



# Magnetic resonance imaging for diagnosing vertebral vascular tumors in Dhi Qar

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## Abstract

**Background:** The vertebral hemangiomas are the most common benign spinal neoplasms has been differently reported from 10 to 27% based on autopsy series, plain X-rays and MRI reviews.

**Patients and method:** In this study, we reviewed consecutive 700 standard spinal MRI with axial and sagittal T<sub>1</sub> weighted and T<sub>2</sub> weighted images looking for hemangiomas.

**Results:** In this study, the incidence of hemangioma was 26%, more common in females (31%) than males (18.5%), in older age group and in lumbar spine. Most hemangiomas (65%) were less than 10 mm in diameter. Multiple hemangiomas were seen in 33% of cases.

**Discussion:** The results of this study are similar to another Mediterranean study reported based on MRI findings, but differ from other reports using X-ray or autopsy as diagnostic tool, suggesting the influence of either the race or the sensitivity of the diagnostic tool on the incidence of vertebral hemangioma.

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## Introduction

The advent of magnetic resonance imaging (MRI) has modified many medical concepts and thrown light on many normal and abnormal medical situations; one such is vertebral hemangiomas. Spinal hemangiomas are the most common benign spinal neoplasm often located in the thoracic and lumbar spine with a peak incidence of occurrence in the fourth to six decades [1-3]. These lesions can involve only a portion of or the entire vertebral body and are multiple in one third of the cases [4, 5]. Bone hemangiomas are usually asymptomatic lesions discovered incidentally on imaging or post-mortem examination [1]. Symptomatic vertebral hemangiomas are rare and represent less than 1% of all

hemangiomas and cause pain, discomfort and neural compression [1,3] which if untreated, they can lead to serious neurological deficits [6]. Incidence of vertebral hemangioma has been reported from 10 to 27%, based on diagnostic modality including autopsy, plain radiographs and MRI [4,7,8]. Imaging appearance of hemangiomas can be pathognomonic and the diagnosis is made by radiologic studies [1,6], however most vertebral hemangiomas are small and cannot be seen on plain radiographs, MRI appearance of vertebral hemangioma is characteristic and small hemangiomas can be detected on MR images [5,9].

## Materials and Methods

In present study, 700 consecutive cases of spinal MRIs, who referred for spinal MRI



to Al-Hilla teaching Hospital MRI unit were enrolled. The cases were collected during a nine months period from October 2008 to June 2009. Apart from the indication of the MRI request and findings, they were looked concisely for the presence of vertebral hemangioma. MRI machine used type is 1.5 tesla Philips imager) using spinal coil for examination „with time repetition (TR ) is 1475 „time echo (TE ) is 120 „sequences used is spin echo (SE ) ,slice thickness is 4 mm , Standard axial and sagittal images with T<sub>1</sub>-W and T<sub>2</sub>-W protocols without contrast injection were obtained (There were 462(66%) lumbar MRI, 233(29%) cervical MRI and 35(5%) thoracic MRI. If any hemangioma was found, extra data including their size, count and vertebral level was recorded.

## Results

### MRI appearance

The characteristic MRI appearances of vertebral haemangiomas are as follows:

- Hyperintense region in the vertebral body on T<sub>1</sub>W and T<sub>2</sub>W images because of the fatty matrix [10,11].
- The matrix shows hypointense areas due to bony trabeculation or vascular channels [11].
- Vertebral haemangiomas always have a relation to the course of the basivertebral vessels and their anastomosis with intraspinal and paraspinal vessels [12].
- Haemangiomas may be discrete and well defined or diffuse and ill defined
- They may be single or multiple.

A hemangioma may involve the whole vertebral body ;in this case it can be seen by X-ray .

The age distribution of the enrolled 700 cases ranged from 24 years to 77 years (mean: 50.7 years), 399 (57%) being females and 301 (43%) were males Figure(1).

Hemangioma was found in 182 (26%) cases. It was seen more common in females (n = 126; 31%) than males (n = 56 (18.5%). The incidences of hemangioma

increased with age of the cases and about (42%) of the cases are at their 6<sup>th</sup> decade then it declines in the 7<sup>th</sup> and 8<sup>th</sup> decade Figure (2). In this study, the lumbar region was the most common involved region and the occurrence of hemangioma in the lumbar, thoracic, sacral and cervical spine were 69, 30,11 and 3%, respectively Figure(3). Multiple hemangiomas were found in 33%, most of them having two-three lesions and in six patients more than six hemangiomas were found.

