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# HISTOPATHOLOGICAL STUDY OF SPINAL TUMOURS

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## ABSTRACT

**Background:** Spinal tumours are tumours that can occur within or adjacent to the spinal cord. Primary spinal cord tumours account for 2 to 4 percent of all primary central nervous system(CNS) tumours, one third of which are located in the intramedullary compartment.

**Objective:** To study the incidence of spinal tumour at Tertiary Care Teaching Hospital and to study the morphological and clinico-radiological correlation and relative incidence of various spinal tumours among different age groups and sex.

**Methods:** In the Present Study, all operated cases; excised biopsies and resected specimens are taken into consideration. After processing detail microscopic examination was carried out.

**Results:** The peak age of incidence of spinal tumours was between 21-40 years of age, with the male:female ratio 1.57:1. Benign tumours (89%) are more common than malignant tumours (11%). Spinal tumours more commonly located in intradural (86%) than extradural(14%) locations. Malignant tumours mostly located on extradural locations(7%) than intradural locations(4%). Spinal tumours are more commonly located in thoracic region. Schwannoma(31%) is the most common spinal tumour followed by meningioma(24%), astrocytoma (11%), neurofibroma (8%) and ependymoma (8%). Hemangioma and lipoma are relatively less common.

**Conclusion:** The study can contribute to epidemiologic knowledge of Spinal cord tumours.

**Key Words:** Spinal Cord Tumours (SCT), Histopathology, Central Nervous System (CNS)

## INTRODUCTION

Spinal tumours are tumours that can occur within or adjacent to the spinal cord. They are considered to be intraaxial in location and can be either primary or metastatic. Primary spinal cord tumours account for 2 to 4 percent of all primary central nervous system(CNS) tumours, one third of which are located in the intramedullary compartment.<sup>1</sup>

In this study spinal tumours are considered as spinal cord tumours. Spinal cord tumours can be classified according to their anatomic location<sup>2,3,4,5</sup>

**Intramedullary** — Intramedullary tumours arise within the spinal cord itself. Most primary intramedullary tumours are either ependymomas or astrocytomas. Low grade tumours are usually benign and high grade tumours are malignant. WHO grade I and II are considered as benign while grade III and IV are malignant. Metastases are being recognized with

increasing frequency, primarily because of improvements in imaging modalities<sup>6</sup>

**Intradural-extramedullary** — Tumours arising within the dura but outside the actual spinal cord are termed intradural-extramedullary. The most common tumours in this group are meningiomas and nerve sheath tumours<sup>(2,3)</sup>. Benign Meningioma are WHO grade I and grow slowly. In contrast atypical (WHO grade II) and anaplastic (WHO grade III) form can be aggressive.

**Extradural** — Extradural tumours are usually metastatic and most often arise in the vertebral bodies. Metastasis mostly comes from breast, lung and prostate. Metastatic lesions can cause spinal cord compression either by epidural growth that results in extrinsic spinal cord or cauda equina compression or less frequently by intradural invasion<sup>7</sup>

Primary spinal tumours commonly occurs in young adults and commonly present with following symptoms.

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- Back or neck pain.
- Pain that does not improve with rest and worse at night
- Pain accompanied by neurologic symptoms such as numbness or weakness of arms or legs or change in bowel or bladder routine.

Spinal tumours can be treated with medications, surgery, radiation, or a combination of treatments.

Spinal tumour oncology is a rapidly evolving and exciting field. Advances are being made through integration of systemic basic laboratory and clinical research. It is hoped that these advances will eventually culminate in safer and more effective treatment for the spinal tumour.<sup>8</sup>

Because of the major advances in diagnosis, multi-modality therapy, surgery, development of rational use of combination chemotherapy and improved supportive care, the cure rate in spinal tumours has increased tremendously.

### AIMS AND OBJECTIVES

1. To study the incidence of spinal tumour at Tertiary Care Teaching Hospital, Gujarat
2. To study the morphological and clinicoradiological correlation of spinal tumours
3. To study the relative incidence of various spinal tumours among different age groups and sex.
4. To compare the data and other investigations with similar studies.

