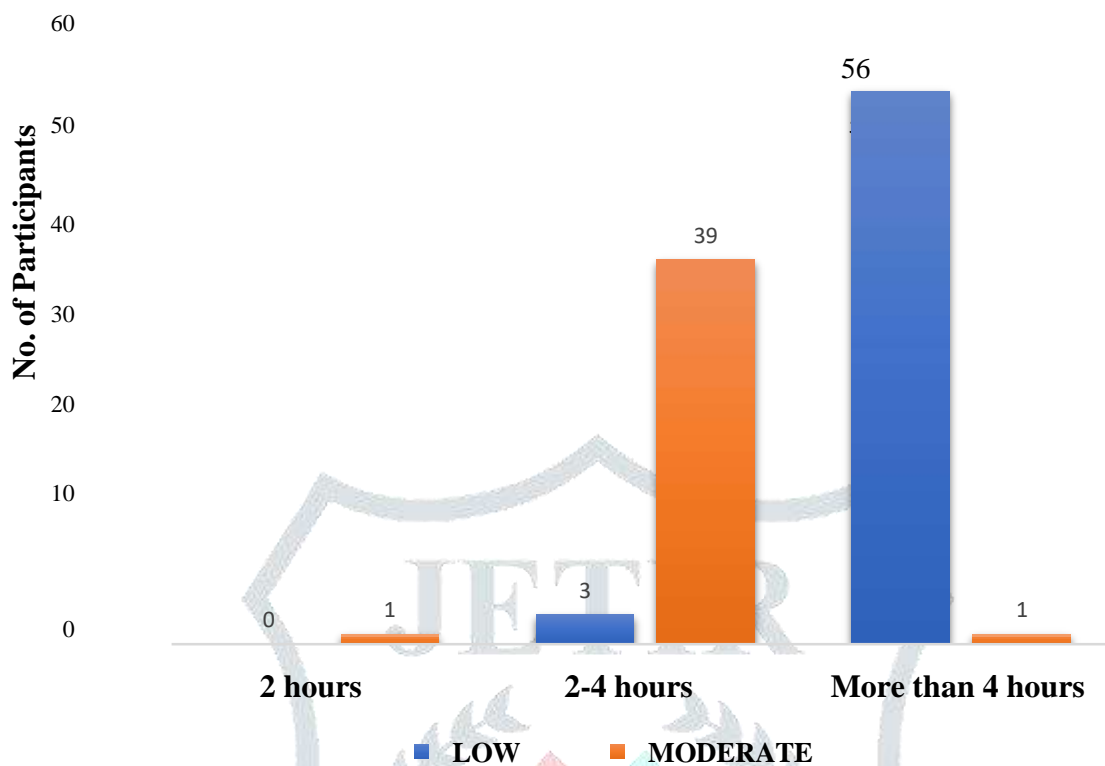
Graph 6: Distribution of time spent during sitting of the sedentary and non- sedentary population

| Pearson | Value | Degree of freedom | P value |
|---|---|---|---|
| Chi-Square | $84.423^a$ | 2 | .000 |

*Statistical significance at $p<0.05$, df=2

**Table 7: Distribution of participants according to time spent during walking ofthe sedentary and non-sedentary population**

