

Original research article

Epidemiological Study of Ischemic heart disease among the people aged 30 years and above in a rural population of Jammu

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Abstract

Introduction: The cardiovascular diseases including ischemic heart disease (IHD) emerged as a major health problem in the 20th century. It is considered as a modern epidemic which started firstly in the developed nations in the middle of the century, where it is now following a declining trend. On the other hand, the epidemic is emerging now in developing nations because of the changing lifestyles and the dietary habits with the consequent obesity; besides the modern day's stressful life superimposed by the smoking, heavy alcohol consumption; increased life span leading to accumulation of these cases and a consequent disease burden on the society; and the increased detection of such cases due to better diagnostic facilities and widened network of health services. These diseases are posing a great challenge to the already strained health services in the developing countries; which envisages the role of a preventive approach which also becomes important while noting the genetic predisposition of the population in the south Asian countries including India. Since the intimal streaks start to appear from the early childhood and there is tracing of the obesity in the life; preventive and health promotional activities need to be adopted by the population at large since the early life.

Materials and Methods: A rural population of 30 years & above was studied to find out the prevalence and the association of various risk factors with the IHD; from the three villages in Jammu, with a combined population of 6169. The Sample size was arrived at taking into account the prevalence rate of IHD in rural areas as 4.15%^[8]. A population of 2216 rural adults was studied by making house to house visits. The information was obtained about the general characteristics, the physical activity (recorded as per the "International Physical Activity Questionnaire"), the socio-economic status (assessed by using the "Uday- Pareek scale") and the presence of angina pectoris by the "Rose questionnaire". Also, height and weight were recorded. The history about the stressful events and personal habits was also taken.

Conclusions: The prevalence of the disease was found as 1.94% (1.50% for the females and 2.41% for the males). Various risk factors studied with a significant association with the IHD were an increasing age, presence of smoking, hypertension assessed at two Blood Pressure levels of 160/95 mmHg & 140/90 mm Hg., a positive family history, lack of physical activity and the presence of stressful event etc. Factors with which no association could be established included obesity, alcoholism, work in women and marital status.

Keywords: Ischemic heart disease, rose questionnaire, IPAQ

Introduction

Among the many health predilections for the new millennium, the most alarming is that of the "Cardiovascular Diseases" (CVDs) topping the list for death and disability.

CVDs are already a major cause of morbidity and mortality in India. The health services are likely to face the challenge of a major epidemic of the cardiovascular diseases in the near future. The figures published by WHO show a much higher prevalence in India than in many other developing countries.

More than 40-60% occlusion of Coronaries is required to give rise to the symptoms, thus implying that a lot of damage has already occurred before the diagnosis enforcing the role of prevention, especially the

modification of various risk factors involved which includes retaining traditional life styles of Indians, giving up smoking, taking fewer fatty foods, need for relaxation in modern day's fast life and keeping one's blood pressure in check besides others.

Overall prevalence estimates obtained from various studies show higher prevalence in urban populations. The risk of IHD increases with increasing age, although the problem is now being recognized on the increase in the younger age groups also. Females in the reproductive age group are at a lower risk of developing IHD & this seems to be having a hormonal basis.

Ischemic Heart disease no more is a disease of the higher social classes in the most affluent countries. The situation is changing since it emerged as a modern epidemic; showing in some studies a strong inverse relation between social class and IHD in developing countries^[3]. Although the prevalence of IHD has been reported to be higher in the persons with a higher socioeconomic status & the same has been found lower in the persons with a lower socioeconomic status^[1], yet few studies have shown an inverse relation between the level of education, which is one of the traditional measures of the socioeconomic status & the prevalence of IHD^[5]. Hearts hate the lazy bodies and don't promise to throb for long with the persons with strained minds; breathing smoke and supporting globular tummies on fast foods. As very well said by Sharper, some people commit suicide by drowning & many by smoking. Elevated BP either systolic or diastolic is predictive of increased risk of developing IHD (Kannel 1975). The role of the heredity has also been emphasized by the available literature on the IHD. The presence of the various risk factors like Hypertension and Obesity in itself is determined by the genetic factors.