### MATERIALS AND METHODS

Biopsies & whole tumours specimens were taken from admitted patients in different wards of our institute. A detailed history of each patient regarding age, sex, chief complaints

were collected. Along with these radiological investigations in the form of CT and MRI findings were also collected in detail.

All the surgically resected specimens were fixed in the 10% neutral buffered formalin for 24 hours. The received bony parts were decalcified with the help of the HNO<sub>3</sub>. After proper fixation and/ or decalcification gross examination is carried out.

Thorough gross examination of each specimen for its size, shape, and consistency was performed. From received surgical specimens representative areas of tissue were taken & submitted to routine tissue processing and paraffin embedding. Hematoxylin & Eosin staining was performed in all cases. After staining thorough macroscopic examination was performed and diagnosis is made. Detail analysis of results are carried out.

### RESULTS & OBSERVATION

The present study was carried out in one of the tertiary care teaching hospital, Gujarat from April-2011 to November-2013. A total of 100 cases were studied in detail. Analysis of the study was collected.

Table I and Chart I show age wise incidence of spinal tumours. It was found that spinal tumor was most common during 21-40 years, i.e. 54%. It also shows sex wise incidence of spinal tumour. It indicates that overall spinal tumours are common in male as compare to female, the male: female ratio is about 1.08:1. But due to unknown reason, during the third and fourth decade it is much higher in male with the ratio of 1.57:1; and the incidence is equal after 60 years of age.

**Table I: Incidence of Spinal tumours according to age and sex**

Age in years	Male		Female		Male/ Female ratio	Total	Percentage (%)
	No. of cases	% Male	No. of cases	% Female			
0-20	6	42.86	8	14	0.75:1	14	14
21-40	33	61.11	21	54	1.57:1	54	54
41-60	11	39.29	17	28	0.65:1	28	28
>60	2	50.00	2	4	1:1	4	4
Total	52	52.00	48	100	1.08:1	100	100

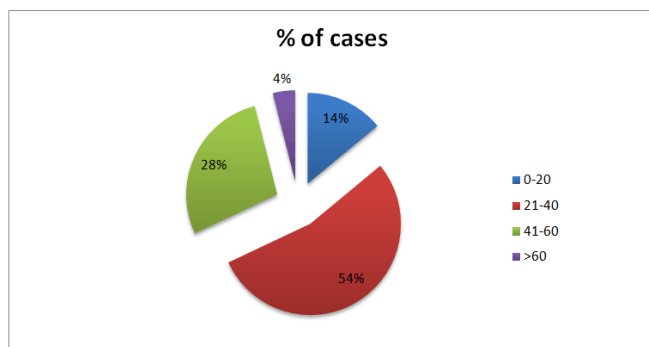


Chart I: Age wise incidence of Spinal tumours

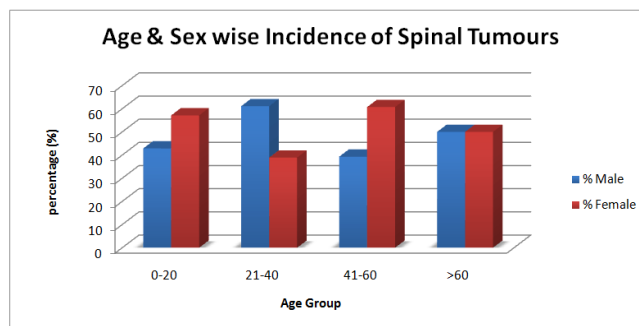


Chart II: Age & Sex wise Incidence of Spinal Tumours

Table II: Age and Sex wise Prevalence of Spinal Malignancy

Age in years	No. of Malignant cases					
	Male	Percentage	Female	Percentage	Total	Percentage
0-20	1	25%	2	28.57%	3	27.27%
21-40	1	25%	3	42.85%	4	36.36%
41-60	2	50%	2	28.57%	4	36.36%
>60	0	0	0	0	0	0
Total	4	36.36%	7	63.64 %	11	

Table II shows that spinal Malignancy were more common in Female ( 42.85 %) than Male (36.36 %) during 20-40 years

of life. Not a single malignant case was recorded after 60 years during the present study.

