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Histopathological Spectrum of Lesions of Heart - An Autospsy Based Study in Tertiary Care Centre

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Abstract: ***Introduction: Autopsy histopathology is useful in conditions of undiagnosed or suspected cases to confirm the diagnosis both in routine and medicolegal cases. The role of pathologist is to study the disease process which lead to death and to establish the cause of death. Incidence of ischemic heart disease in India has increased to about 10 percent. The occurrence of sudden death presents a great challenge to the general autopsy pathologist and as cardiac autopsy is the main diagnostic tool to study various histomorphological changes in normal and diseased heart. Objective: The aim of this study was to analyze the various heart lesions histopathologically i.e both on gross and microscopy on heart received after autopsy at department of pathology, Gajra Raja Medical College, Gwalior during the period of 1.5 years. Method: A prospective study was done on 131 specimens of heart received during 2021 - 22. All relevant histopathological details pertaining to gross and microscopic diagnosis were comprehensively studied. Result: Out of total received 131cases, in 26.66% of cases, Heart was normal grossly and in 19.8% of cases Heart was normal microscopically, while in 76.33% of cases, Heart was diseased grossly and 80.15% of cases Heart was diseased microscopically. Most common Microscopic Lesion in left ventricle was [Muscle Hypertrophy] with 41 (31.29%) cases. Most common Right Ventricular Lesions was found to be [MUSCLE HYPERTROPHY] with 21 [16.03%] cases. On examining left coronary artery, [ATHEROSCLEROSIS] was present in maximum number of cases; 10 [47.61%], while in Right coronary artery, [ATHEROSCLEROSIS] was the most common lesion being present in; 08 [34.78%] cases. Conclusion: The Study of Autopsy Specimen histologically which include both gross and microscopic examination is a simple, convenient and reliable method which gives precise histological diagnosis which may have led to mortality or morbidity of deceased. It is highly imperative to subject the whole heart of all medicolegal autopsies for histopathological examination in order to know or to rule out various pathologies.***

Keywords: Autopsy Pathology, Left Ventricle, Right Ventricle, Left Coronary Artery, Right Coronary Artery

1. Introduction

The non - forensic or clinical autopsy remains key aspect of medicine today. Advances in radiology, biopsy techniques, and diagnostic tests have not only made major strides in providing accurate diagnosis, they also often raise many smaller questions for autopsy. Autopsies now also provide more refined diagnosis by using advanced microbiological tests, molecular tests, and immunohistochemistry.

Pathological autopsy remains a focal point for the integration of medical knowledge. It benefits physicians, patients, and society and therein demonstrates its value. As truly said by STANLEY ROBBINS, 1957 that pathologist is interested not only in the recognition of structural alterations, butalso in their significance, i. e., how these changes affect cellular and tissue function and ultimately the effect of these changes on the patient.

Autopsy histopathology is useful in conditions of undiagnosed or suspected cases to confirm the diagnosis both in routine and medicolegal cases. The role of pathologist is to study the disease process which lead to death and to establish the cause of death.

Cardio respiratory diseases are the leading cause of death in the world and have now become leading cause of morbidity and mortality in India. Incidence of ischemic heart disease in India has increased to about 10 percent.[1, 2] The occurrence of sudden death presents a great challenge to the general autopsy pathologist and as cardiac autopsy is the main diagnostic tool to study various histomorphological changes in normal and diseased heart[3], many concealed cardiac pathologies are found incidentally on histopathological evaluation of hearts received after autopsy.

Autopsy histopathology is thus an important complementary tool to evaluate disease or injury that may be present and to determine the cause and manner of a person's death. Many a times it is found that when gross pathology could not help to evaluate the cause of death, histopathological examination can conclusively opine the involved cardiac pathology.

2. Material and Methods

This was a One and half year, Prospective Study, conducted in a tertiary care centre of central India from January 2021 to June 2 with a sample size of 131 cases. All the specimen of heart from routine and medico legal autopsies irrespective of cause of death were included in the study.

