

Research Article

An Evidence Based Study Towards the Association of Cardiovascular Diseases and The Sedentary Lifestyle in Indian Scenario

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ABSTRACT

Aim and objectives: Study about the relationship sedentary life style associated with cardiac patients in a tertiary care hospital.

Methodology: A Prospective observational study was conducted on January to June 2017 tertiary care hospitals in Erode. The sample size we collected was 216. Patients with cardiovascular diseases both male and female patients with all age groups were included in the study. Patients having family history and out patients were excluded from the study. The data was collected from case sheets of hospitalized patients and direct patient interview from various departments in the hospital.

Results: 249 patients are interviewed to confirm the sedentary behaviors among them 216 patients are having sedentary behaviors without any family history. Among 216 patient's 125 patients are male and 91 female patients in that 146 patients were above 50 years. 38.6% (mean) of having sedentary behaviors like Alcohol, Smoking, and Tobacco chew. 74.53% of patients fall on non- regular physical activities. The amount of sedentary behaviors reported by this patient's Age, Sex, Weight, Habit, Food style, Physical activities was associated with the cardiovascular diseases.

Conclusion: Patients who doesn't having any physical activities, Irregular food style, and having habits like consuming alcohol, smoking, tobacco chew are the leading sedentary behaviors that causing cardiovascular diseases.

Keywords: Cardiac Diseases, Dietary Modifications, Physical Inactivity, Risk Factors, Sedentary Life Style Changes.

Aim and Objective

To study about the influence of sedentary lifestyle in different cardiac diseases and to analyze the risk factors of the diseases with the collection of case details and socio demographic characters of the study subjects

INTRODUCTION

From the 19th century onwards there is an increased cardiovascular disease in Indian population. The reason behind this was unknown to evidence that there is a relationship between the cardiovascular diseases and the sedentary lifestyle was our main priority. From the evolution of Homo sapiens, humans are trying to reduce their physical activity. Due to the technological improvement humans utilize all those things to reduce the most of the physical activity e.g., walking is good for health but it was replaced by

vehicles such as bike, car, aero planes etc. When compared with our grandparents we have a short term lifespan and having high risk of affecting non-communicable disease. This was because of, they was participated in physical activities like fishing, farming, and hunting. This helps them to make resistant to various disease conditions. Health as quality of life is the result of diverse factors and life style is one of the most powerful determinants of health.^[1]

In 17th century Berenadino Ramazzini, an occupational physician discovered that sedentary life style was associated with physical inactivity has an adverse effect on human metabolism, cardiac output, physical function and wellbeing.^[2] According to world health report 2002, cardiovascular diseases will be the largest cause of death and disability by 2020 in India.^[3] So the aim of this paper is to investigate the concept of

sedentary life style and examine the factors enhancing it in Indian population.

According to WHO, Cardiovascular diseases is divided into 6 types and these are the major death occurring cardiovascular diseases.^[4]

1. Coronary heart disease
2. Stroke
3. Other cardiovascular diseases
4. Hypertension heart diseases
5. Inflammatory heart disease
6. Rheumatic heart disease

Coronary heart disease

Coronary heart disease (CHD) is a disease in which a waxy substance called plaque builds up inside the coronary arteries. These arteries supply oxygen-rich blood to your heart muscle. When plaque builds up in the arteries, the condition is called atherosclerosis. The buildup of plaque occurs over many years. Over time, plaque can harden or rupture (break open). Hardened plaque narrows the coronary arteries and reduces the flow of oxygen-rich blood to the heart. If the plaque ruptures, a blood clot can form on its surface. A large blood clot can mostly or completely block blood flow through a coronary artery. Over time, ruptured plaque also hardens and narrows the coronary arteries. It can be known in several terms such as atherosclerosis, coronary artery disease, hardening of the arteries, heart disease, ischemic heart disease, narrowing of the arteries.^[5]

Stroke

Stroke is the second leading killer worldwide and the third leading cause of death in the United States, behind cardiovascular disease and all cancers. Despite improvements in the stroke mortality rates in the second half of the 20th century, stroke occurs in more than 700,000 individuals per year and results in 150,000 deaths. Recent advances in our knowledge of the pathophysiology of stroke and efforts to organize stroke care have led to evidence-based recommendations on the management of the stroke patient.^[6]

Rheumatic heart disease

Rheumatic heart disease describes a group of short-term (acute) and long-term (chronic) heart disorders that can occur as a result of rheumatic fever. One common result of rheumatic fever is heart valve damage. This damage to the heart valves may lead to a valve disorder.^[7]

Rheumatic fever

Rheumatic fever is an inflammatory disease that may affect many connective tissues of the body,

especially those of the heart, joints, brain or skin. It usually starts out as a strep throat (streptococcal) infection. Anyone can get acute rheumatic fever, but it usually occurs in children between the ages of 5 and 15 years. About 60% of people with rheumatic fever develop some degree of subsequent heart disease.

