



## “A STUDY OF SUDDEN DEATH- WITH SPECIAL REFERENCE TO HEART WEIGHT AND WALL THICKNESS.”

### Forensic Medicine

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### ABSTRACT

Sudden unexpected deaths pose a serious problem, According to WHO prediction, by AD 2020 up to three-quarters of death in developing countries would result from non communicable diseases and that coronary heart disease will top the list of killers. Coronary heart disease otherwise called as Myocardial Infarction (MI) is a dreaded complication of coronary atherosclerosis. Total 107 hearts were removed during autopsy and studied. Cases were divided into Control and Negative Control group. Heart weight was more in all cases of control group having cardiovascular pathology and left side ventricular thickness is more as compare to right side in the deceased heart having myocardial infarction

### KEYWORDS

#### Introduction:

Death is said to be sudden or unexpected when a person not known to have been suffering from any disease, and found dead or die within 24 hours of the onset of the terminal illness.<sup>1</sup> Sudden unexpected deaths pose a serious problem not only to the family members but also to the treating physician if the person was admitted in the hospital for some other disease.<sup>2</sup>

According to WHO prediction, by AD 2020 up to three-quarters of death in developing countries would result from non communicable diseases and that coronary heart disease will top the list of killers. Coronary heart disease otherwise called as Myocardial Infarction (MI) is a dreaded complication of coronary atherosclerosis. The diagnosis of MI in living is attainable whereas in dead or sudden death cases, its diagnosis is difficult. Diagnosis of myocardial infarction at autopsy is not only a challenging task for the forensic pathologist but also a essential step from the point of ascertaining the cause of death in sudden deaths.<sup>2</sup>

Another numerically much smaller but medico-legally more important group, were those cases in which some unnatural event, such as a road accident, was suspected to have been precipitated by acute myocardial ischemia. Thus the present study brightens the light in the field of macroscopic diagnosis of myocardial infarction by a forensic pathologist

#### Material And Method:

The present study is carried out at Govt. Medical College, Nagpur in the Department of Forensic Medicine from November 2015 to December 2016.

Total 107 hearts were removed from the dead bodies of routine medico legal autopsies. The clinical data for each case was derived primarily from evidence of prior cardiovascular and other diseases obtained from relative of deceased or friends or from police and accordingly the cases were divided into two groups-

**1. Control group-** known cases of myocardial infarction and ischemic heart disease were included in this group which shows clinical signs of myocardial infarction along with relevant history obtained from relative of deceased and which showed coagulation necrosis of myocardium at histopathology has been labelled as control group.

**2. Negative control group** - cases of sudden natural death, asphyxial deaths and accidental traumatic cases are included in this group presuming that these might produce myocardial infarction at the terminal stage for comparative analysis.

After removing, the heart was rinsed immediately in physiological

saline and heart weight is taken after removing blood clots.

Weight of heart as given in standard text (Robin's Pathologic Basis of Disease)- Normal 300-350 (300) grams-male and 250-300 (250) grams-female

If heart measuring > 300gms in female and > than 350gms in male is considered as increased weight.

#### Result:

**Table No. 1- Age and sex wise distribution of cases.**

Age	Male	Female	Total	%	Histopathological +ve for Myocardial Infarction	
					+ VE	%
20-30	12	08	20	18.69	6	11.33
31-40	24	01	25	23.36	10	18.87
41-50	23	02	25	23.36	11	20.75
51-60	23	01	24	22.42	17	32.07
61-70	10	02	12	11.21	9	16.98
71-80	01	00	01	0.94	0	00
Total	93	14	107	100	53	100%

Out of these 107 cases, 93 cases are males and 14 cases are females. Among total 107 cases 49.53% (n-53) of cases were positive histopathological myocardial infarction findings. Out of these 53 positive histopathological myocardial infarction cases, most of the cases belongs to 51-60 yrs accounted for 32.07% (n-17), followed by 41-50 yrs age group (20.75%, n-11) and 31-40 yrs age group (18.87%, n-10), while in 21-30 yrs age group 11.33% (n-6) of cases found.

**Table No. 2:- Distribution of cases as to cause of death.**

#### Group-1 (Control Group)

Cause of Death	Number of cases	Histopathological +ve for Myocardial Infarction
Myocardial infarction	11	10
Atherosclerotic Heart Disease	04	3
Total	15	13

#### Group-2 (Negative Control Group)

Cause of Death	Number of cases	Histopathological +ve for Myocardial Infarction
Sudden Natural Death	48	29 (60.4%)
Hanging	06	00
Drowning	02	00

Accidental Deaths	10	02 (20%)
Miscellaneous	26	09 (34%)
Total	92	40

### Group-1 (Control Group)

In the control group total 15 cases has been included in which 11 cases with clinical evidence of recent myocardial infarction supported by biochemical, electrocardiographic and clinical findings. While it also includes four cases of patients with known atherosclerotic heart disease having clinical and laboratory signs of myocardial infarction. Among 15 cases of control group, 13 cases were shown positive histopathological myocardial infarction.