Most of the hemangiomas were small sized (less than 10 mm) and only 10 hemangiomas were larger than 20 mm .

### Discussion

Vertebral hemangioma is extra ordinarily common, the reported incidences ranged from 10-27% in adults [1-5]. The incidence varies depending on the diagnostic modality used; 10.7% in one large autopsy report [7], 10-12% in a large population based study using plain X-ray [8] and 27% in a cross sectional study using MRI as the diagnostic tool [14].

The characteristic radiographic appearance is of a sclerotic or ivory vertebra with coarse thickened vertical trabeculae having a corduroy appearance. On CT scan the thickened trabeculae are seen in cross section as small punctuate areas of sclerosis often called the polka-dot appearance [1,5,9]. On MR imaging most of the hemangiomas are high signal on T<sub>1</sub> weighted (T<sub>1</sub>-W) or T<sub>2</sub> weighted (T<sub>2</sub>-W) images and areas of trabecular thickening have low signal, regardless of the pulse sequences used. The presence of high signal intensity on T<sub>1</sub>-W or T<sub>2</sub>-W images of vertebral hemangioma is related to the amount of adipocytes or vessels and interstitial edema respectively [15]. The T<sub>2</sub> hyperintensity is typically greater than of fat, thereby differentiating hemangiomas from focal fat deposition. These signal characteristics also differ from those of metastatic lesions which have decreased signal intensity on T<sub>1</sub>-W



images and increased signal intensity on T<sub>2</sub>-W images [1,9,15,16]. The signal intensities of typical hemangiomas sometimes could be indeterminate, but the morphology of the lesion including the presence of coarse trabeculae, can be used to make the diagnosis [9].

The increased use of MR imaging as a whole body diagnostic tool allows more frequent detection of hemangiomas, either incidentally or as a clinical indication to characterize a tumor or to document the extent of the anomaly [17]. MRI is also the imaging modality of choice when evaluating a complicated hemangioma with neurologic abnormality [18]

Incidence of vertebral hemangioma in our series was 26%, which was similar to Hiari *et al.* (1998)(14) which was conducted in Jordan, who also had used MRI as the diagnostic tool, but was different from other studies, which were based on autopsy or X-ray. The difference in the incidence could either be due to the sensitivity of the tools or the geographic and genetic base of the population. Both studies using MRI have been done in eastern population, while the other two studies were in western countries. To solve this conflict a large study using spinal MRI is recommended.

In this study, spinal hemangiomas were found more common in the lumbar spine, which was similar to Hiari *et al.* (1998)[14] and followed by the thoracic cervical and sacral regions. In some other reports thoracic or thoraco-lumbar spine was the dominant site of vertebral hemangioma [1-4, 13] these reports come from western countries.

The other findings in present study like the increased incidence of spinal hemangiomas in the elderly and female cases and the multiplicity of the lesions are similar to the literature apart from one point that is the incidence increases with age just like other studies reaching a peak at the sixth decade but then the incidence will decline unlike Hiare et

al[14] who expressed increased incidence with older age and this finding was similar to these derived from western reports[4,13,19].

The difference in our findings can be explained by the low number of patients examined at the age of 60 years and above.

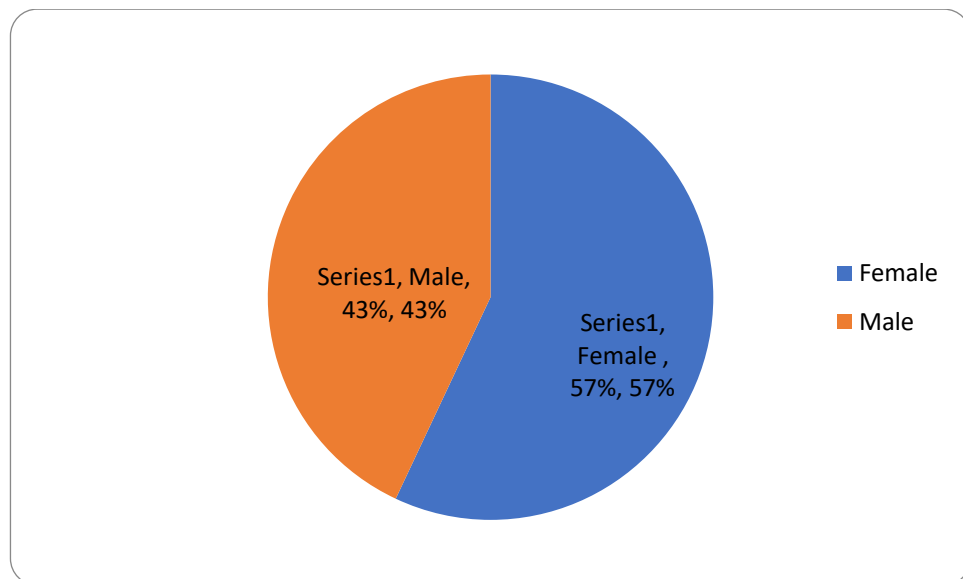
It seems wise to recommend studying the incidence of vertebral hemangioma using MRI in multiple geographic areas to find out the real worldwide burden of the lesion.

