Mini Review
Volume 12:02, 2023

Journal of Spine

ISSN: 2165-7939 Open Access

Vertebral Landmark Labelling on Lumbar Spine X-ray Images: Reliability Analysis

Gtila Chawla*

Department of Simulation Medicine, University of Punjab, Chandigarh, India

Abstract

Lumbar spine X-ray images are commonly used for diagnosing and evaluating spinal disorders. Accurate identification and labelling of vertebral landmarks on these images play a crucial role in clinical assessments, surgical planning, and research studies. However, the manual process of landmark labelling is prone to inter-observer variability, which can affect the reliability and validity of the measurements. This article explores the importance of reliable vertebral landmark labelling on lumbar spine X-ray images and discusses the methods and challenges associated with achieving consistency.

Keywords: Neuromuscular scoliosis • Anesthesia • Spondylosurgery • Spine

Introduction

Vertebral landmark labelling involves identifying specific anatomical points on the lumbar spine X-ray images. These landmarks are crucial for various clinical measurements, including assessing spinal curvature, vertebral alignment, disc height, and intervertebral distances. Accurate and consistent labelling is essential to ensure the reliability and reproducibility of these measurements, which are often used to guide treatment decisions, monitor disease progression, and compare research findings [1,2]. Manual Landmark Labelling: The traditional approach involves manual identification and labelling of vertebral landmarks by trained observers. This process requires expertise and knowledge of anatomical structures. However, inter-observer variability can arise due to differences in interpretation, experience, and skill level among observers. This variability may lead to inconsistent measurements and affect the reliability of the labelling [3]. Observer variability, computer-assisted methods have been developed. These methods utilize image processing and computer vision techniques to automate or semi-automate the landmark labelling process. Computer algorithms can detect and locate vertebral landmarks based on predefined anatomical features, edge detection, or machine learning approaches. This approach offers the potential for increased accuracy and reproducibility in landmark labelling.

Literature Review

Reliability analysis is a statistical method used to evaluate the consistency and agreement between multiple observers or measurements. In the context of vertebral landmark labelling, reliability analysis helps assess the inter-observer variability and determine the level of agreement among different observers or between manual and computer-assisted labelling methods. ICC measures the degree of agreement among multiple observers or measurements. A high ICC value (close to 1) indicates good agreement, while a low value suggests variability. ICC can be calculated for individual landmarks or composite measures involving multiple landmarks.

Discussion

Bland-Altman analysis is used to assess the agreement between two measurement methods, such as manual and computer-assisted labelling. It involves plotting the difference between the measurements against their average. The analysis helps identify systematic biases, limits of agreement, and any proportional or fixed biases that may exist between the two methods [4]. Consistency in landmark labelling requires training and standardization among observers. Training programs should ensure that observers understand the anatomical structures, landmarks, and labelling protocols. Regular calibration sessions and inter-observer agreement assessments can help maintain consistency over time. The lumbar spine exhibits natural anatomical variations among individuals, such as differences in vertebral shape, size, and orientation. These variations can pose challenges in landmark labelling, as the locations and appearances of landmarks may differ between patients. Robust algorithms or manual adjustments may be necessary to account for these variations and ensure accurate labelling [5,6]. Conducting validation studies comparing manual and computer-assisted labelling methods is essential to establish the accuracy and reliability of computer algorithms. These studies involve assessing the level of agreement, potential biases, and the impact of automation on measurement variability. Validation against a gold standard, such as expert manual labelling, can provide insights into the performance of the computer-assisted methods.

Conclusion

Reliable vertebral landmark labelling on lumbar spine X-ray images is crucial for accurate clinical assessments and research studies. While manual labelling has been the traditional approach, computer-assisted methods offer potential benefits in terms of consistency and reproducibility. Reliability analysis plays a key role in evaluating the consistency and agreement between observers or measurement methods. Overcoming challenges related to training, standardization, anatomical variations, image quality, and validation can lead to improved reliability in vertebral landmark labelling. By ensuring consistent and accurate labelling, clinicians and researchers can enhance the reliability and validity of measurements derived from lumbar spine X-ray images, ultimately benefiting patient care and advancing scientific understanding of spinal disorders.

***Address for Correspondence:** Gtila Chawla, Department of Simulation Medicine, University of Punjab, Chandigarh, India, E-mail: gitlac@gmail.com*

Received: 03 April, 2023, Manuscript No. jsp-23-95811; **Editor Assigned:** 05 April, 2023, PreQC No. P-95811; **Reviewed:** 17 April, 2023, QC No. Q-95811; **Revised:** 22 April, 2023, Manuscript No. R-95811; **Published:** 29 April, 2023, DOI: 10.37421/2165-7939.2023.12.585

Acknowledgement

None.

Conflict of Interest

None.

References

1. Berthonnaud, Eric, Joannes Dimnet, Pierre Roussouly and Hubert Labelle. "Analysis of the sagittal balance of the spine and pelvis using shape and orientation parameters." *Clin Spine Surg* 18 (2005): 40-47.
2. Jang, Jun-Su, Joong Il Kim, Boncho Ku and Jin-Hyun Lee. "Reliability analysis of vertebral landmark labelling on lumbar spine x-ray images." *Diagn* 13 (2023): 1411.
3. Safari, A., H. Parsaei, A. Zamani and B. Pourabbas. "A semi-automatic algorithm for estimating cobb angle." *J Biomed Phys Eng* 9 (2019): 317-326.
4. Keenan, Bethany E., Maree T. Izatt, Geoffrey N. Askin and Robert D. Labrom, et al. "Sequential magnetic resonance imaging reveals individual level deformities of vertebrae and discs in the growing scoliotic spine." *Spine Deform* 5 (2017): 197-207.
5. Lechner, Ricarda, David Putzer, Dietmar Dammerer and Michael Liebensteiner, et al. "Comparison of two-and three-dimensional measurement of the Cobb angle in scoliosis." *Int Orthop* 41 (2017): 957-962.
6. Lee, Timothy Tin-Yan, Wei Wei Jiang, Connie Lok Kan Cheng and Kelly Ka-Lee Lai, et al. "A novel method to measure the sagittal curvature in spinal deformities: The reliability and feasibility of 3-D ultrasound imaging." *Ultrasound Med Biol* 45 (2019): 2725-2735.

How to cite this article: Chawla, Gtila. "Vertebral Landmark Labelling on Lumbar Spine X-ray Images: Reliability Analysis." *J Spine* 12 (2023): 585.