| Time spent in walking | CATEGORY | |
|---|---|---|
| | LOW (SEDENTARY) | MODERATE (NON-SEDENTARY) |
| 2-4 hours | 9 | 23 |
| Less than 1 hour | 48 | 2 |
| More than 4 hours | 2 | 16 |
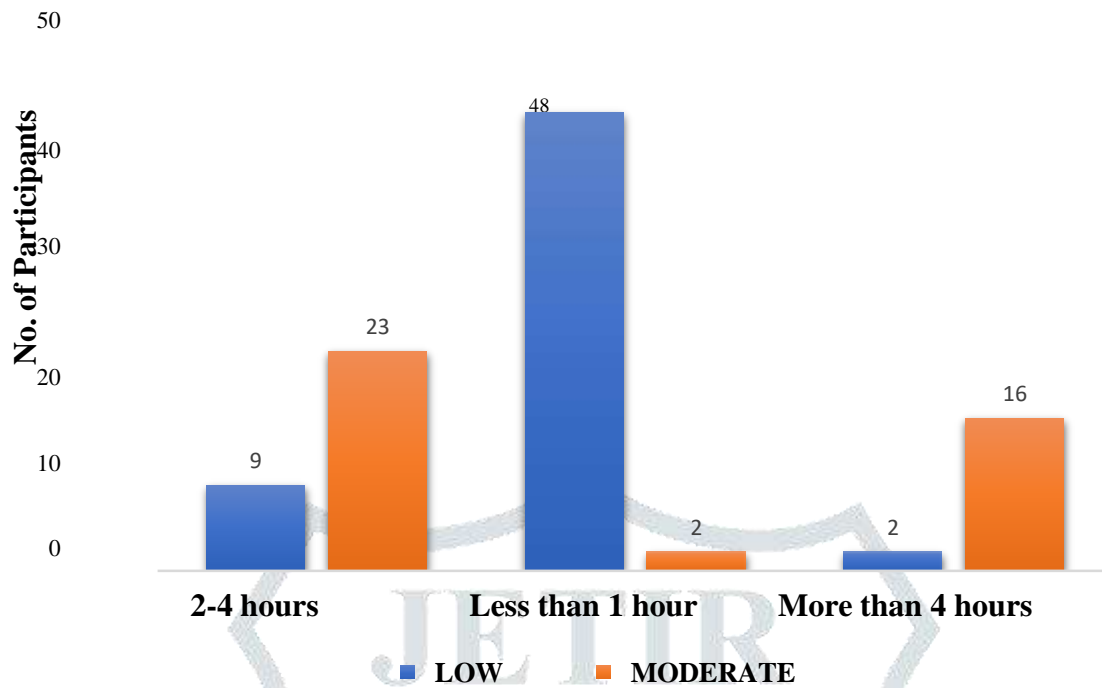
Graph 7: Distribution of time spent during walking of the sedentary and

non-s edentar y  population

| Pearson Chi-Square | Value | Degree of freedom | P value |
|---|---|---|---|
| | 57.972[a] | 2 | .000 |

*Statistical significance at $p<0.05$, df=2

## Discussion

Affluent population   have become increasingly sedentary with most of the activities that involves basically sitting that has possible association with cardiovascular diseases. Sedentary behaviour has also shown relation with increased risk of obesity, cancer, metabolic syndrome, type 2 diabetes and cardiovascular diseases. Lack of regular physical activity is also a risk factor for cardiovascular diseases and premature mortality. This has made significant difference to quantify the prevalence of acquired heart diseases among the people. The present study helps to find out the prevalence of acquired heart diseases among the people having sedentary lifestyle with least physical activity and non-sedentary lifestyle in Punjab. The observation of the study has been discussed below:

5.1 Evaluation of acquired heart diseases among sedentary people and non-sedentary people of Punjab.

5.2 Factors associated with acquired heart diseases affecting the sedentary people and non-sedentary people.

5.3 Impact of physical inactivity and sedentary lifestyle on health.

## 5.1 Evaluation of acquired heart diseases among sedentary people and non-sedentary people of Punjab

To evaluate the acquired heart diseases among sedentary people and non-sedentary people of Punjab, the study population was categorised into two group sedentary people non-sedentary people. The population were assessed for classifying into sedentary people and non-sedentary people by using International Physical Activity Questionnaire (IPAQ short form). Short IPAQ form were structured to provide separate scores on walking, moderate-intensity and vigorous-intensity activity. Computation of the total score for the short form requires summation of the duration (in minutes) and frequency (days) of walking, moderate-intensity and vigorous-intensity activities. The Categorical Score- three levels of physical activity was proposed as Low, Moderate and High. In which low category means no activity (sedentary lifestyle), moderate category means doing some activity/more than the low category (non-sedentary lifestyle) and high category means higher level of participation (non-sedentary lifestyle) (Crichton, 2015). Descriptive analysis was done for the IPAQ scores. The hundred participants were included in the study. The results of study in context to IPAQ scale showed that (59%) of participants fall in category of low level of activity i.e. (Sedentary people) followed by (41%) participants fall in category of high level of activity i.e. (Non-Sedentary people) who were suffered from acquired heart diseases. The (41%) of non-sedentary people who were also having acquired heart diseases. Hence, the findings of the present study suggested that a higher prevalence of acquired heart diseases among sedentary people as compared to non- sedentary people in different hospitals of Punjab.

The present study further compared the prevalence of which acquired heart diseases between sedentary participants and non-sedentary participants using chi-square test. Total 100 were included out of which 43 males, 16 females were from sedentary lifestyle with mean age group of $55.34 \pm 11.07$ and 20 males, 21 females were from the non-sedentary lifestyle with mean age group of $58.80 \pm 10.52$. The participants were distributed according to their sedentary behaviour and non-sedentary behaviour. It was recorded that more was sedentary participants (59%), as compared to non-sedentary participants (41%). Mean value of body mass index among participants of sedentary behaviour was $25.74 \pm 25.43$, as compared to participants of non-sedentary $3.895 \pm 3.146$.