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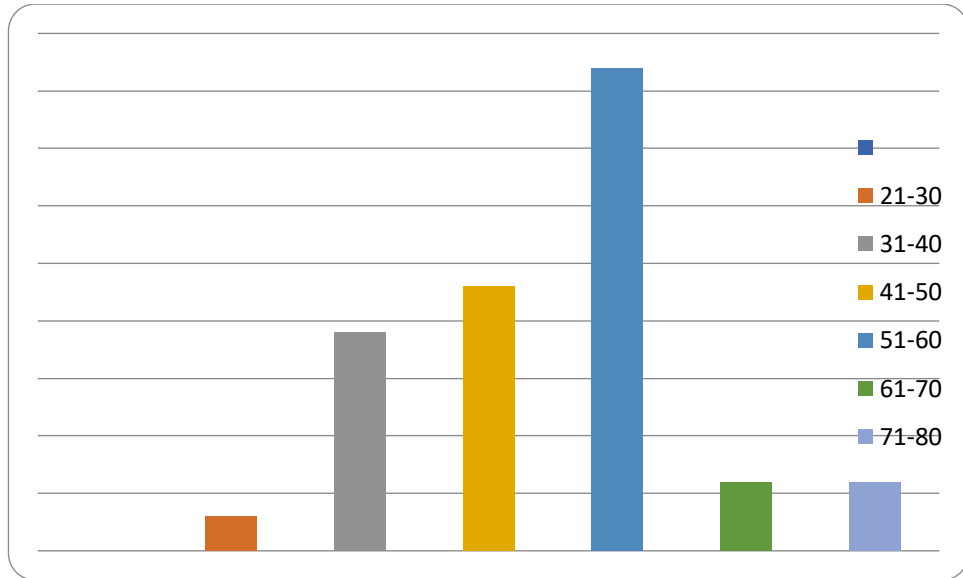


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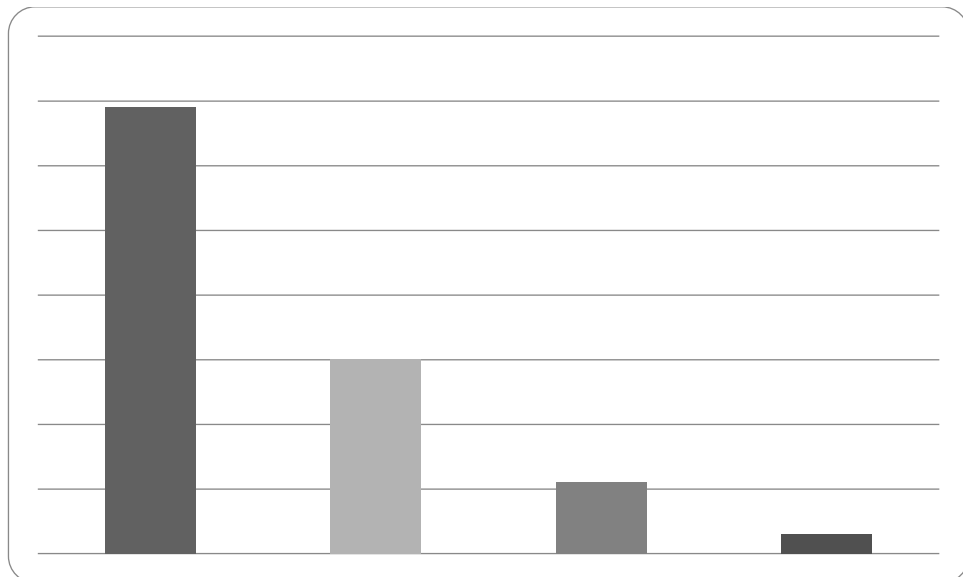


**Figure 1** Distribution of cases between males and females





**Figure 2** The Percentile Age distribution of Cases



**Figure 3** Frequency of Distribution of hemangioma between different vertebral levels

