

# Study of the Lumbosacral Angles of Males in Port Harcourt, South- South, Nigeria

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## ABSTRACT

**Background:** This study was carried out to evaluate the lumbosacral angles of males in the south south geopolitical region of Nigeria in the age group.

**Methods:** A total of 100 lumbosacral lateral radiographs of normal from subjects South South geopolitical region of Nigeria taken in the department of Radiology, UPTH were evaluated. The lumbosacral angles were measured using Ferguson's method.

**Results:** The mean lumbosacral angle in the sample population is  $36.1^{\circ} \pm 9.41^{\circ}$ . The lumbosacral angle was found to increase with age up to a maximum in the age group of 36-40 years. It remains fairly constant there after until the seventh decade.

**Conclusion:** The normal range of lumbosacral angles in Nigerians of South-South geopolitical zone is demonstrated and it does not increase significantly after the age 36-40 years.

## INTRODUCTION

The lumbosacral angle is the angle formed between the long axis of the lumbar vertebrae and the sacrum<sup>1</sup>. It is sometimes defined as the angle formed between the superior surface of the sacrum and the horizontal<sup>2</sup>. The weight borne by the cervical and thoracic vertebrae is transmitted to the lumbosacral spine. The lumbosacral joint also permits flexion, extension and rotation movements. It is thus subject to subluxation and frequent injuries and therefore important in assessment of back pain and in traumatic medicine<sup>3</sup>. The regions of the vertebral column where the greatest degree of permissible movements occurs are cervical and lumbar regions and they are the most frequent sites of disabling pains<sup>4</sup>. Approximately 10% of the population consult physicians each year on account of low back pain. More than 80% of people worldwide complain of backache during their lifetime<sup>5</sup>. Low back pain, which is a very common complaint, occurs typically in the 3<sup>rd</sup> through 6<sup>th</sup> decades of life<sup>6</sup>. The lumbosacral angle has been associated with some degree of instability and low back pain in the 3<sup>rd</sup> to 6<sup>th</sup> decades of life. Therefore knowledge of the range of normal lumbosacral angles is critical in management of low back pain. There is also racial bias in the normal angles<sup>7</sup>. There is therefore a need to evaluate lumbosacral angle with respect to age in healthy subjects. We decided to evaluate this angle in males because greater percentage of

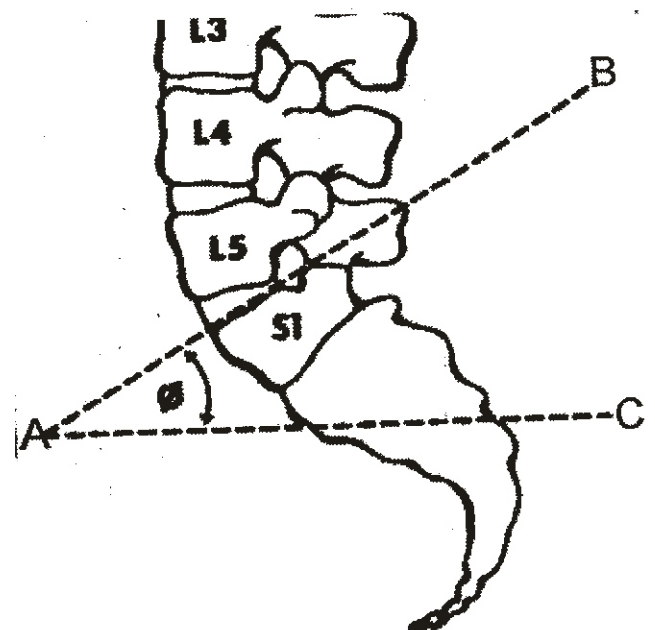
back pain and injuries are encountered in males than in females<sup>5</sup>.

## MATERIAL AND METHODS

This is a prospective study using 100 lumbosacral spine radiographs of normal male subjects from the Niger delta region or south south geopolitical region of Nigeria at the department of Radiology of the University of Port Harcourt Teaching Hospital (U.P.T.H). Exclusion criteria were subjects who were none indigenes of the South South geopolitical zone of Nigeria. The Ferguson's technique<sup>6</sup> was employed whereby the patient lies on his side with the long axis of the spine parallel to the long axis of the radiographic table. The film-focal distance was 90cm and moveable grid was used. The lateral projection of the lumbar spine was used giving lateral radiographs. All the lateral radiographs that were used had distant base of the sacrum, clearly visible inferior surface of the fifth lumbar vertebra, and proper alignment of the spinous process indicating satisfactory positioning.

The radiographs were mounted on the x-ray film viewing box. Thereafter, transparencies were placed over the radiographs. A straight line along the superior margin of the sacrum (S) was drawn to meet the horizontal line. The angle formed between the plane of the superior surface of S1 to the horizontal was measured using a protractor. This is Ferguson's method<sup>6</sup>. AB is a line tangent to the superior surface of the sacrum (S1). AC is a line drawn to the

Fig. 1



horizontal of the diagram (Figure 1). The data was analysed using SPSS version 16.

The angle formed between the planes of the superior surface of S1 to the horizontal plane was measured. This is the method Ferguson. AB is a line tangent to the superior surface of the sacrum.