### Group-2 (Negative Control Group)

In Group-2 total 92 cases are examined which included cases of other disease such as sudden natural death (n=48 cases), Asphyxial death (n=08 cases), Accidental death (n=10 cases) and Miscellaneous (n=26 cases) which might produce myocardial infarction in the terminal stage of illness, has been taken for comparative analysis. Among 92 cases of negative control group, 40 cases were found to be histopathologically positive for myocardial infarction, of which majority bulk of the cases belongs to sudden natural death accounted for 60.4% (n=29).

**Table No. 3:- Distribution of cases as per heart weight.**

#### Group-1

Cause of death	Number of cases	Heart weight Range(grams)	Average weight (grams)
Myocardial infarction	11	295-500	372
Atherosclerotic Heart Disease	04	355-380	366
Total	15	295-500	370

#### Group-2

Cause of death	Number of cases	Heart weight Range(grams)	Average weight (grams)
Sudden Natural Death	48	200-512	328
Hanging	06	240-270	250
Drowning	02	225-257	241
Accidental Deaths	10	220-387	274
Miscellaneous	26	220-750	295
Total	92	200-750	315

From the Table No -3, it was clearly evident that the heart weight in cases with cardiovascular pathology had increased heart weight with an average weight of 370 gms above than the normal weight of 300-350 gms. While in Group-2, the heart weight range between 200-750 gms with an average weight of 315 gms which can be considered as a normal heart weight which is due to normal physiological size and shape of muscle fibers working in normal physiological conditions.

**Table No. 4:- Distribution of cases as per ventricular wall thickness.**

#### Group-1

Control group	Number of cases	Range value(mm)	Average(mm)
Left ventricular thickness	11	18-22	20
Right ventricular thickness	03	6-7	6.8
Normal	01	8-12	9.2
Total	15	6-22	12

#### Group-2

Negative Control group	Number of cases	Range value(mm)	Average(mm)
Left ventricular thickness	37	13-24	17.3
Right ventricular thickness	04	6-8	6.2
Normal	51	3-5	3.7
Total	92	3-24	9.0

Thus, it is observed that the average thickness of left ventricle in group-1 is 20 mm and in group-2 is 17.3 mm and average thickness of right

ventricle in group-1 is 6.8mm and in group-2 is 6.2 mm. This increase of ventricular wall thickness in left ventricle which was above the normal 8-12mm in both group- 1 and group-2. and right ventricle which was above normal that is 3-5mm in group-1

### DISCUSSION

In the present study the total number 107 cases are examined in group-1 and group-2 for determination of myocardial infarction.. Out of these 53 positive histopathological myocardial infarction cases, most of the cases belongs to 51-60 yrs accounted for 32.07 % (n-17), followed by 41- 50 yrs age group (20.75%, n- 11) and 31- 40 yrs age group (18.87%, n- 10), while in 21- 30 yrs age group 11.33% (n-6) of cases found. Our findings were consistent with Rissanen V3, Banshidhar Gupta.<sup>4</sup>

While Baroldi G<sup>5</sup> observed that maximum number of cases (41 cases) in his study falls between 60-69 years and 18 cases in age group of 50-59 years.

The present study shows that the incidence of myocardial infarction is prevalent in age group of 25-70 years. This might be due to the fact that in our country the eating habits, indiscriminate use of tobacco and lack of physical activity, sedentary lifestyle in the people increases the chances of getting this malady and also rising these trends in the earliest age group such as 21-30yrs..

### HEART WEIGHT

In the present study the weight of heart was observed in control group with known cases of cardiovascular disease, varying from 295-500 gms with an average of 370 gms. While in negative control group it was between 200-750gms with an average of 315 gms. This findings were similar with Robin's<sup>6</sup> Pathologic Basis of Disease and Marvin Sagkner.<sup>7</sup>

This increase in heart weight might be as a result of pathological demands for increased heart work. Such increased heart weight above the critical level is due to increase in the number of fibers with a little further thickening.

The weight of difference in heart might be due to various factors like eating habits, environment social status of the individual person in the Western Countries.

**Ventricular wall thickness:-** In the present study the average thickness of left ventricle wall in group-1 was 20 mm and in group-2 was 17.3 mm and average thickness of right ventricle in group-1 is 6.8mm and in group-2 is 6.2 mm. This increase of ventricular wall thickness in left ventricle which was above the normal 8-12mm in both group- 1 and group-2. and right ventricle which was above normal that is 3-5mm in group-1. Our findings were consistent with Marvin Sagkner<sup>7</sup>, Russell S8 and J F Goodwin.<sup>9</sup> as they observed that there was increase in ventricular wall thickness in cardiovascular diseases.

As in the cardiovascular pathology the ventricular wall thickness was increased due to the fact that with the hypertrophy the growth of the coronary arteries and coronary ostia was retarded and atherosclerotic lesions of the coronary system becomes more frequent.

### CONCLUSION:

Myocardial infarction is a major cause of sudden and unexpected death

- 1) The incidence of myocardial infarction is prevalent in males as compared to females and also it is more in 40-60 years of age as compare to Western countries.
- 2) Heart weight was more in all cases of control group having cardiovascular pathology
- 3) Left side ventricular thickness is more as compare to right side in the deceased heart having myocardial infarction.

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