An evidence from the Korean Adult study shows that 3,301 registered individuals participated and mean sedentary time was 6.1 hour/day. It was significantly associated with high diastolic BP and low HDL cholesterol level which are the cardiovascular risk factors (Park, 2016).

According to physical activity, sedentary behaviour and lipid levels in the observation of cardiovascular risk factors in 1331 individuals, with International Physical Activity Questionnaire (IPAQ) the mean of

overall sitting time was 6.2 (±3.2) hours and screen time (television plus computer time) on week day was 4.2 (±3.4) hours, 0.4 (±0.9) hours for intense physical activity. 11% of participants were classified as sedentary, with a higher proportion of men (66.7%) than women (33.3%) being inactive (p<0.001) and frequency of active smoking was similar between sedentary participants (25.3%) and active participants (Crichton, 2015).

## 5.2 Factors associated with acquired heart diseases affecting the sedentary people and non-sedentary people

According to effect of acquired heart diseases which are more common among sedentary participants (59%), as compared to non-sedentary participants (41%). It was recorded that according to type of acquired heart diseases, the prevalence of coronary artery disease (CAD) is more among sedentary participants (46%), as compared to non-sedentary participants (28%). Others like rheumatic heart disease (RHD) among sedentary participants (8%), as compared to non-sedentary participants (8%). Congestive cardiac failure (CCF) among sedentary participants (3%), as compared to non-sedentary participants (3%) whereas myocardial infarction (MI) among sedentary participants (2%), as compared to Non-sedentary participants (3%). An evidence suggest that the sedentary behaviour has a direct influence on metabolism, bone mineral content, and vascular health (Tremblay, 2010).

There are various risk factors of acquired heart diseases in which smoking and alcohol drinking habits showed significant association with sedentary lifestyle (p = 0.003). There is no significant association between various conditions such as diabetes, hypertension, high cholesterol, breathing difficulty and swelling in legs or feet (not caused by walking) with sedentary and non-sedentary lifestyle (p > 0.239). Job risk factor for acquired heart diseases showed significant association with sedentary lifestyle (p = 0.000).

## 5.3 Impact of physical inactivity and sedentary lifestyle on health

Physical inactivity is also associated with increased risk of morbidity or worsening of many cardiovascular diseases. The present study shows participants performing physical activity as part of work had significant association with sedentary lifestyle (p = 0.000). The time spent in physical activity had significant association with sedentary lifestyle (p = 0.000). Time spent in physical activity during leisure time in a day had significant association with sedentary lifestyle (p = 0.000). Time spent in standing had significant association with sedentary lifestyle (p = 0.000). Time spent in sitting had significant association with sedentary lifestyle (p=0.000). There is no significant association between kind of transportation used with sedentary and non-sedentary lifestyle (p > 0.941).

According to a study, the greater sedentary time is associated with an increased risk of cardiovascular morbidity and mortality (Ford, 2012). Too much sitting is an important sedentary behaviour leading to different health hazards on metabolism, in relation to lack of exercise. Individuals engaging in light, moderate or vigorous physical activity had significantly lower risk for cardiovascular diseases mortality(Gonzalez, 2017). Spending less time in sedentary behaviours, and engaging in medium levels of intense physical activity may be associated with a more favourable blood lipid profile (Crichton, 2015).

## Limitations of the Study

The study is performed on small sample size. Patients having acquired heart diseases below 35 years of age were not included. Reasons for conditions like diabetes, hypertension, high cholesterol, difficulty in breathing and swelling in legs and feet could be anything apart from acquired heart diseases. The study was limited to geographical area (Patiala district).

## Conclusion

The present study entitled **"Prevalence of Acquired Heart Diseases and its Relationship with Sedentary and Non-Sedentary Lifestyle among People of Patiala District"** concludes that:

1. Young-to-middle age population, with the higher proportion of their time spent in sedentary activity are more prone to diseases like acquired heart diseases.

2. Population awareness about the risk factors from the physical inactivity and sedentary lifestyle which may lead to various metabolic health diseases.

3. Prohibiting smoking, alcohol drinking and indulging in regular physical activity is an effective way to stay healthy.

4. Therefore, this study recommends the regular moderate to vigorous physical activity for about 150 minutes per week which is helpful for decreasing the prevalence of many acquired heart diseases.

Thus the present study concludes that it will be feasible to induce people to shift some proportion of their sedentary time to higher volumes of light or moderate-intensity physical activity. People can indulge in various household chores activities, sports, meditation, yoga and asana. This is helpful in the primary prevention of chronic diseases beginning early in life (Tremblay, 2010).

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