

## Introduction

It is the inward curve of the lumbar spine and exclusive to humans

Extremely vital to facilitate an upright posture.

## Lumbar Lordosis

According to NHMS and MOH, incidence of low back pain is 12-60% in Malaysia

Deviation from the typical spinal curvature negatively impacts posture and causes low back pain (LBP)

Normal lordosis is variable hence, needs to be evaluated for every population

Influenced by ethnicity, age, gender, weight, body mass index (BMI), and flexibility

Lumbar lordosis finds significant relevance in fields of surgery, Physiotherapy, and ergonomics

Lumbar lateral X ray radiography is considered as a golden standard method worldwide in evaluating lumbar lordosis.

Understanding lumbar lordosis and its association with various demographic parameters can help create effective screening and rehabilitation measures for high risk groups in the population

## Objectives

- To examine the Lumbar Lordosis Angle (LLA) of adult Malaysians.
- To analyze its association with age, gender, Waist to Hip ratio (WHR), Body mass index (BMI) and Low back pain (LBP).

## Results

The mean lumbar lordosis angle (LLA) observed in the various demographic parameters are illustrated below:

N	Mean (in degrees)	Std. Deviation (in degrees)	Min (in degrees)	Max (in degrees)
86	40.6	11.7	14.2	68.0

Gender	N	Mean (in degrees)	Std. Deviation (in degrees)
Male	29	37.0	12.8
Female	57	42.5	10.8

Statistically Significant

WHR	N	Mean (in degrees)	Std. Deviation (in degrees)
Normal Male ≤ 0.95 Female ≤ 0.85	41	36.5	11.3
Obese Male ≥ 0.95 Female ≥ 0.85	45	44.4	10.9

Statistically Insignificant

Group No.	Age(yrs)	N	Mean (in degrees)	Std. Deviation (in degrees)
1	18-35	14	37.9	10.4
2	36-50	29	40.3	10.9
3	51-65	43	41.7	12.8

BMI groups	N	Mean (in degrees)	Std. Deviation (in degrees)
Normal (18.5 - 24.9)	17	41.8	10.6
Over Weight (25.0 - 29.9)	38	40.1	12.4
Obese (30.0 - 39.9)	27	40.5	12.3
Morbidity Obese ≥ 40	4	41.1	9.2

LBP group (using Visual Analog Scale - Wong Baker's Faces)	N	Mean (in degrees)	Std. Deviation (in degrees)
Mild	9	45.4	12.7
Moderate	42	40.1	10.8
Severe	35	40.0	12.6

- LLA has been observed to be significantly higher in female subjects and obese subjects in WHR groups.
- The variations in LLA among the other group parameters were statistically insignificant.

## Discussion

Assessment of Lumbar Lordosis angle (LLA) is an important prerequisite to determine the health of the spine. Deviation from the typical spinal curvature is known to negatively impact posture and cause low back pain (LBP). WHR exceeding 0.85 in females and 0.95 in males is considered to be a marker of central or abdominal obesity.

It can be observed in this study that female subjects and subjects with higher WHR have a significantly higher lumbar angle than the males and than subjects with normal WHR respectively. The results reflect the biological and anatomical gender variation of the lumbar lordosis in humans. They also demonstrate the impact of increased abdominal fat deposition on the lumbar curvature.

It was found that people with abdominal obesity carried twice the risk of lower back pain than those without abdominal obesity. The weight and expansion of the abdomen cause a change in the position of the center of gravity and the positioning of the spine, which multiplies the force required to carry out the efforts of daily activities and postural changes. This continued increase in strain in the lumbar spine may increase frequency and duration of low back pain. In addition, an increased lumbar lordosis angle (LLA) was also related to an increased risk of low back pain.

Thus, in females and in subjects with abdominal obesity, the effects of overload are cumulative and are further influenced by behaviors and habits associated with lifestyle thus putting them at greater risk for low back pain.

## Conclusion

- This study showed a significant statistical association of females and abdominally obese subjects with the lumbar lordosis angle in the sagittal plane.
- Several earlier studies have indicated a positive association that links increased lumbar curvature and abdominal obesity as risk factors for the development of low back pain.
- Statistics from MOH, Malaysia have also shown an increasing trend of abdominal obesity and low back pain in Malaysians.
- The Mean LLA values of various demographic parameters observed in this study can serve as a baseline reference value for Malaysian population.
- It can be useful to identify the high risk groups within the population.
- Thus, it can help physiotherapists and orthopaedics in a general assessment of lumbar spine and plan rehabilitation strategies for vulnerable groups.