Exclusion Criteria:
1) Autolysed samples
2) Heart specimen received in pieces.

Methodology:
The heart was examined on gross under following headings:
1) Weight
2) Measurement
3) Left ventricular wall thickness
4) Right ventricular wall thickness
5) Left coronary artery patency
6) Right coronary artery patency
7) Aorta patency

After gross examination, grossing was done according to heart and lungs grossing protocols and tissue were cut, paraffin blocks were made, tissue section was made to put on slide and H & E staining was done.

3. Observation and Results

Out of total received 131cases, in26.66% of cases, Heart was normal grossly and in 19.8% of cases Heart wasnormal microscopically, while in 76.33% of cases, Heart was diseased grossly and 80.15% of cases Heart was diseased microscopically. (Table 1) Out of total cases studied, in left ventricle 86 (65.64%) cases shown to have Left Ventricular lesion microscopically. No specific Left Ventricular Lesion [Unremarkable] was seen in 45 (34.35%) cases. Most common Microscopic Lesion in left ventricle was [Muscle Hypertrophy] with 41 (31.29%) cases; followed by Microscopic Lesion [Myocarditis] with 15 (4.83%) cases. Microscopic Lesion [Fibrosis] was present in minimum numberi. e 1 [0.76%] case. (Table 3). On examining the left ventricle wall thickness, wall thickness in the range of [1.6 - 2cm] was found in the maximum number; 43 [32.82%] cases followed by 1.1 - 1.5 cm, 42 [32.06%] cases. (Table 4) On correlating between left ventricular lesions and left ventricular wall thickness, maximum (48.78%) cases of [MUSCLE HYPERTROPHY]were in the wall thickness range of [2.1 - 2.5cm]. All the cases of [MYOCARDIAL INFARCTION] were associated with Left Ventricular Wall Hypertrophy. (26.6%) cases of [MYOCARDITIS] were associated with Left Ventricular Wall Hypertrophy. (50.0%) cases of [EDEMA] were associated with Left Ventricular Wall Hypertrophy. (Table 5) Most common Right Ventricular Lesions was found to be [MUSCLE HYPERTROPHY] with 21 [16.03%] cases, followed by [CONGESTION] in 13 [9.93%] cases, (Table 6). On examining left coronary artery, [ATHEROSCLEROSIS] was present in maximum number of cases; 10 [47.61%] out of all the lesions present in left coronary artery; shown in Table 7. While in Right coronary artery, [ATHEROSCLEROSIS] was the most common lesion being present in; 08 [34.78%] cases out of all the lesions present in right coronary artery.

Table 1: Frequency of Normal and Diseased Heart on Gross and Microscopy

Heart	Gross	Microscopy
Normal	31	26
Diseased	100	105

Table 2: Statistical Analysis of Normal and Diseased Heartongross Andmicroscopy

Grossly	Microscopically	
	Diseased Heart	Normal Heart
Diseased Heart	96	8
Normal Heart	12	15
Sensitivity	88.89%	
Specificity	65.22%	
Positive Predictive Value	92.31%	
Negative Predictive Value	55.56%	
Accuracy	84.73%	
Disease Prevalence	82.44%	
Sensitivity Of Microscopy	92.31%	
Disease Prevalence On Microscopy	79.39%	

Table 3: Left Ventricular Lesions On Microscopy

S. No	Left Ventricular Lesions	No. of Cases [Out of 131]	Frequency
1.	Muscle Hypertrophy	41	31.29 %
2.	Myocarditis	15	11.45 %
3.	Congestion	10	7.63 %
4.	Edema	10	7.63 %
5.	Myocardial Infarction	03	2.30 %
6.	Hemorrhage	04	3.05 %
7.	Fibrosis	01	0.76 %
8.	Nercrosis	02	1.55 %
9.	Unremarkable	45	34.34 %