Every part of the heart, including the outer sac (the pericardium), the inner lining (the endocardium) and the valves may be damaged by inflammation caused by acute rheumatic fever. However, the most common form of rheumatic heart disease affects the heart valves, particularly the mitral valve. It may take several years after an episode of rheumatic fever for valve damage to develop or symptoms to appear.^[7]

Myocardial infarction

Acute myocardial infarction is the medical name for a heart attack. A heart attack is a life-threatening condition that occurs when blood flow to the heart muscle is abruptly cut off, causing tissue damage. This is usually the result of a blockage in one or more of the coronary arteries. A blockage can develop due to a buildup of plaque, a substance mostly made of fat, cholesterol, and cellular waste products.

Abnormal heart rhythms

The heart is an amazing organ. It beats in a steady, even rhythm, about 60 to 100 times each minute. That's about 100,000 times each day. Sometimes, your heart gets out of rhythm. An irregular or abnormal heartbeat is called an arrhythmia. An arrhythmia (also called a dysrhythmia) can produce an uneven heartbeat, or a very slow or very fast beat.

Coronary artery disease

You may hear this called CAD. It's hardening of the arteries that gives the heart vital oxygen and nutrients. That hardening can also be referred to as atherosclerosis.

Heart Failure

The term can be frightening. It doesn't mean the heart has "failed," or stopped working. It means the heart doesn't pump as well as it should. This will cause you to retain salt and water, which will give you swelling and shortness of breath. Heart failure is a major health problem in the U.S., affecting more than 6.5 million Americans. It is the leading cause of hospitalization in people older than age 65. The number of people diagnosed with heart failure is projected to rise by 46 percent by 2030, according to the American Heart Association.

Heart Valve Disease

Your valves sit at the exit of each of your four heart chambers. They maintain one-way blood flow through your heart.

Examples of heart valve problems include:

- **Mitral valve prolapse:** The valve between your left upper and left lower chambers doesn't close right.
- **Aortic stenosis:** Your aortic valve narrows. It affects blood flow from your heart to the rest of your body.
- **Mitral valve insufficiency:** Your mitral valve doesn't close tightly enough. This causes blood to leak backwards, leading to fluid backup in the lungs.^[8]

Concept of sedentary life style

The word sedentary life style derived from "sedere" a Latin word which means that "to sit" a term associated with behaviors and activities which needs a low energy expenditure. The expenditure can be measured in terms of metabolic equivalent task (MET). The sedentary life style is a class of behaviors characterized by little or no physical movement and low energy expenditure less than 1.5 MET. Running expends energy with off 8 MET and 3 to 4 in brisk walking. So the sedentary lifestyle includes sitting at work, home, business centers, long screen time, and leisure time and some individuals classified as a sedentary because of physical inactivity while others are classified based on the engagement inactivity that don't require high energy consumption.

Current scenario in India

The Indian health care system shows its extreme fly over the last decades, but still now it was alone way to go before to meet with the international standards. The health care finance is an important issue. In 2010, the total GDP spends for the health care system was 50%. The extent of the heart disease in India is mainly dependent on the factor such as changing life style, aging and food habits and other rapidly involving socio-economic determinants across developing factors. The rapid urbanization of India results with 31.8% of Indians living in urban areas, and the growth is three times faster than rural areas, which led to a lot of issues such as low physical activity, unhygiene and overcrowded living conditions, growing levels of stress and higher exposure to pollution.

Smoking is an important etiology for atherosclerosis and twice the chance of death cases from coronary diseases.^[9] From register general of India from 1990s the proportion of the

mortality due to coronary diseases or the circulatory systems diseases in a static range of 15%-17%.^[10] The report of the stroke prevalence study illustrates a substantial burden of stroke in both urban and rural areas.^[11]

According to the statistical data the age standardized CVD death rate of 272 per 1,00,000 population in India is higher than the global average of 235 per 1,00,000 population.^[12] This data reveals that most of the death occurring cases are related to cardiac diseases in India. However, there is a major gap in knowledge, especially regarding the causes of death in rural India; Global Burden of Disease estimates are based on smaller community based studies.^[13]

Risk factors

With the changes in the development, India has gone through dramatic lifestyle changes which include changes in the dietary changes – a shift from aggressive diet and active lifestyles to fast food and sedentary lifestyle which disease the span time than other nation. Recent studies show that CVDs have outgrowth the barriers of gender, local and economic status.

