

Original article:

Anatomical Basis of Low Back Pain

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Abstract:

Introduction: Low back ache is one of the commonest complaints of patients coming to the Out Patient department. Patients from urban setups are rescued from the agonizing tribulations of severe back aches because of easy access to various multi-speciality hospitals. The rural population at the same time does not have ease of access to such secondary and tertiary health care, thereby causing anguish for lengthy periods of time. The present study aims to study the surface landmarks of lumbosacral region and to correlate them with conditions causing low back ache.

Materials and methods: The study was a cross sectional study including 163 patients in the age group of 30-60 years, (100 males and 63 females) with complaints of low back pain for more than 1 week, from the Orthopaedics department of Sri Manakula Vinayagar Medical College and Hospital, Puducherry constituted the study population. Measurements were taken and reported in terms of mean and range noted in the given condition.

Results: The significant findings noted were; Spinal length, lateral rotation and posterior rotation are commonly affected in all conditions. Distance between spine and Venus dimple is significant in lateral protrusion of Inter vertebral disc. Movements are restricted to a maximum in cases of lumbar disc protrusion and lumbar canal stenosis.

Conclusion: The present study gives an idea as to the measures which are reduced in various conditions. Additional studies have to be done in detail regarding severity of each of these factors causing back ache. The study will ultimately be useful for the rural population where a diagnosis can be made up to a certain extent and thus delineate a proper line of investigation or treatment depending on the clinical finding itself.

Keywords: low back ache, surface landmarks, lumbo sacral region

Introduction:

Low back ache is a very common cause of concern and anguish to people world over. The diagnosis of the affecting condition is usually made by clinical examination and radiological findings. In a country like ours, where the majority of the population subsists in villages with poor transport and communication to multi- speciality clinics and hospitals, it is essential to identify definite criteria for diagnosing various conditions with the help of

clinical examination. One cannot argue that a confirmatory diagnosis can be made without the help of radiological investigations; however, efforts can be made to distinguish those markers which can be measured easily and which will come in handy to diagnose and relieve the distress and pain of patients, especially people prevailing from the rural areas.

Impairment of the back and spine are the most frequent cause of limitation of activity^[1]. The

spinal cord terminates in a bulbous enlargement at the conus medullaris at the level of the first lumbar vertebra^[2]. The lumbar spinal column provides mobility of flexion, extension, lateral flexion and rotation and posture. It is made up of basic units called 'vertebral motor units'.

It consists of two adjacent vertebral bodies separated by the intervertebral disc anteriorly and diarthroidal facet joint posteriorly^[3].

The degeneration of intervertebral disc shows dehydration and fraying of the nucleus pulposus and also the formation of tears within the annulus pulposus^[4].

Chronic low back pain, defined as pain symptoms persisting beyond three months. The diagnostic approach and therapeutic options are diverse and often inconsistent, resulting in rising costs^[5].

Thus the present study is expected to be useful, especially for physicians in a rural setup, to analyze a case of low back pain. The present study was planned to study the surface landmarks of lumbosacral region and to correlate them with conditions causing low back ache

Materials and methods:

Patients from Orthopaedics department of Sri Manakula Vinayagar Medical College and Hospital, Puducherry were included in the study. The study was a cross sectional study. 163 patients in the age group of 30- 60 years, (100 males and 63 females) with complaints of low back pain for more than 1 week constituted the study population. Patients with underlying fracture vertebra or congenital anomalies were excluded from the study.

The following lengths are measured:

- Lumbar spinal length from L1 to L5 (normal 10 cm)
- L5 to Venous dimple (normal 5 cm)

- T12 to Venous dimple (normal 15 cm)
- Spinal flexion length

Measurement of movements:

Spinal flexion length- The end of measuring tape is kept constant at T12 spine. The patient was first asked to stand in erect posture. Later the patient was asked to bend forward by requesting the patient to touch his/ her feet. Distance between the T12 spine and a point between the dimples of Venus, which lie directly over the sacroiliac joints. The difference of length between upright posture and spinal flexion is normally 5 cm^[6, 7].

Lateral Flexion- The subject's head is marked on the wall in erect posture and later at maximum lateral flexion by telling the patient to touch the knee with the hand; the angulation is measured by a protractor. Normally it is about 30 degrees^[6, 7].

Posterior Flexion: The subject's head is marked on the wall in erect posture and later at maximum posterior flexion; the angulation is measured by protractor. It is normally about 25 degrees^[6, 7].

Spinal rotation: Spinal axial rotation is marked by the differential movement of shoulder tip. The rotation occurring at the thoracic region is about 40 degrees but the actual lumbar rotation is only 5 degrees^[6, 7].

Statistical analysis: Descriptive statistics will be reported in percentages. Lumbar spinal length, flexion length, distance between T12 spine to Venous dimple, distance between L5 spine to Venous dimple, lateral flexion, posterior flexion, spinal rotation will be reported in means with standard deviation and compared to normal quoted values.