Table III: Prevalence of clinical features of spinal tumours in study group.

Primary symptoms	No. of cases	Percentage
Local Plain	42	42%
Muscle weakness	34	34%
Sensory dysfunction	14	14%
Radicular Pain	10	10%
Total	100	

Table III shows that most of our patients were presented due to local pain. And thus, local pain was more frequent primary symptoms (42%), followed by muscle weakness (34%).

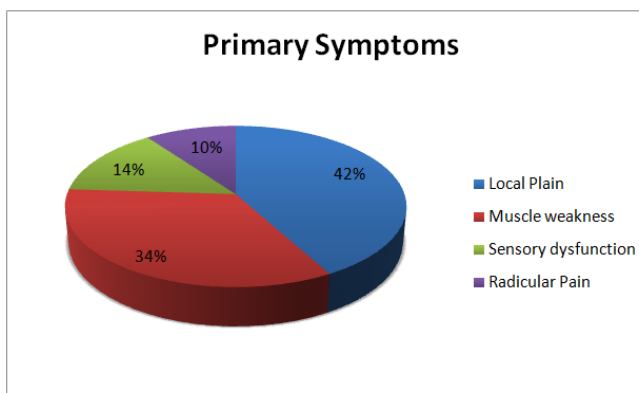
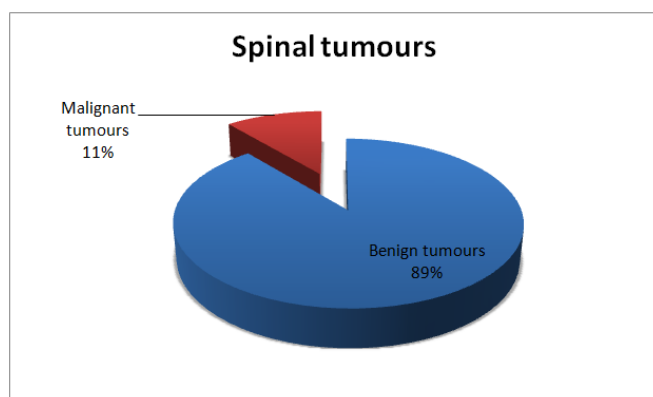


Chart III: Presentation of Patents with Spinal Tumours

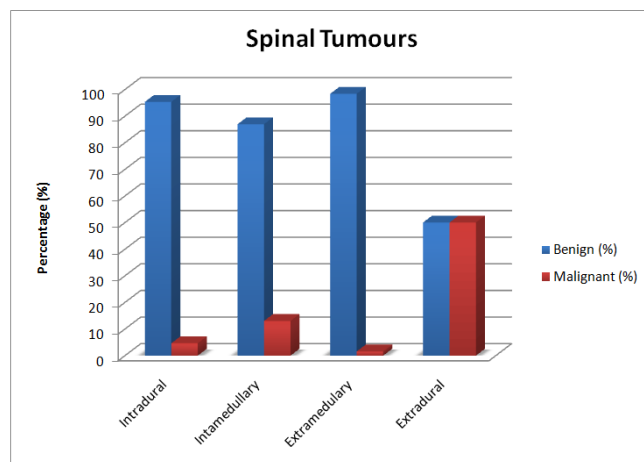
**Table IV: Prevalence of Spinal tumours according to tumor position (Benign & Malignant)**

Tumor Position	No of Benign		No. of Malignant		Total No. of cases	
	Cases	Percentage	Cases	Percentage	Cases	Percentage
Intradural	82	95.35	4	4.65	86	86
Intamedullary	20	86.96	3	13.04	23	26.74
Extramedullary	62	98.41	1	1.59	63	73.26
Extradural	7	50	7	50	14	14
Total	89	89	11	11	100	

Table IV shows that benign tumours (89%) were more common than Malignant (11%) tumours. It also indicates that spinal tumours were more common In intradural than extradural location, not only that if it is located Intradural extramedullary; chances are higher that the tumour is benign. Malignancy is higher if the tumour is located extramedullary site (63.64%).