The risk factors includes

Gender

According to the reports of the incidence rates in (percentages) by the National Commission Dr. Mao economics and Health (NCMD) states that from 2000 to 2015 the number of the urban males with an age group of 26 to 29 years age group suffering from CHD will be almost double and the females of the same age group will keep up with their pare. When the prevalence rates in the estimated data were compared areas age groups, i.e., from 20-69 years in males and females, an increasing trend was obtained. On comparing with percentage of incidence of males and females across age groups from 2000 to 2015 (Fig: 2), a similar pattern is estimated where in more number of females will suffer from CVD at a large age as compared to men.^[14]

Rural and Urban

According to the study of 2015 the mortality rate due to acute coronary syndrome was 5.5% for that, while that for poor was 82%. The ICMR – WHO study on burden of disease reviewed literature till 2003 on NCDS. In 2003, the prevalence of CHD in India was estimated to be 3-4% in rural areas and 8-10% in urban areas with a total 29.8 million off less.^[15]

Dietary factors

which includes high intake of saturated fats, cholesterol and salt and low intake of fruits, vegetables and fiber are linked to higher incidence of cardiovascular diseases.^[16, 17, 18] The street foods, fried and stuffed balls with potatoes, pulses and spices are very popular in India, the deep fried and highly saturated fatty foods will increase to risk of heart disease.^[19, 20]

Sedentary Lifestyle and Vitamin Deficiencies

Sedentary life style is associated with vitamin deficiencies especially vitamin B and D which can lead to other health conditions like Osteoarthritis. The displacement from natural outdoor environment to an indoor sedentary lifestyle and avoidance of ultraviolet ray of the sun as a means of checking cancer has resulted in high incidence of vitamin D deficiency which in turn leads to various bone diseases and organ malfunctions such as osteoarthritis, hypertension, heart failure and other vascular diseases.^[21]

Obesity

The major problems for the both developed and developing country is obesity (30 reference of journal of nutritional and food survey).^[22] Across India the prevalence rates of obesity among women with an age group of 15-49 years was found to be 10.6 to 14.8%.^[23]

Sedentary Lifestyle and Obesity in Children

There is a strong courting among variety of hours of display screen time and obesity in kids and teens. TV viewing, video and laptop video games are risk factors for weight problems in children and teens especially on this laptop age.^[24]

Sedentary Lifestyle and Obesity in Adults

Between 50 – 75 % of adults aged 35 – 64 are either overweight or obese among the number of Indian population.^[25]

Disease conditions

Disease conditions have a primary role in the development of cardiovascular disease wherein improper sedentary lifestyles fashion will result in type 2 diabetes mellitus and high blood pressure. Presently type 2 diabetes mellitus and hypertension are the two principal instances may be seen because of improper balanced sedentary lifestyles.

Sedentary Lifestyle and Type 2 Diabetes

It is well known fact that physical inactivity plays a key role in diabetes mellitus especially type 2 which was formally known as non – insulin dependent diabetes which results from the body's

inability to effectively utilize insulin. Sedentary behaviors such as prolonged screen time, sitting time, driving and reading time among others are behaviors strongly associated with increased eating and weight gain which favor diabetes mellitus.^[26]

Sedentary Lifestyle and Cardiovascular Impact

The cardiovascular system is the part of the body that contains the heart, arteries and veins. It is responsible for pumping blood throughout the body thereby providing a rapid-transport system to distribute oxygen to the body cells and also remove carbon dioxide from the body with other waste products. The cardiovascular system consists of the heart and blood vessels. By the process of contraction and relaxation, the heart muscle pumps blood throughout the body within 20 seconds when the body is at rest , cardiovascular disease as one caused by unhealthy lifestyle including smoking, poor diet and sedentary behavior.^[27]

METHODOLOGY

A modified pre tested data entry was developed and it was tried on some cardiovascular patients to check feasibility and reliability. Necessary revisions were made based on the feedbacks to make the questions more clear and understandable. The data entry was examined for a second time and the changes were made accordingly. The purpose of the data entry was to collect the clinical findings such as diagnosis and the laboratorial data and the information's regarding their sedentary life style.

Study protocol was approved by the Institutional Ethics Committee. The nature and purpose of the study was explained. Patients were interviewed with a well-developed questionnaire. Patients were provided with the information about the study, its objectives and the assurance of confidentiality. Those who had met the inclusion criteria were interviewed and it's were collected data.