Table 4: Left Ventricular Wall Thickness on Gross

S. No	Left Ventricular Wall Thickness	No. of Cases [Out Of 131]	Frequency
1.	< 0.5 cm	01	0.76 %
2.	0.6 - 1 cm	08	6.11 %
3.	1.1 - 1.5 cm	42	32.06 %
4.	1.6 - 2 cm	43	32.82 %
5.	2.1 - 2.5 cm	32	24.43 %
6.	2.6 - 3 cm	05	3.82 %

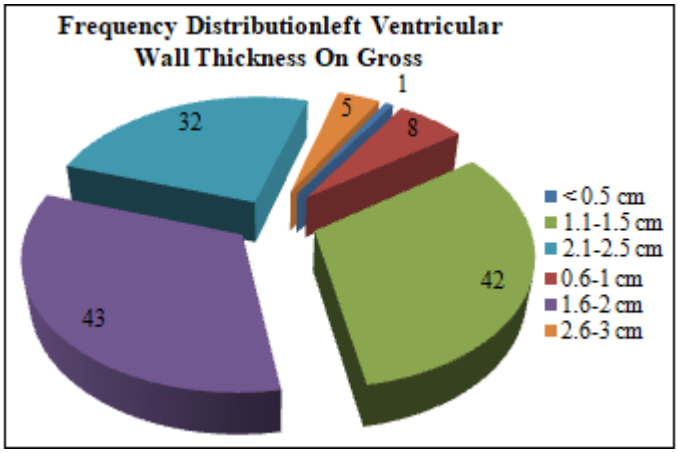


Table 5: Correlation between Left Ventricular Lesions and Wall Thickness

S. No.	Left Ventricular Lesions/ LVW Thickness	<0.05 cm	0.6-1 cm	1.1-1.5 cm	1.6 - 2 cm	2.1 - 2.5 m	2.6 - 3 cm	Total Cases
1.	MUSCLE HYPERTROPHY	-	-	01	16	20	04	41
2.	MYOCARDITIS	-	-	11	02	02	-	15
3.	CONGESTION	-	01	05	04	-	-	10
4.	EDEMA	-	-	05	02	03	-	10
5.	MYOCARDIAL INFARCTION	-	-	-	01	02	-	03
6.	HEMORRHAGE	-	-	01	01	02	-	04
7.	FIBROSIS	-	-	-	-	01	-	01
8.	NERCROSIS	-	-	-	01	01	-	02
9.	UNREMARKABLE	01	07	19	16	01	01	45
	TOTAL CASES	01	08	42	43	32	05	131

Table 6: Right Ventricular Lesions

S. NO	RIGHT VENTRICULAR LESIONS	NO OF CASES [OUT OF 131]	FREQUENCY
1.	MUSCLE HYPERTROPHY	21	16.03 %
2.	MYOCARDITIS	06	4.58 %
3.	CONGESTION	13	9.93 %
4.	EDEMA	08	6.10 %
5.	MYOCARDIAL INFARCTION	01	0.76 %
6.	HEMORRHAGE	04	3.06 %
7.	LARGE THROMBI	01	0.77 %
8.	UNREMARKABLE	77	58.77 %

Table 7: Left Coronary Artery Lesions on Microscopy

S. No	Left Carotid Artery Lesions	No. of Cases [Out Of 131]	Frequency
1.	Calcification	05	3.82 %
2.	Atherosclerosis	10	7.63 %
3.	Features Of Coronary Artery Disease	01	0.76 %
4.	Lumen Obliterated With Throbus	04	3.06 %
5.	Throbus Superimposed On Atheroma	01	0.76 %
6.	Unremarkable	110	83.97 %