Objectives

1. To find out the prevalence of IHD among adults (30 years and above) in a rural population.
2. To find out the association of various risk factors implicated such as socio-economic status, occupation, smoking, obesity, hypertension, lack of physical activity and increased levels of serum cholesterol etc. with the IHD.

Material and Methods

A cross sectional epidemiological study was conducted in which 2216 rural adults 30 years and above were studied from the three villages *viz.* Purkhoo, Gaddi and Jungwadi falling in the Kot-Bhalwal Block in the District, Jammu with a combined population of 6169. Sample size was arrived at taking into account the prevalence rate of IHD in rural areas as 4.15%⁸ within 95% confidence limits with an allowable error of 20%. The survey was conducted by house-to-house visits. All the members of the eligible population were also administered individually, the oral questionnaire/personal interviews.

General information of the family members was recorded on a pretested proforma.

Socioeconomic status was assessed by using the "Uday- Pareek scale".

Age of the person in years was recorded as on the previous or the next birthday whichever was nearer.

Family history of IHD was taken from all the persons studied.

Presence of Diabetes & Hypertension was enquired from all the persons.

A history regarding any stressful event in the preceding one-year such as Death, Separation, Migration, Marriage, Divorce & unemployment was also taken. Any other stressful event as per the perception of the person was also noted.

A detailed history regarding a death in the family that probably resulted because of IHD within the preceding 5 years was also taken.

Time spent in Mild, Moderate and Vigorous types of physical activities was calculated by taking into consideration the activities performed during the preceding seven days, for a minimum period of 10 minutes each & was recorded on the "International Physical Activity Questionnaire(IPAQ)"^[24] modified as per local requirements.

B.P. of all the persons was measured in a sitting position^[21]. Hypertension was diagnosed^[20] when the Diastolic BP was 95 mmHg or more &/or the systolic BP was 160 mmHg or more (without the use of Antihypertensive medication) or when the medications for the established hypertension were being received.

Weight & Height^[12] of all the persons in the study population were recorded, to calculate the Body Mass Index (BMI). A metal tape was used after standardizing the same^[6].

The "Rose Questionnaire"^[15] was administered to all the persons.

The persons who responded positive to any portion of the "Rose questionnaire" were taken to the Govt. Medical College Hospital Jammu for the investigations. They were subjected to ECG and their fasting blood sample was taken; these persons were then shown to a physician specialist and the diagnosis of the IHD was recorded after his interpretation of the ECG. In those with a normal resting ECG, the TMT was done.

Such of the persons as having ECG or TMT suggestive of IHD were further shown to a cardiologist for confirmation of the findings and the diagnosis.

The analysis was done using Chi square test (with Yates correction wherever applicable) using Epi-info 6 software. Chi Square for trends was also applied wherever applicable.

Body Mass Index (Quetelet’s index) [22] was used to diagnose obesity. The obesity was defined as a BMI of 30 or more for males & 28.6 or more for females.

Hyper-cholesterolemia was diagnosed when the Serum Cholesterol Level exceeded 250 mg%.

Observations and Discussion

A population of 2443 persons aged 30 years and above was registered during the course of the study conducted in 2004. Amongst these there were 227 non-respondents Thus a study population of 2216 persons including 1081 males and 1135 females was studied. There were 48.78% men & 51.22% women in the study population.

Majority of the study population 1822 falls in the age groups of less than 60years while there were only 394 people in the age group of 60 years & above.

Majority of the study population i.e. 1961 persons belonged to the “Middle Class” whereas only 255 persons belonged to the “Lower Class”. No person belonged to the “Upper Class” in the study population.

In the males the majority 597 was doing Service & Business, followed by 265 persons who were Agriculturists & Laborers. 219 males studied were unemployed.

Majority of women (971) were involved in some work i.e., household work, business & service.

The further breakdown of those women “involved in some sort of work” showed that the majority (924) of these women were involved exclusively in household works. The women who were doing service or business were doing the household work in addition.