Totally 216 study subjects were assessed in a tertiary care hospital in Erode for a period of six months from January to June 2018 with the inclusion criteria of both the male and female cardiovascular disease patients in all age groups from those who were admitted in the hospital. We excluded the cardiovascular out patients due to lesser possibilities for follow-up and the family history of the patients were excluded owing to chance of any gene correlations.

Collection of data

Data were collected based on the direct interview with the patients on bed side with a designed

data entry. Almost all the information in the data entry were filled directly by interviewing them and the rest of the clinical data was obtained from the hospital case sheets of the patients. Before the collection of data we had stated our plans and prospects regarding the same.

Data entry consisted 3 parts

Part1: Demographic data: Information comprising age, gender, height, weight, education, and income.

Part2: Clinical data: Questionnaire to collect the diagnosis details and the laboratorial data.

Part3: Life style data: This part of the questionnaire aimed to collect the daily life style of the patients to examine whether it is a sedentary life style or not.

Study sample

Totally 249 patients were obtained from one of the hospitals in Erode, among them 33 patients were excluded due to family history. Based on the inclusion criteria, 216 patients were taken and the bed side data collection were also done by means of personalized interview from the patients.

RESULTS AND DISCUSSION

From 216 cardiovascular disease patients 58% (n=125) of the patients were male and 42%

(n=91) of the patients were female. Cardiovascular diseases are more affected in males linked to coping with stressful events may be less adaptive physiologically, behaviorally and emotionally, contributing increased risk for CVD males have a greater chance for having cardiovascular diseases may due to sedentary life style changes.^[29] About 52.3% (n=113) patients were living in urban area and 47.6% (n=103) were living in rural area. Among that 51-60 age group patients had cardiovascular diseases 32.87% (n=71), 61-70 age group participants were 22.22% (n=48), 41-50 age group patients were 19.90% (n=43), 71-80 age group patients were 12.5% (n=27), 31-40 age group patients were 11.57% (n=25), 21-30 age group patients were 0.92% (n=2), and no patients were seen in less than 20 years. Aging has a remarkable effect on the heart and arterial system, leading to an increase in CVD, including atherosclerosis, hypertension, myocardial infarction, and stroke. Aging cardiovascular tissues are exemplified by pathological alterations, including hypertrophy, altered left ventricular (LV) diastolic function, and diminished LV systolic reverse capacity, increased arterial stiffness, and impaired endothelial function.^[30]

Table 1: Socio-Demographic data

S.No	Parameters		Total number of patients (n=216)	
			Number of patients	Percentage (%)
1	Sedentary Behaviors(n=249)	Yes	216	86.7
		No	33	13.2
2	Sex	Male	125	58
		Female	91	42
3	Age	21-30	02	0.9
		31-40	25	11.5
		41-50	43	19.9
		51-60	71	32.8
		61-70	48	22.2
		71-80+	27	12.5
4	Living Area	Urban	113	52.3
		Rural	103	47.6
5	Education	Uneducated	86	39.8
		Primary	63	29.1
		Secondary	55	25.4
		Higher Secondary	04	1.8
		Degree	08	3.7
6	Body Mass Index (BMI)	Under weight	12	5.5
		Normal	98	44.9
		Obese	76	35.1
		Very Obese	30	13.8

From the total study patients 39.8% (n=86) was uneducated and remaining patients 60.1% (n=130) were literate from school to a degree. In a population based prospective cohort study in Spain there is a high risk with lack of education.^[31] Based on BMI calculation Obese patients 48.9% (n=106) were higher in our study when compared to normal 44.9% (n=98) and

underweight 5.5% (n=12) for further data see table 1. This may be due to strong correlation between obesity and major cardiovascular risk factors such as a raise in blood pressure, glucose intolerance and dyslipidemia. In a study found that obesity may be associated with hypertension, dyslipidemia, diabetes all of which increase the risk of CVD events.^[34]

Table 2: Substance association in the cardiovascular diseases

S. No	Contents	Consuming patients (%)	Number of patients (n)	Non-Consuming patients (%)	Number of patients (n)
1.	Alcohol	50.9	110	53.7	116
2.	Smoking	52.3	113	47.6	103
3.	Tobacco chewer	12.6	35	83.7	181