## Methods & Methodology

- This is a cross sectional, descriptive study.
- The data was collected by convenience sampling from selected 86 subjects with due consent.
- Ethical approval was obtained from NMRR & AUHEC
- Lumbosacral spine (LSS) lateral view digital X-rays of 86 Malaysian adults visiting Hospital Sultan Abdul Halim, Sungai Petani, Kedah, were examined.
- Inclusion Criteria:** Subjects between 18 to 65 years with an existing LSS X ray in Lateral view .
- Exclusion Criteria:** Pregnant women, subjects with physical disability, spinal deformities, history of spinal fractures, spinal pathology or surgeries and/ or subjects with BMI < 18.5.
- The total sample size of 86 was divided into – **3 age groups, 2 gender groups, 2 WHR groups, 4 BMI groups and 3 LBP groups**
- The mean LLA was measured using Cobb's method as shown in Figure 1.
- Variations in LLA according to age, gender, BMI, waist to hip ratio (WHR), and LBP were recorded and analyzed.
- Data Analysis:** All the data was analyzed using IBM Statistical Package for Social Sciences (SPSS) Version 22.
- Descriptive statistics were applied to arrive at the mean and standard deviation. Lumbar Lordosis Angle (LLA) was taken as the continuous variable.
- Independent T test was applied to compare the variations in all parameters in both the genders and in relation to WHR.
- Analysis of Variance (ANOVA) was used to analyze LLA in relation to age groups, BMI groups and LBP groups.
- Pearson Correlation and Spearman correlation test were used to assess the significance of variations in LLA in relation to the sex, BMI and WHR of the subjects.

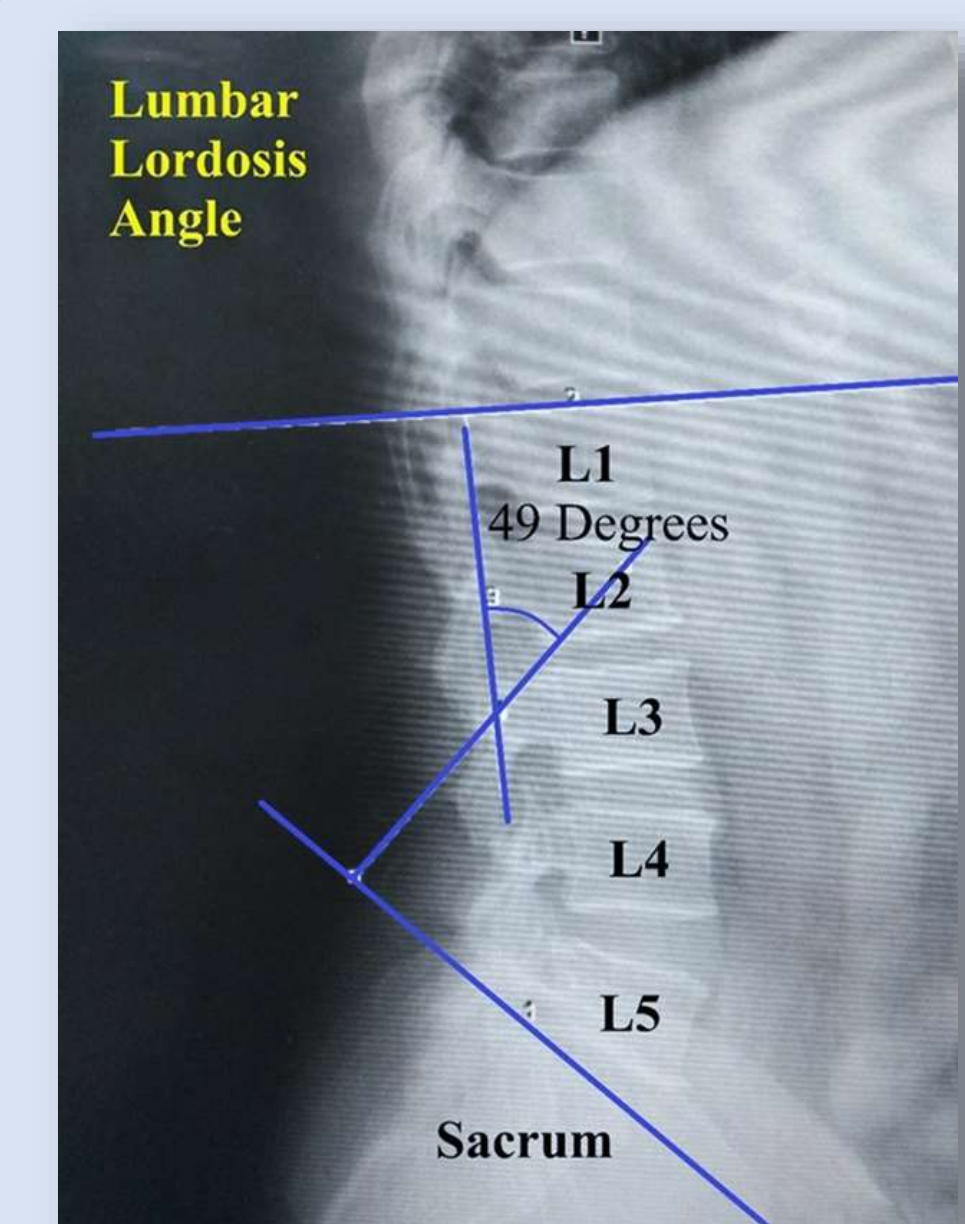


Figure 1. Measuring LLA using Cobbs method

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