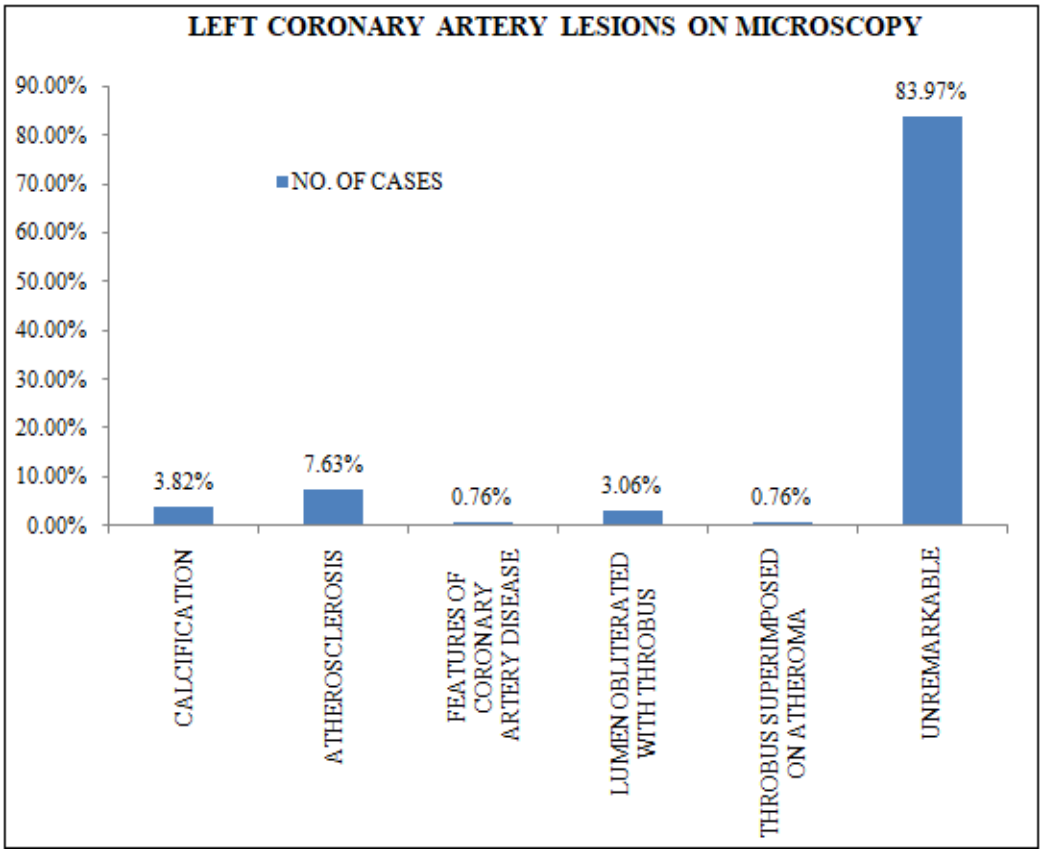
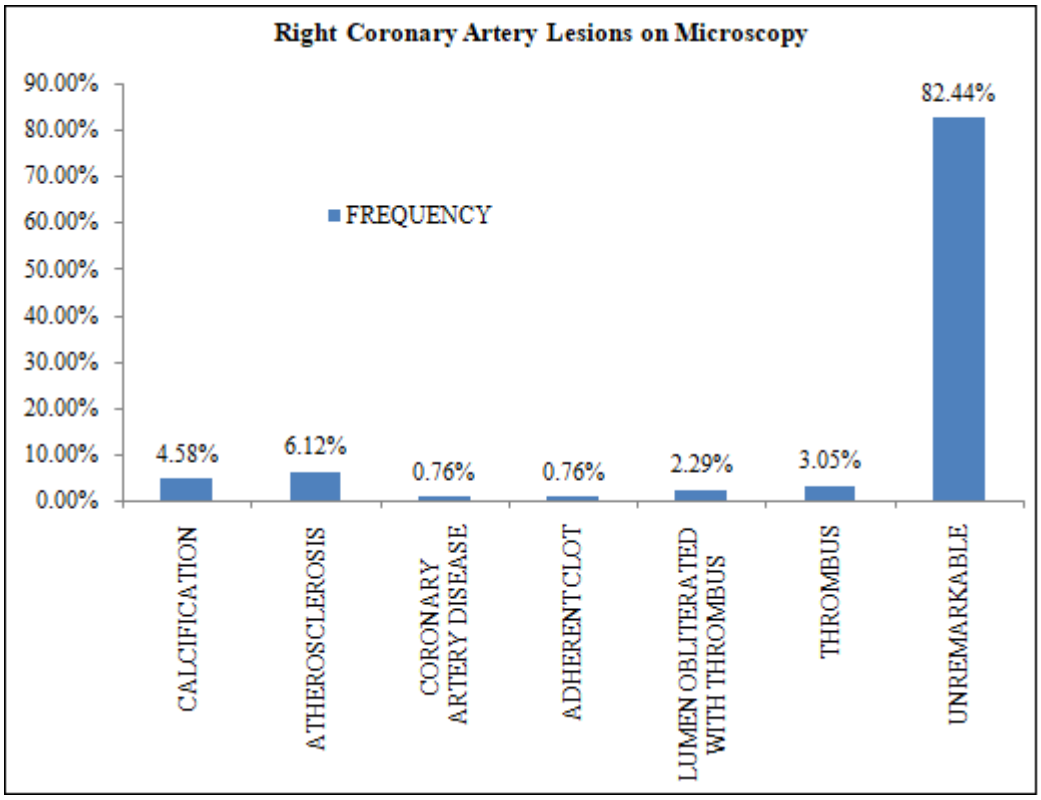