**Chart IV:** Distribution of Benign and Malignant Lesions



**Chart V:** Prevalence of Spinal tumours according to tumor position (Benign & Malignant)

**Table V: Prevalence of Spinal tumours (Benign & Malignant) according to tumor location within spinal canal**

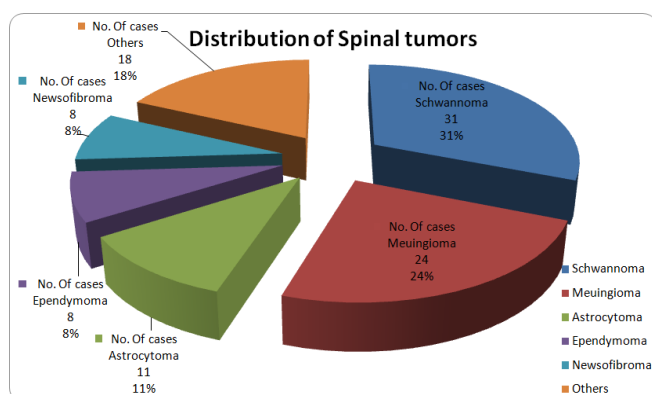
Location of Tumour	Benign	Percentage	Malignant	Percentage	Total No. of Cases	Percentage
Cervical	29	32.58%	2	18.18%	31	31%
Thoracic	48	53.93%	7	63.63%	55	55%
Lumbar	12	13.48%	2	18.18%	14	14%
Sacral	-	-	-	-	-	-
Total	89	89%	11	11%	100	

Table V indicates that spinal tumor were more common in thoracic region (55%) followed by cervical region (31%) and Malignant tumours were more common in thoracic region (63.63%). In this study no cases identified in sacral region or filum terminals.

**Table VI: Prevalence of Morphologic type of spinal tumours in study group.**

Type	No of Benign cases (%)	No of Malignant cases(%)	No. of total cases	%
Schwannoma	31(34.83)	-	31	31%
Meningioma	24(26.97)	-	24	24%
Astrocytoma	9(10.11)	2(18.18)	11	11%
Ependymoma	8(8.99)	-	8	8%
Neurofibroma	8(8.99)	-	8	8%
Others	9(50)	9(50)	18	18%
Hemangioma	2(2.25)	-	2	2%
Ganglioglioma	2(2.25)	-	2	2%
Hemangioblastoma	2(2.25)	-	2	2%
Lipoma	2(2.25)	-	2	2%
Glomus tumor	1(1.12)	-	1	1%
Osteochondroma	1(1.12)	-	1	1%
PNET	-	3(27.27)	3	3%
NHL	-	4(36.36)	4	4%
Immature teratoma	-	1(9.1)	1	1%
Metastatic SCC	-	1(9.1)	1	1%
Total	89(89%)	11(11%)	100	100

Table VI indicate that schwannoma was most common (31%) benign spinal tumor in present study followed by Meningioma (24%), astrocytoma (11%), Neurofibroma, Ependymoma. Hemangioma and lipoma were relatively less frequent. One case of glomus tumor and osteochondroma was found. A rare case of Immature teratoma and a Metastatic SCC in IDIM location was also found.