Majority of the study population (2012) consisted of Hindus, followed by Sikhs i.e., 191. The Muslims and Christians were grouped together since they comprised of a small number i.e.,13 including 10 Muslims and 3 Christians in comparison to the total population studied.

The majority of the Hindus 1189 belonged to the “Lower caste” (including SC, ST & OBCs), whereas the “Upper caste” (including all the other castes not included in the “lower caste”) comprised of 823 persons only.

The majority (623) in the males in the study population studied upto “Middle” or “Matric” whereas the majority (832) in the females were “Illiterates” or with an educational qualification of “Upto Primary”. Only 65 males & 22 females had an educational qualification of “Graduate & above”.

The number of males diagnosed as IHD cases was more than that in the females. The highest number of IHD cases in males was in the age group 50-59, whereas the highest number of IHD cases in the females was in age group 30-39.

Table 1: Prevalence of IHD in the Study Population

	IHD	Non IHD	Prevalence % of IHD
Males	26	1081	2.41
Females	17	1135	1.50
Both Sexes(n)	43	2216	1.94

n(number of persons)

As shown in the table 1 above, the overall prevalence of IHD was 1.94% in the study population. This is lower than the prevalence in the rural areas i.e., 4.15%. as reported in a meta-analysis [8] in 1990s & also lower than the prevalence shown in various studies of IHD in rural areas i.e.,7.43% in Kerala [14],3.09% in Punjab [18],3.53% in Rajasthan [7], 3.09% in Uttar Pradesh [16],& 2.7% in Gurgaon, but it was similar to the prevalence found in a rural area of Haryana [6] (2.06%,Dewan *et al*). This prevalence is lower than the prevalence among immigrant Indians in other countries [2]. This prevalence of IHD is also lower than that in the different Urban areas (9.67% -12.63%) in various studies [5, 9, 10, 13].

The prevalence in the males and females was 2.41% & 1.50% respectively showing a lower prevalence in females.

The age wise prevalence in this study increased in both the sexes from the age group of “30-40 years” to the subsequent age groups upto/& “50-59 years”. In a study [10] by Gupta Rajeev *et al* in India there was a similar increase in the prevalence of IHD in both the sexes along with the increasing age.

Table 2: Association of the age with the IHD

Age (Yrs.)	IHD Cases (%)	Non IHD (%)	Total
30 TO 39	3(0.35)	847(99.65)	850
40 TO 49	12(1.95)	604(98.05)	616
50 TO 59	18(5.06)	338(94.94)	356
60 &Above	10(2.54)	384(97.46)	394
All Ages (n)	43(1.94)	2143(98.06)	2216

n(number of persons) Test applied, Chi Square (Yates Correction); P Value0.000001

Chi Square For Trends; p value0.000008, df 1

The table 2 above shows that in the age groups upto “less than 60 years”, the proportion of the IHD cases increased from the lowest 0.35% in the age group of “30-39”, to the highest 5.06% in the age group of “50-59”, followed by a fall upto 2.54% in the age group of “60 years & above”.

These findings are statistically highly significant, showing a strong association of age with IHD. This observation is consistent with a study [10] conducted by Gupta Rajeev *et al*, in Rajasthan in which he found significant association of increasing age with the IHD.

IHD cases have a higher proportion of smokers i.e., 44.19% when compared to non-IHD population in whom it is 25.26% only as is evident from the table 3 below. The findings are statistically highly significant showing strong positive association between Smoking and IHD.

Table 3: Association of Smoking with IHD

Population Studied	Smoker (%)	Non-Smoker (%)	Total (%)
IHD Cases	19(44.19)	24(55.81)	43
Non IHD	549(25.26)	1624(74.74)	2173
Total (n)	568(25.63)	1648(74.37)	2216

n(number of persons) Test Applied; Chi Square: p value <. 005

This observation is consistent with a study in Varanasi [17] (Sinha PR *et al*). Also, other studies [9, 10, 11, 14] substantiate the same.

