***Original Research Article***

# ASSESMENT OF PELVIC INCIDENCE ANGLE IN NORMALINDIAN POPULATION AND SPONDYLOLISTHESIS

**ABSTRACT**: There is increasing emphasis on the sagittal spino-pelvic alignment and its interpretation is of critical importance in the management of spinal disorders. The vertebral column shows a vital role in the funding and locomotion of the human body. The judgment of normality can be made possible by analyzing the normal patterns of sagittal curvature and characteristics of each pattern of sagittal curvatures. In our study the control group which comprised of 50 healthy volunteers exhibited a minimum pelvic incidence of 33° and a maximum of 60° with an average of 50.12°. The minimum pelvic incidence in the study group was 42° and the maximum was 75°.The average pelvic incidence in the low grade listhesis group was 57.78° and in the high grade listhesis group it was 64.75°.The combined average of pelvic incidence angle in the study group was 58.34°and only one patient had a Pelvic incidence Angle of 75 degrees and the remaining three were only one patient had a Pelvic incidence Angle of 75 degrees and the remaining three were below 65 degrees. The objective of this study is to observe the parameters of sagittal and spino-pelvic balance in a sample of the Indian population consisting of volunteer asymptomatic individuals.

**Keywords**: **pelvic, listhesis, sagittal spino-pelvic, curvatures, Pelvic incidence Angle**

INTRODUCTION:

Pelvic vertebra is the key point connecting the trunk and the posterior limbs. As the femoral heads are mobile, it is a significant part in the orientation of the pelvic vertebra. The surface and the mandatory point is the point where the vertebral column rest on the sacral plateau. The incidence angle is the main characteristics of the pelvic and this also becomes the reference angle.it becomes the major parameter in balancing the spine. Pelvic tilt is the angle between a vertical line and the CS segment. The normal pelvis is horizontal, with symmetrical points at equal height. However, the geometry of the sagittal pelvic position is more complex. Characterisation of the sagittal balance of the pelvis requires the definition of certain parameters based on notable biomechanical features involved in the transmission of constraints [1]. The "local" sagittal imbalance of the lumbosacral junction is compensated by adjacent mobile segments in the upper lumbar spine, the pelvis orientation and the thoracic spine. The result is a not optimal but a satisfactory global sagittalbalance of the trunk, even in the most severe grade of slipping.

As we know that isthmic spondylolisthesis has a multifactorial origin its incidence is 4-8% in general population. Aim of our study is to assess the pelvic incidence angle in normal Indianpopulation and Indian population with spondylolisthesis.

**Methodology:** We performed a prospective case–control study at Sree Balaji Medical College & Hospital, Chennai. A total of 50 normal volunteers without any history of back pain or any other spinal problems were included in this group-I and group II are patients with complaints of back pain or leg pain. Radiographs of the lumbar sacral spine were taken in anteroposterior view and in In group 2(study) additional to measuring the pelvic incidence,the spondylolisthesis was also graded.

**Patient inclusion criteria**

- ✓ Patients' age 18–45 years
- ✓ Patients with chronic low backache and lumbar degenerative disorders.
- ✓ Patients who have been operated for the above-mentioned pathology and are in the category of failed back syndrome, either because of persistent pain or requiring revision surgery or removal of the implant.

**Patient exclusion criteria**

- ✓ Patients with any other spinal pathology other than the above-mentioned.
- ✓ Patients unwilling to give consent
- ✓ Patients operated previously for any other spinal pathology.

The study was approved by the Institutional Ethics Committee. After obtaining a proper written informed consent, these participants were examined clinically by two independent spine surgeons and underwent radiographic examination to establish the normal values.

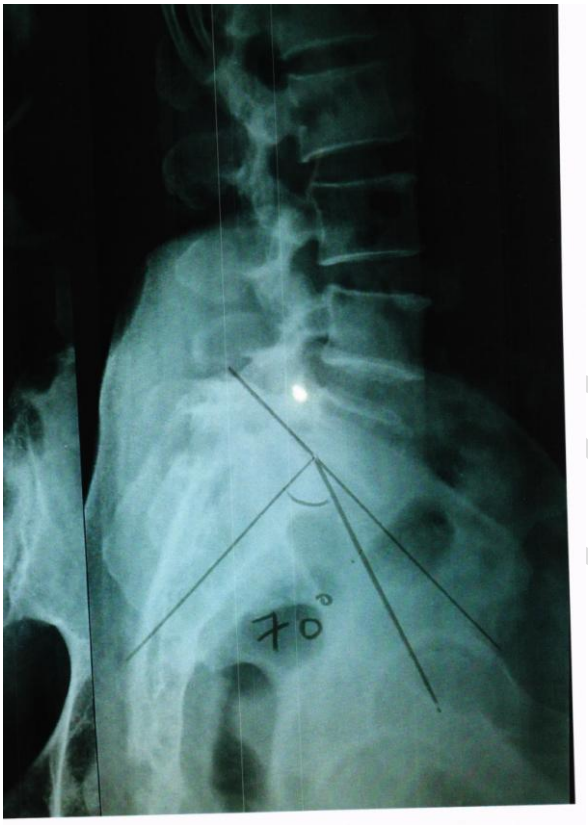
**Results and Discussion:**

In our study the control group which comprised of 50 healthy volunteers exhibited a minimum pelvic incidence of 33° and a maximum of 60° with an average of 50.12°,wherease in a study by G.Vaz et al the incidence was 33° to 85. From the study it was confirmed that the pelvic incidence was lowerein women than men.

In our study the study group consisted 50 patients with Isthmic spondylolisthesis who were sub divided into two groups,low grade spondylolisthesis group and high grade spondylolisthesis group.The minimum pelvic incidence in the study group was 42° and the maximum was 75°.The average pelvic incidence in the low grade listhesis group was 57.78° and in the high grade listhesis group it was 64.75°.The combined average of pelvic incidence angle in the study group was 58.34°.in a study performed by In a similar study by Hanson DS et al ,the incidence was 47.4 degrees. In the study group 4 patients had high grade listhesis,out of which only one patient had a Pelvic incidence Angle of 75 degrees and the remaining three were below 65 degree. We do support the theory that a high pelvic incidence predisposes an individual with spondylolysis to spondylolisthesis,however its prognostic role in assesing the severity of slip is doubtful.Our sample size might not be adequate,but in the study by Raphael Vialle et al it was observed that the pelvic incidence progressively increased in grade 1 to grade 3 spondylolisthesis group,but started showing a decline in the value in grade 4 and grade 5 groups.The reason for this was postulated as this phenomenon is secondary to forces on the cranial sacral endplate in grade 1, 2 and 3 patients. In Grade 4 and 5 patients, the loss of contact between the L5 vertebra and the sacral cranial endplate is responsible for a progressive sacral and pelvic retroversion. This phenomenon explains the vertical sacrum pattern in high-grade spondylolisthesis patients

Fig:1 Listhesis grade- grade 2

fig:2 Listhesis grade- grade 1





Mrs.E,48 yrs old female, PIA-70°

Mrs.E,50 yrs old Male, PIA-61°

Conclusion: In the study group the lowest pelvic incidence recorded was 42° and the maximum recorded was 75° with an average of 58.34°.ln the low grade spondylolisthesis group the average pelvic incidence was 57.78° and in the high grade

spondylolisthesis group it was 64.75°.Pelvic incidence is an important anatomical parameter in regulating the sagittal curvature of spine.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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