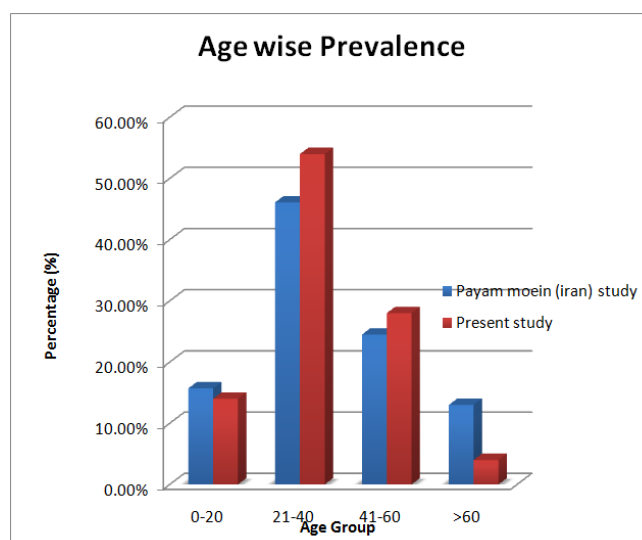
**Chart VI:** Distribution of Spinal Tumours

### DISCUSSION

**Table VII: Prevalence spinal tumours according to age**

Age in years	Payam moein (iran) study <sup>9</sup>	Present study
0-20	15.7%	14%
21-40	46.1%	54%
41-60	24.5%	28%
>60	13%	4%

In present study spinal tumours are common in 21-40 years age group (54%) followed by (41-60 years) age group 28%, which is almost equal to Payam Moein (Iran) study (Table IX).



**Chart VII:** Prevalence of Spinal Tumours according to Age

**Table VIII: Comparison of spinal tumours according to Sex**

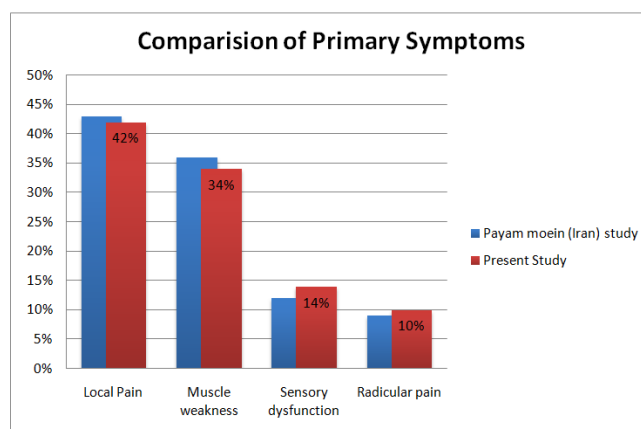
Gender	Payam moein (Iran) <sup>9</sup>	Hirano k et al <sup>10</sup>	Present study
Male	59%	55.6%	52
Female	43%	44.4%	48
MF Ratio	1.37	1.25	1.08

Table shows that Incidence of spinal tumours are higher in males than in females.

Male & Female ratio is 1.08 in present study which is almost comparable with both Payam moein, Iran & Hirano k et al studies.

**Table IX: Comparison of Spinal tumor according to primary symptoms**

Primary symptoms	Payam moein (Iran) study <sup>9</sup>	Present Study
Local Pain	43%	42%
Muscle weakness	36%	34%
Sensory dysfunction	12%	14%
Radicular pain	9%	10%



**Chart VIII:** Comparison of Spinal tumor according to primary symptoms

During the present study most common primary symptoms of spinal tumor is local pain (42%) followed by muscle weakness (34%) and sensory dysfunction, which is almost equal to Payam moein, Iran study (Table IX).

**Table X: Comparison of incidence of benign & Malignant Tumours**

Sr. No.	Authors (Years)	Benign	Malignant
1.	Schellinger Ka et al <sup>11</sup> (2007)	69%	31%
2.	Payam moein <sup>9</sup> , Iran (1992-2004)	80.4%	19.6%
3.	Present study	89%	11%

Benign tumours are more common as compared to malignant tumours, which is comparable to Schellinger and Payam moein study (Table X).