In the study population, a higher proportion of IHD cases 9.27% is present in hypertensives (Hypertension defined as B.P.> or= 160/95mm Hg), when compared to non-hypertensives where it is only 1.19% as shown in the following table 4(a). These findings are statistically significant showing a strong association of hypertension with IHD.

Table 4(a): Association of Hypertension (B.P.> or= 160/95mm Hg) with IHD

Hypertension	IHD CASES (%)	Non-IHD (%)	Total
Present	19(9.27)	186(90.73)	205
Absent	24(1.19)	1987(98.81)	2011
Total(n)	43(1.94)	2173(98.06)	2216

n (number of persons) Test applied, Chi Square (Yates correction) : p value<.001

Table 4(b): Association of Hypertension with IHD (B.P.> or= 140/90mm Hg)

Hypertension	IHD Cases (%)	Non-IHD (%)	Total
Present	24(8.33)	264(91.67)	288
Absent	19(0.99)	1909(99.01)	1928
Total (n)	43(1.94)	2173(98.06)	2216

n(number of persons) Test applied, Chi Square (Yates correction): p value<. 001

The study population, was further analyzed by defining Hypertension [23] at B.P.> or= 140/90mm Hg. A higher proportion of IHD cases 8.33% was found to be present in hypertensives, when compared to non-hypertensives where it was only 0.99% as shown in the Table 4(b) above.

These findings are statistically significant showing strong association of hypertension with IHD even when the lower level of BP was taken as diagnostic criterion.

The various other studies also substantiate this finding (Chada SL *et al*, [4], Chada SL *et al*, [5], Wander GS *et al*, [18], Wellborn TA *et al*, [19], Gupta R. *et al*, [10], Kutty V.R. *et al*, [14]) of the strong positive association of hypertension with IHD.

Table 5: Association of the Family History with the IHD

Family History	IHD CASES (%)	NON-IHD (%)	TOTAL
Present	7(16.28)	69(3.18)	76
Absent	36(83.72)	2104(96.82)	2140
Total(n)	43(100)	2173(100)	2216

n(number of persons) Test applied, Chi Square (Yates correction);pvalue0.00002

The table 5 above shows that there is a higher proportion 16.28% of persons with a family history present in IHD cases as compared to non IHD population where it is only 3.18%. These findings are statistically highly significant showing strong positive association of IHD with presence of family history. Similar observations were found in various other studies [4, 5, 18].

No significant association between obesity and IHD was found.

Table 6: Distribution Of IHD Cases & General Population as per Their Socio-Economic Status

Social Class	IHD CASES (%)	NON- IHD (%)	Total
Lower class	-	255(100)	255
Lower middle class	26(2.04)	1244(97.96)	1270
Middle class	17(2.20)	674(97.80)	691
Upper middle class	2(25.00)	6(75.00)	8
Total(n)	43(1.94)	2173(98.06)	2216

n(number of persons) Tests applied, Chi square
 Row1 & Row 2, p value 0.04; Row2 & Row 3 p value0.83; Row 3 &
 Row 4 (Yates correction), p value<0.001

It is evident from the table 6 above that there is an increase in the proportion of IHD cases with an increase in the Socio-economic class with 0.0%(no case) in the “Lower Class”, 2.04% in the “Lower Middle Class”, 2.20% in the “Middle Middle Class” &25.00% in the “Upper Middle Class” groups of the study population. No person belonged to “Upper Class” It was found that transition is highly significant between “Lower Class” and the “Middle class (all subgroups together)”[Chi square (Yates correction), p value <.001].Also the transition between “Lower class” and “Lower Middle Class”; & “Middle Middle Class” and “Upper Middle Class”, was found statistically significant[Chi square (Yates correction);p value <.001].However the transition between “Lower Middle Class” & “Middle Middle class” with proportion of IHD cases respectively as 2.04% & 2.20% was found to be statistically insignificant.. These findings show strong positive association of the socio-economic class with IHD which is in consistence with various studies^[13, 14, 18].