S1, AC is a line drawn to the horizontal of the diagram.

**Table 1: Showing age and degree ranges, mean, standard deviation and error**

AGE GROUP	NO OF FILMS	RANGE (DEGREES)	MEAN	STANDARD DEVIATION	STANDARD ERROR
0-5	3	5-7	6.0	0.35	0.057
6-10	2	19	19.0	0.00	0.000
11-15	5	16-40	28.0	5.96	1.200
16-20	3	30-41	35.5	4.42	1.800
21-25	7	28-45	38.1	5.20	0.980
26-30	17	28-52	40.0	8.50	0.690
31-35	6	25-48	39.0	9.93	2.170
36-40	7	35-50	41.9	5.59	1.100
41-45	11	28-50	39.0	6.04	0.740
46-50	11	28-44	36.0	4.69	0.580
51-55	5	34-50	42.0	4.67	1.200
56-60	8	20-40	30.0	6.97	1.160
61-65	2	45-50	47.5	2.89	1.700
66-70	5	34-48	41.0	5.30	1.370
71-75	5	41-49	43.0	3.50	0.900

VARIANCE = 88.57  
 STANDARD DAVIATION = 9.41  
 STANDARD ERROR = 0.94  
 COEFFICIENT OF VARIATION = 26.07%  
 CONFIDENCE INTERVAL = 35.1 1.84

adapted from Hellems and Keats (1971)

The mean lumbo sacral angle in the sample population is  $36.1^{\circ} \pm 9.4^{\circ}$ . However, the lumbersacral angles show ranges within a given age bracket

The lumbo sacral angle was found to be greater in adults than in children below 14 years of age in the present study. The lumbo sacral angle increases after birth until puberty and attains a relatively constant range with minor variations between the age groups.

## DISCUSSION

The present study shows the mean lumbo sacral angle in the sample population to be  $36.1^{\circ} \pm 9.4^{\circ}$ . This finding is falls between the values recorded by Lusted and Keats<sup>8</sup>, Meshan<sup>9</sup> who reported angle of  $<34^{\circ}$  and Ferguson<sup>10</sup> and Friedman<sup>11</sup> who recorded an angle of  $<42^{\circ}$ . Mitchell<sup>7</sup> reported the lumbo sacral angle to be  $41^{\circ}$  while Splithoff<sup>12</sup> noted the angle to be  $40^{\circ}$ - $44^{\circ}$ . Von Lackum<sup>13</sup> reported the lumbo sacral angle in intact pelvis to be  $42.5^{\circ}$ . The aforementioned investigators measured the lumbo sacral angles in Caucasian population while the present study was done among black population in the south south geopolitical zone of Nigeria. The reason for the ranges of this angle even among a given race is not clear. However, constitutional build and activities of the muscles that act on the spine may be contributory .

However, Williams<sup>14</sup> reported the angle to be within a range of  $20^{\circ}$ - $80^{\circ}$ . Their measurements were carried out among

Caucasian population. Mitchell<sup>7</sup> measured the lumbo sacral angle in 28 subjects and found the average to be  $41^{\circ}$  but he did not state the method by which the radiographs were obtained. In this study, the radiographs were obtained with the patient in the left lateral position. It is noteworthy that when supine lateral and erect lateral are compared, there is usually an increase in the lumbo sacral angle between 8 to 12 degrees in erect position. In this study, we made sure that the long axis of the patient's 's' curved spine was parallel to the long axis of the roentgenographic table so as to obtain a valid or true lumbo sacral angle. Taking the radiograph with the patient in erect position will ensure that the patient's 'S' curved spine is parallel to the x-ray table.

The finding from the present study show that there was a steady increase in lumbo sacral angle with age up to a maximum age group 36-40 years. The angle remained fairly constant after age group 36-40 years until 7<sup>th</sup> decade of life. This is rather suprising because advancing age is associated with loss of normal lumbar lordosis<sup>15</sup>. Shane et al.<sup>16</sup> reported that the lumbo sacral angle at birth is  $20^{\circ}$ , but this angle increases to  $70^{\circ}$  by 5 years of age and thereafter remains constant.

Some flexibilities of this angle are possible due to age especially with the young as noted by Hutson<sup>17</sup>. He also noted that the abdominal muscles and gluteus maximus can actively decrease the angle. The lumbo sacral angle appears to be attributed to the ontogeny of bipedal position rather than obstetrical requirements. In humans who acquire bipedalism early in life, there is evidence of precocious formation of the lumbo sacral angle. For those who do not walk, walk late or have impaired gait due to disease ie poliomyelites, they develop only a very minimal lumbo sacral angle<sup>17</sup>. The stability at the lumbo sacral junction is favoured by a large lumbo sacral angle .

## Experimental Limitation and Sources of Error

There could have been slight variation in patient position from different radiographers. There is no doubt could likely limit the degree of accuracy of result. A few radiographs were not very clear. This affected sample population of radiographs selected for the study.

## CONCLUSION

Findings suggest that the mean lumbo sacral angle of males in black population is  $36^{\circ} \pm 9.4^{\circ}$  and that this angle does not increase significantly after age 36-40 years. The range of the lumbo sacral angles in males from South south Nigeria which is critical in management of back pains has been determined.

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