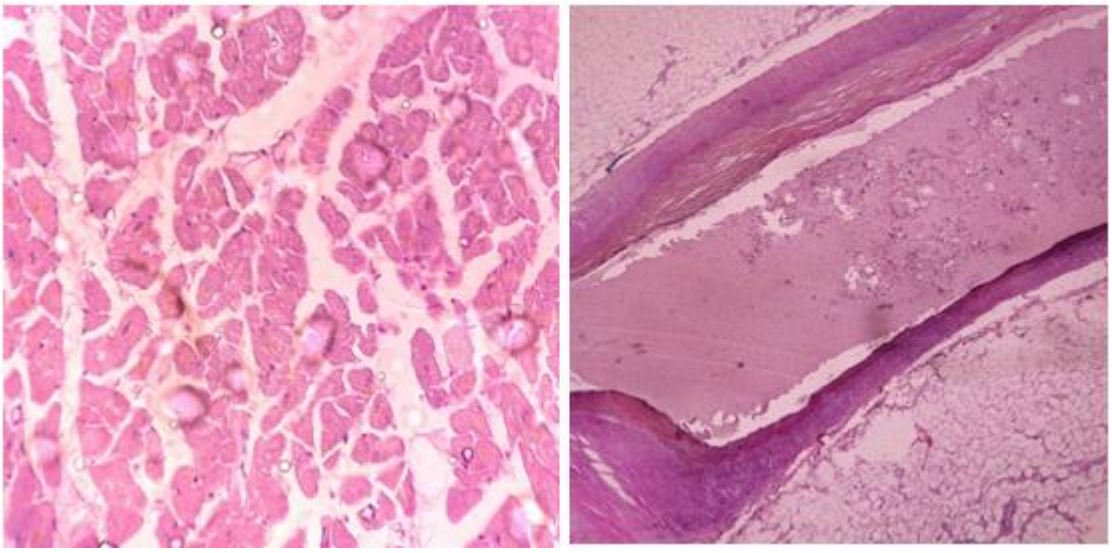