No significant association was found between marital status and IHD.

Table 7: Association of Men with the Occupation

Occupation	IHD Cases (%)	Non IHD (%)	Total
Agriculturist	1(0.38)	264(99.62)	265
Service	6(1.48)	399(98.52)	405
Business	4(2.13)	188(97.87)	192
No occupation	15(7.35)	204(92.65)	219
Total (n)	26	1055	1081

n(number of men) Test applied, Chi Square; p value 0.00001
 No IHD case was present in laborers, so it was clubbed with
 Agriculturists for analysis.

It is evident from the table 7 above that in the study population, the proportion of IHD cases is increasing from a lowest i.e.0.38% in the agriculturists, to 1.48%& 2.13% respectively in those doing service and business respectively. The highest proportion (7.35 %) of IHD cases is in those with no occupation. These findings are found to be statistically highly significant. Also when “the persons with no occupation” were tested against “all the other groups together”, the difference in the prevalence of IHD cases in these two groups in consideration was also highly significant (Test applied Chi Square; p value 0.000001). All these observations show a strong association of the occupation with the IHD in males.

This is probably because the business persons are involved in a sedentary life style. The prevalence was highest in those having no occupation. In these unemployed persons there is an additional mental strain of doing nothing and no income.

No significant association was found between the type of work and IHD in women.

Table 8: Association of IHD Cases with the Moderate Physical Activity (IPAQ)

Time spent in the activity	IHD CASES (%)	NON-IHD (%)	Total
Less than60 (minutes/day)	25(5.38)	440(94.62)	465
60to119 (minutes/day)	4(1.73)	227(98.27)	231
120to 179 (minutes/ day)	3(1.24)	239(98.76)	242
180to239 (minutes/ day)	3(1.57)	188(98.43)	191
240& above (minutes/ day)	8(0.74)	1079(99.26)	1087
Total (n)	43(1.94)	2173 (98.06)	2216

n(number of persons) Test applied, Chi Square, p value <0.001

The table 8 above depicts that as the time spent in the moderate physical activity increases from “<60 minutes” to “More than 240 minutes”; there is a corresponding decrease in the proportion of the persons having IHD in persons performing such activities, from 5.38% to 0.74% respectively; except from “120-179 minutes” group to “180-239 minutes” group, where there was a marginal insignificant increase from 1.24% to 1.57% (Chi square test; p value 0.772). These observations were found statistically to be highly significant showing a strong inverse association of the amount of the moderate physical activity with the IHD.

Table 9: Association of IHD Cases with the Vigorous Physical Activity (IPAQ)

Time spent in the activity	IHD Cases (%)	NON-IHD (%)	Total
Less than 10(minutes./DAY)	40(2.26)	1733(97.74)	1773
≥ 10(minutes./DAY)	3(0.68)	440(99.32)	443
Total (n)	43	2173	2216

n (number of persons) Tests applied, Chi Square, p value 0.03

It is evident from the table 9 above that as the amount of time spent in the “vigorous physical activity” increased from “less than 10 Minutes/Day” to “≥ 10 Minutes/Day,” the proportion of the IHD cases in the persons doing such activities decreased from 2.26% to 0.68%; When the statistical test was applied, these observations were found to be statistically significant.

The inverse association between Moderate & Vigorous physical activity with IHD is in agreement with the various studies conducted relating the physical activity to the IHD [4, 10].

It becomes evident from the following table (table 10) that there was a higher proportion of IHD cases (5.45%) in those who had a history of the presence of a stressful event in the past one year as compared to those in whom no such history was present, where the proportion of IHD cases was only 1.59%. These findings were statistically highly significant, showing a strong association of IHD with the presence of a stressful event.

Table 10: Distribution Of IHD Cases & General Population by The Presence of Stressful Event

Stressful Event	IHD Cases (%)	Non IHD (%)	Total
Yes	11(5.45)	191(94.55)	202
No	32(1.59)	1982(98.41)	2014
Total (n)	43	2173	2216

n (number of persons) Test applied, Chi square: p value.00015

Table 11: Distribution of IHD Cases as per Presence or Absence of Hypercholesterolemia.