Tobacco, alcohol, and smoking consuming patients were described in Table 1. In a study conducted by centers for Disease Control and Prevention (US); National Centre for Chronic Disease Prevention and Health Promotion (US) demonstrated a strong dose-response relationship between the number of cigarettes smoked per day and cardiovascular risk. The relationship is not linear, however, and even low levels of exposure to tobacco, such as a few cigarettes per day, occasional smoking, or exposure to second-hand tobacco smoke are sufficient to substantially increase risk of cardiac events. Some interventions have accomplished significant reductions in the number of cigarettes smoked per day, but the reductions in levels of biomarkers of exposure and biomarkers of cardiovascular risk factors are not proportional, probably because of compensatory smoking by study participants and the nonlinear dose-response relationship.^[35] A study conducted by Isaac et al., states that alcohol abuse can increase the risk of cardiovascular diseases to a similar degree as other well established risk factors.^[36] Drinking alcohol can cause temporarily increase in the heart rate and blood pressure. Long term drinking can lead high blood pressure increased heart rate weakened heart muscle and irregular heartbeat, all of which can increase the risk of alcohol caused heart attack and stroke. In our

study most of them non-vegetarian 96.7% (n=209), in that most of the patients 56.4% (n=122) consuming chicken, 54.6% patients were taking mutton also, 37.7% (n=81) patients consuming fish and only fewer patients 4.6% (n=10) only taking other non-vegetarian foods which mentioned above, few patients only consuming vegetarian foods 3.2% (n=7). Study data show Increased consumption of non-vegetarian food may cause to high cholesterol levels in the blood and this will lead to various cardiovascular diseases. Buttar Het al., has the data that about 65% of study population in his study consuming non-vegetarian. This study also showed a similar results to our study results that lack of dietary knowledge may lead to cardiovascular diseases.^[35] Activities while eating, watching TV were 61.1% (n=132), no activities were 17.1% (n=37), talking were 14.3% (n=31), table sitting were 3.7% (n=8), lying were 2.3% (n=5), standing were 1.3% (n=3). Junk food consuming patients were 42.1% (n=91) and junk food non-consuming patients were 57.8% (n=125). On reviewing the case sheets of the patients we came to know that the CHD was 39.3% (n=85) which it's an highly diagnosed disease in that circumstances, SHT was 34.2% (n=74), MI was 9.7% (n=21), Stroke was 6.4% (n=14), TVD was 4.1% (n=7), RHD was 3.2% (n=7) and CVD was 2.7% (n=6), Table 3.

Table 3: Types of Cardiovascular diseases

S. No	Type of CVD	Number of Patients (n=216)	Percentage (%)
1.	Myocardial Infraction	21	9.7
2.	Systemic Hypertension	74	34.2
3.	STROKE	14	6.4
4.	Congestive Heart Diseases	85	39.3
5.	Coronary Vascular Diseases	6	2.7
6.	Triple Vascular Diseases	9	4.1
7.	Rheumatic Heart Diseases	7	3.2

Based on job nature we categorize it by sedentary 39.8% (n=86), moderate 33.7% (n=73) and heavy 26.3% (n=57). Our study result shows that patients who were following a sedentary job in nature are more prone to cardiovascular diseases. A same results were observed in a study conducted by Tanuja et al., states that in her study about 20% were Heavy, 34% were Moderate and 46% of peoples were Sedentary who were had CVD'S. This data match with our study and shows that physical inactivity is also one of the considering factor for NCD's.^[32] In our study population (n=216), 25.4% (n=55) patients were doing regular exercises, from regular exerciser the sub class data as follows, No one was doing strenuous exercise but even though moderate exerciser were 22.3% (n=44) and mild were 5.09% (n=11) and rest 74.5% (n=161) patients were non exerciser. The data shows that those who were not performed any physical activity in their daily life are more prone to CVDs. A similar result were also observed in a study conducted by Tatiana et al.^[28]

Limitation of the study

Although the research has reached its aims, there were some unavoidable limitations. First the time limit, this research was conducted only on a small size of population. Therefore to generalize the results for larger groups the study should be have involved more participants. Sedentary lifestyle studies are mainly conducted in developed countries and in patients who were all living in a developed area, but in our study it was difficult to differentiate and measure the intensity of the sedentary lifestyle in a developing and undeveloped area such as erode. The patients need to respond to some of the questionnaires based on their memory where there is a chance of error. However, attempts were made to

minimize such errors as much possible through appropriate research design and methodology.

CONCLUSION

Our study concluded that cardiovascular diseases are related to several factors such as smoking, alcohol consumption, food style, exercise and physical in activities of the individuals. Persons who were using heavy alcohol and smoking have a greater chance of affecting cardiovascular diseases. Sedentary behaviors such as increased sitting time on work and decreased physical activity in life have a greater affinity towards cardiovascular diseases. Our study concluded that persons who are all leading a sedentary life style have a greater chance of getting cardiovascular diseases. So by preventing the sedentary lifestyle can reduce the occurrence of the cardiovascular in our population. So this can be made by creating awareness about the risk factors and the lifestyle modification.

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