**Table XI: Comparison of Spinal tumours according to tumor location.**

Tumor location	Payam moein <sup>9</sup> Iran study			Present Study		
	Total Cases	Benign cases	Malignant Cases	Total Cases	Benign cases	Malignant Cases
Intadural Intramedullary	35%	83.30%	16.70%	23%	86.95%	13.05%
Intradural Extramedullary	45%	93.50%	6.50%	63%	98.41%	1.59%
Extradural	18%	45%	55%	14%	50%	50%
Mixed Extra Intradural	2%	-	-	-	-	-

In present study most common location of spinal tumours is Intradural extramedullary 63%. Followed by Intradural Intramedullary 23% which is quite comparable with earlier

study (Table XI). Malignant tumours were observed more frequently in extradural(50%) compared to intradural locations(14.64%) which is comparable with earlier study.

**Table XII Comparison of Spinal tumours according to tumor location**

Tumor location within spinal canal	Payam moein <sup>9</sup> study%	Present study%
Cervical	24	31
Thoracic	40	55
Lumbar	24	14
Sacral	6	0
Filum terminalis	6	0

Table XII shows that spinal tumours are more common in thoracic (55 %)region followed by cervical(31%) region, payam moein study shows that incidence is higher in thoracic region (40%). He also noticed equal incidence in cervical and lumbar region.

**Table XIII: Comparison of Relative frequency of different morphologic types of spinal tumours**

Morphologic type	Payam moein <sup>9</sup> study	Hirano k <sup>10</sup> et al	Present study %
Schwannoma	33.3%	57.2%	31%
Meningioma	14.7%	11.6%	24%
Ependymoma	22.5%	8%	8%
Astrocytoma	15.6%	10.8%	11%

Present study suggest that other tumours were more common in inextradural location 11 cases. Cases of hemangioma, hemangioblastoma, angioma, osteochondroma, NHL and Rare case of metastatic SCC were found in present as well as moein study and comparable with that. Cases of plasmacytoma, chordoma, neuroblastoma, medulloblastoma which were not found in present study but present moein study. The difference is due to geographical difference.

## SUMMARY

A histopathological study of spinal tumours was undertaken at Tertiary Care Teaching Hospital from April-2011 to November-2013.

- It was found that spinal tumor was most common during 3<sup>rd</sup> and 4<sup>th</sup> decade of life.
- It was found that overall spinal tumours are common in male as compare to female.
- Spinal Malignancy were more common in Female than Male.

- Benign tumours were more common than Malignant tumours.
- Spinal tumours were more common in intradural than extradural location,
- In present study most common location of spinal tumours is intradural extramedullary

## CONCLUSION

A histopathological study of spinal tumours was undertaken at Tertiary Care Teaching Hospital, Gujarat to know the occurrence of different types of spinal tumours and was correlated with other studies. A total of 100 cases were studied from April 2011 to November 2013 after routine tissue processing and H&E staining. The findings are as follows.

- The peak age of incidence of spinal tumours was between 21-40 years of age.
- Spinal tumours are more common in males(52%) than females(48%), with the male:female ratio 1.57:1.
- Local pain was the commonest mode of presentation.
- Benign tumours (89%) are more common than malignant tumours (11%).
- Spinal tumours more commonly located in intradural (86%) than extradural(14%) locations. Malignant tumours mostly located on extradural locations(7%) than intradural locations(4%).
- Within spinal cord spinal tumours are more commonly located in thoracic (55%)region followed by cervical region(31%).
- Malignant tumours were more common in thoracic region (63.63%)
- Among spinal tumours, schwannoma(31%) is the most common followed by meningioma(24%), astrocytoma (11%), neurofibroma (8%) and ependymoma (8%). Hemangioma and lipoma are relatively less common.

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**NOTE:** The present study tumours was undertaken at Tertiary Care Teaching Hospital, Gujarat to know the occurrence of different types of spinal tumours. In the Present Study, all operated cases; excised bipsies and resected specimens are taken into consideration. Biopsies & whole tumours specimens were taken from admitted patients in different wards of our institute, which are with prior consent of the patients. Ethical committee clearance has not been required as confidentiality of patient's details not been published.

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