Age in years	Hyper-cholesterolemia		Total
	Present (%)	Absent (%)	
Less than 50	0(0)	12(100)	12
50&above	6(25)	18(75)	24
Total(n)	6	30	36

n (number of persons); Test applied, Chi Square (Yates correction); P value <0.001

As is shown in the following table 11 above, out of the 36 IHD cases in which the serum cholesterol levels were investigated; no person in the age group “less than 50 years” had hypercholesterolemia as per the diagnostic criteria used in this study, whereas 25% of the persons in the age group “50& above” had hypercholesterolemia. This difference in the proportion was found to be statistically significant showing a strong association of hypercholesterolemia with the age in IHD cases.

As is shown in the table 12 below, out of the 36 IHD cases in which the serum glucose levels were investigated; no person in the age group “less than 50 years” had hyperglycemia, whereas 29.17% of the persons in the age group “50& above” had hyperglycemia. This difference in the proportion was found to be statistically significant showing a strong association of hyperglycemia with the age in IHD cases.

Table 12: Distribution of IHD Cases as per the presence or absence of Hyperglycemia

Age In Years	Hyperglycemia		Total
	Present (%)	Absent (%)	
< 50	0(0)	12(100)	12
50 & above	7(29.17)	17(70.83)	24
Total (n)	7	29	36

N (number of persons); Test applied, Chi square (Yates correction); P value < 0.005

Hyperglycemia (Fasting serum glucose > 120mg / dlt).

It is quite expected with the hypercholesterolemia since IHD is an atherosclerotic heart disease with the higher serum cholesterol levels especially in the older age groups due to the lack of physical activity. Various studies have found an association between higher cholesterol [18, 19] levels and the IHD in the study population and also of increasing levels of blood sugar with the IHD [5,17, 19].

Table 13: Distribution of the Study Population as per the Presence or Absence of the History of Diabetes Mellitus

History of Diabetes	IHD Cases	Non IHD	Total
Present	6	30	36
Absent	37	2143	2180
Total (n)	43	2173	2216

n (number of persons).

As shown in the table 13 above, it was further observed during the course of the study that there were 36 persons (including 6 in the IHD cases & 30 in the non IHD population) who gave a history of the presence of the Diabetes Mellitus, diagnosed by a physician & receiving treatment. All these persons were receiving oral hypoglycemic agents.

Two studies ^[4, 10] have taken a history of diabetes from the study population in which the proportion of the persons with the history of diabetes was 0.2 and 1% respectfully. In the present study a total of 36 persons (1.62%) gave a history of diabetes, diagnosed by a physician and on treatment.

Further it was found during the course of study that 27 deaths in the study population during the past five years were due to IHD as was elicited on interviewing the persons in detail about any such event during this period.

Conclusions

The following conclusions were drawn from this study conducted in 2004 in a rural population of Jammu in the persons aged 30 years and above. An overall prevalence of IHD in this study population was found to be 1.94%. The females have a lower prevalence 1.50% of IHD when compared to males where it is 2.41%.

The prevalence of the IHD increased with the increase in the age with a lowest prevalence in the age group 30-39; and a highest prevalence in the age group 50-59 years. The increasing prevalence of the IHD with the age was statistically significant. No significant association was found with gender.

It was further concluded that the smokers had a strong association with the prevalence of IHD.

The hypertension was also found to be strongly associated with the presence of IHD.

Also, the family history was found having a strong association with the IHD. The obesity could not be associated with the presence of the IHD.

There is a strong association between the IHD and the socio-economic status. No association was found between the IHD and the marital status of a person. A strong association was found between the IHD and the occupation in men. The prevalence of IHD increased from agriculturists (including labourers) to those doing service, businessmen and unemployed.

A strong inverse association was found between the amount of the physical activity of and the presence of the IHD both for the moderate as well as vigorous activities.

The presence of various stressful events was found strongly associated with presence of IHD.

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