Table 8: Right Coronary Artery Lesions on Microscopy

S. NO	Right Coronary Artery Lesions	No. of Cases [Out of 131]	Frequency
1.	Calcification	06	4.58 %
2.	Atherosclerosis	08	6.12 %
3.	Coronary Artery Disease	01	0.76 %
4.	Adherent Clot	01	0.76 %
5.	Lumen Obliterated with Thrombus	03	2.29 %
6.	Thrombus	04	3.05 %
7.	Unremarkable	108	82.44 %



Images



H&E Section showing Muscle Hypertrophy in LVW (40x)

H&E Section showing dilated RCA filled with thrombus (4x)

4. Discussion

Incidence of cardiac deaths has been increasing all over the world particularly in urban population during last five decades. In India incidence of ischemic heart disease has increased to about 10%.

The autopsies Histopathological examination can be a valuable source for epidemiological information in addition to providing valuable information to deceased immediate family.

Thus, in our study an attempt was made to study the Histopathological features (both gross and microscopic) to detect the various lesions in Heart.

Comparison of commonest Heart Lesion with other studies:
Out of total 131 cases studied, 15 (11.45%) cases found to have no pathology both grossly and microscopically. This was similar to the study done by Sonawane S Y et al.4 who also reported (12.09%) cases with no specific cardiovascular lesions.
In our study cases with both left ventricular and right ventricular hypertrophy were 16 (12.21%). In a similar study done by Shah SN et al.5 also reported 20 cases (13.15%) of Hypertrophy.

Our study reported left ventricular hypertrophy to be the commonest left ventricular lesion 41 (31.29%) cases. Right ventricular hypertrophy was the commonest right ventricular lesion reported with cases 21 (16.03%). Isolated left ventricular hypertrophy cases were 25 (19.08%). Cases with isolated right ventricular hypertrophy were 05 (3.82%). There were no studies available to compare individual and isolated left and right ventricular hypertrophy incidence on autopsy.

In our study cases with both left ventricular and right ventricular Myocarditis were 4 (3.15%). In a similar study done by Sonawane SY et al.4also reported 4 (3.22%) cases of Myocarditis.

Left ventricular Myocarditis was reported in 15 (11.45%) cases. Right ventricular Myocarditis was reported in 6 (4.58%) cases. Isolated left ventricular Myocarditis cases were 11 (8.39%). Cases with isolated right ventricular Myocarditis were 02 (1.53%). There were no studies available to compare individual and isolated left and right ventricular Myocarditis incidence on autopsy.

Myocardial infarction was reported in 3 (2.30%) cases in Left VentricularWall. Myocardial infarction was reported only in 1 (0.76%) case in Right Ventricular Wall. In a similar study Shah SN et al.5 reported 3 cases of LVW infarction. There was no RVW infarction case reported in that study.

In our study cases with both Left Ventricular and Right Ventricular Congestion were 3 (2.29%). Cases with Left Ventricular Congestion were 10 (7.63%). Cases with Right Ventricular Congestion were 13 (9.93%). Isolated Left Ventricular Congestion was found in 7 (5.34%) cases. Isolated Right Ventricular Congestion was found in 10 (7.63%) cases. Shah SN et al.5also reported similar findings with 14 (9.21%) cases of congestion in their studies.

In our study cases with atherosclerosis in Left Coronary Artery, Right Coronary Artery and Aorta was only 1 (0.76%). Cases with Atherosclerosis only in Left Coronary Artery and Right Coronary Artery were 1 (0.76%). Cases with Atherosclerosis in Left Coronary Artery were 10 (7.63%). Cases with Atherosclerosis in Right Coronary Artery were 8 (6.12%). Cases with isolated Atherosclerosis in Left Coronary Artery were 8 (6.12%). Cases with isolated Atherosclerosis in Right Coronary Artery were 6 (4.58%). In contrast study done by Garg S et al.6 reported higher cases of Atherosclerosis 78 (55.3%).