Results:

The results are reported with the help of tables depicting mean values and range.

Table 1: Mean values of measurements of length and movement as recorded in different conditions

Sl. No	Condition	Measurement of length			Measurement of movement			
		Lumbar spinal length in cm	Flexion length in cm	Distance b/w T12- Venus dimple in cm	Distance b/w L5- Venus dimple	Lateral flexion in degrees	Posterior flexion in degrees	Spinal rotation in degrees
1	low back ache	9.8	4.3	4.7	14.5	28.6	21.4	36.9
2.	lumbo sacral strain	9.2	4.1	4.8	14.2	27.5	24.4	33.6
3.	lumbar spondylosis	9.8	3.7	5	15.4	24.5	18.4	24.9
4.	lumbar disc herniation	9.1	3.3	5.3	14	11.7	7.4	17.1
5.	lumbar canal stenosis	9.8	2.3	4.4	13.2	16.2	16.3	26.1

Table 2: Range of values of measurements of length and movement as recorded in different conditions

Sl. No	Name	Measurement of length				Measurement of movement		
		Lumbar spinal length in cm	Flexion length in cm	Distance b/w T12- Venus dimple	Distance b/w L5- Venus dimple	Lateral flexion in degrees	Posterior flexion in degrees	Spinal rotation in degrees
1	low back ache	9.3- 10.1	4.1- 5.1	4.2- 5.1	14.1- 15.1	21- 29	15- 25	31- 41
2	lumbo sacral strain	8.5- 10.2	3.1- 5.1	3.1- 5.1	21- 15.1	21- 30	20- 25	31- 40
3	lumbar spondylosis	9- 10.2	3.0- 4.0	4.1- 5.1	14- 15.2	20- 29	14- 22	20- 39
4	lumbar disc herniation	6.9- 8.1	2.7- 3.1	4.2- 4.7	12.1- 14.1	12-15	06- 10	15- 18
5	lumbar canal stenosis	9.2- 10.1	1.6- 3.6	4.1- 4.7	12- 14.6	15- 24	10-21	15- 24

The significant findings noted were as follows;

Spinal length, lateral rotation and posterior rotation are commonly affected in all conditions.

Distance between spine and Venus dimple is significant in lateral protrusion of Inter vertebral disc.

Spinal rotation is not a true index, since lumbar rotation is only 5 cm.

Movements are restricted to a maximum in cases of lumbar disc protrusion and lumbar canal stenosis.

Discussion:

Low back ache is a common clinical ailment in the society. Back ache can occur as a result of a number of diseases. The diagnosis of these diseases is done via investigative procedures, which may at times give inconsistent results. The present study aims to identify and delineate some clinical surface markers that will help in identifying the various conditions causing back ache.

The basic anatomy of the vertebral column is such that the spines of the vertebrae can be easily demarcated on the back. Depending on their location, the spinal cord level and spinal nerve roots affected can also be identified.

In the present study, surface landmarks of the vertebral spine, distances between these landmarks and movements of the vertebral column have been studied and significant variations noted.

The landmarks identified were,

- Spine of L1
- Spine of L5
- Spine of T12
- Venus dimple (lies exactly at the sacro-iliac joint)

Measuring aids used were a measuring tape, a protractor and skin, wall marking pens.

The present study helps in;

- Making a clinical diagnosis
- Follow up after treatment
- Prognosis

The use of these markers will also help in a cost containment of diagnosis and treatment.

The role of this study especially involves the rural population, which does not have adequate access to radiological investigative procedures.

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The findings of this study indicate that the spinal flexion length is the most significant factor in making a diagnosis.

For e.g. the spinal flexion length is the least in lumbar canal stenosis (1.6- 3.6 cm), followed by lumbar disc herniation (2.7- 3.1 cm), lumbar Spondylosis (3.0- 4.0 cm) and lumbo sacral strain (3.1- 5.1 cm)

This indicates that a patient with minimal spinal flexion length must be suspected to be suffering from lumbar canal stenosis or lumbar disc herniation and conditions must be ruled out using further diagnosis. At the same time it is also important to note that the value may also indicate a severe form of a common etiology.

Other important findings were values of lateral and posterior flexion in degrees. It was noted as given in table 2 that the lateral and posterior flexion in degrees is significantly reduced in cases of lumbar disc herniation followed by those in lumbar canal stenosis.

Significant reduction in all measurements occurs in lumbar disc herniation and lumbar canal stenosis.

It was also recorded that the T12- Venus dimple distance is significant in lateral protrusion of disc.

Conclusion: The present study touches only the tip of the iceberg with regards to the vast number of etiologies of low back ache. The findings from the study will help out in diagnosing the condition causing low back ache to some extent especially in rural areas. Further investigation is required to ascertain the severity of the disease. Additional studies have to be done in detail regarding severity of each of these factors causing back ache.

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