Comparison of Age (yrs) and Gender in different studies:
In our study the cases with both left ventricular and right ventricular hypertrophy were found maximum in the age group 41 - 50 years (50.0%) cases. Isolated Left Ventricular Hypertrophy was found maximum in the age group 31 - 40years (36.0%) cases. Isolated Right Ventricular Hypertrophy was found maximum in the age group 21 - 30years (40.0%) cases.

In our study the cases with both left ventricular and right ventricular Myocarditis were found maximum in the age group 30 - 50 years (75.0%) cases. Isolated Left Ventricular Myocarditis was found maximum in the age group 31 - 40 years (54.54%) cases. Isolated Right Ventricular Myocarditis was found maximum in the age group 40 - 60 years (100%).

Left Ventricular Wall infarct was found maximum in the age group >40 years (75.0%) cases. Right Ventricular Wall infarct was found maximum in the age group > 70 years (100.0%) cases.

Cases with both Left Ventricular and Right Ventricular Congestion were found maximum in the age group of 20 - 40 years (75.0%). Cases with Left Ventricular Congestion were found maximum in the age group of 20 - 50 years (60.0%) cases. Cases with Right Ventricular Congestion were found maximum in the age group of 31 - 70 years (69.23%).

In our study cases with atherosclerosis in Left Coronary Artery, Right Coronary Artery and Aorta was only 1, which was reported in the age group of 31 - 40 years. Case with Atherosclerosis in Left Coronary Artery and Right Coronary Artery was only 1, which was reported in the age group of 41 - 50 years. Cases with Atherosclerosis in Left Coronary Artery were reported maximum in the age group of 35 - 60 years (90.0%) cases. Cases with Atherosclerosis in Right Coronary Artery were reported maximum in the age group of 35 - 65 years (90.0%). Cases with isolated Atherosclerosis in Left Coronary Artery were reported maximum in the age group of 35 - 50 years (90.0%). Cases with isolated Atherosclerosis in Right Coronary Artery were reported maximum in the age group of35 - 65 years (66.66%).

5. Conclusion

The Study of Autopsy Specimen histologically which include both gross and microscopic examination is a simple, convenient and reliable method which gives precise histological diagnosis which may have led to mortality or morbidity of deceased. It is highly imperative to subject the whole heart of all medicolegal autopsies for histopathological examination in order to know or to rule out various pathologies. In our study majority of microscopic lesions found in Left ventricle were of Left Ventricular Wall Hypertrophy followed by Myocarditis. The cases were maximum in the 4^{th} to 6^{th} decade of life with male preponderance.

References

[1] Goldberger JJ, Basu A, BoineauR. Risk stratification for sudden cardiac death a plan for the future. *Circ*2014; 129: 516 - 26.
[2] Frederick JS, Richard NM, The Heart. In: Vinay Kumar, editor. Robbins &Cotran Pathologic Basis of Disease: South Asia Edition. Vol I, 9th edn. New Delhi: Reed Elsevier India Private Limited; 2015. p.538 - 50.
[3] Marwah N, Sethi B, Gupta S, Duhan A, Singh S, Sen R, et al. Histomorphological Spectrum of Various Cardiac Changes in Sudden Death: An Autopsy Study. *Iran J Pathol*2011; 6: 179 - 86.
[4] Sonawane SY, MatkariPP, Pandit GA. Pathology of heart, coronaries and aortain autopsy cases with history of sudden death: anoriginal article. Int J Res Med Sci 2017; 5: 3287 - 91.
[5] Shah SN, Patel KA, Patel HB, Bhalodia JN. Histomorphological study of changes in heart An autopsy study. Arch CytolHistopathol Res 2019; 4 (2): 159 - 63.
[6] Garg S, Hasija S, Sharma P, Kalhan S, Saini N, Khan A. A histopathologicalanalysis of prevalence of various heart diseases: anautopsy study. Int J Res Med Sci 2018; 6: 1414 - 8.