

## Daftar Pustaka

- Akkawi, I., & Zmerly, H. (2021). *Degenerative Spondylolisthesis : A Narrative Review*. 92. <https://doi.org/10.23750/abm.v92i6.10526>
- Almeer, G., Azzopardi, C., Kho, J., Gupta, H., James, S. L., & Botchu, R. (2020). Anatomy and pathology of facet joint. *Journal of Orthopaedics*, 22(April), 109–117. <https://doi.org/10.1016/j.jor.2020.03.058>
- Anastasia, A., Sukmaningtyas, H., Priambodo, A., & Setiawati, E. (2022). Analysis of Risk Factors Affecting Lumbal Facet Joint Osteoarthritis in Mri Scan. *Diponegoro Medical Journal (Jurnal Kedokteran Diponegoro)*, 11(1), 19–23. <https://doi.org/10.14710/dmj.v11i1.32588>
- Barreras, D. M. T. (2006). Spinal Degeneration and Aging. *The Back Letter*, 21(12), 134. <https://doi.org/10.1097/00130561-200612000-00003>
- Bierry, G., Kremer, S., Kellner, F., Abu Eid, M., Bogorin, A., & Dietemann, J. L. (2008). Disorders of paravertebral lumbar muscles: From pathology to cross-sectional imaging. *Skeletal Radiology*, 37(11), 967–977. <https://doi.org/10.1007/s00256-008-0494-8>
- Boxal, D., Bradford, D. S., Winter, R. . (1979). *Management of Severe Spondylolisthesis in Children and Adolescence*. 1979.
- Bydon, M., Alvi, M. A., & Goyal, A. (2019). Degenerative Lumbar Spondylolisthesis Definition , Natural History , Conservative Management , and Surgical Treatment Degenerative spondylolisthesis Management Low back pain Spine surgery. *Neurosurgery Clinics of NA*, 30(3), 299–304. <https://doi.org/10.1016/j.nec.2019.02.003>
- Chou, P. H., Lin, H. H., Yao, Y. C., Wang, S. T., Chang, M. C., & Liu, C. L. (2021). Preoperative facet joint arthropathy does not impact long-term clinical outcomes after lumbar-stability-preserving decompression and dynesys fixation. *Scientific Reports*, 11(1), 1–9. <https://doi.org/10.1038/s41598-021-90967-0>
- Chua, M., Salame, K., Khashan, M., Ofir, D., Hochberg, U., Ankory, R., Lidar, Z., &

- Regev, G. J. (2022). Facet overhang: A novel parameter in the pathophysiology of multifidus muscle atrophy. *Clinical Anatomy*, 35(8), 1123–1129. <https://doi.org/10.1002/ca.23923>
- Cooper, R. G., Forbes, W. S. C., & Jayson, M. I. V. (1992). Radiographic demonstration of paraspinal muscle wasting in patients with chronic low back pain. *Rheumatology*, 31(6), 389–394. <https://doi.org/10.1093/rheumatology/31.6.389>
- Cui, J., Zhou, R., Tian, N., Sui, X., Huang, M., Hao, D., & Xu, W. (2021). Correlation between lower lumbar multifidus muscles fatty atrophy and corresponding level degenerative diseases in patients with low back pain using MRI. *Chinese Journal of Academic Radiology*, 4(1), 63–70. <https://doi.org/10.1007/s42058-021-00054-6>
- Danneels, L., Vanderstraeten, G., Cambier, D., Witvrouw, E., & De Cuyper, H. (2000). CT imaging of trunk muscles. *Eur Spine J*, 9, 266–272.
- Dzefi-Tetty, K., Edzie, E. K. M., Mensah, S. K., Osei, S., Pierson, A. D., Amedi, M. K., Asemah, A. R., & Kusodzi, H. (2023). Lumbar facet joint arthrosis on magnetic resonance imaging and its association with low back pain in a selected Ghanaian population. *Journal of Neurosciences in Rural Practice*, 14(4), 681–685. [https://doi.org/10.25259/JNRP\\_94\\_2023](https://doi.org/10.25259/JNRP_94_2023)
- Evans, D. P. (1982). Osteoarthritis of the facet joints. *Backache: Its Evolution and Conservative Treatment*, 9(4), 157–159. [https://doi.org/10.1007/978-94-011-6672-0\\_14](https://doi.org/10.1007/978-94-011-6672-0_14)
- Faur, C., Patrascu, J. M., Haragus, H., & Anglitoiu, B. (2019). Correlation between multifidus fatty atrophy and lumbar disc degeneration in low back pain. *BMC Musculoskeletal Disorders*, 20(1), 414. <https://doi.org/10.1186/s12891-019-2786-7>
- Frost, B. A., Camarero-Espinosa, S., & Johan Foster, E. (2019). Materials for the spine: Anatomy, problems, and solutions. *Materials*, 12(2), 1–41. <https://doi.org/10.3390/ma12020253>

- Fujiwara, A., Lim, T. H., An, H. S., Tanaka, N., Jeon, C. H., Andersson, G. B. J., & Haughton, V. M. (2000). The effect of disc degeneration and facet joint osteoarthritis on the segmental flexibility of the lumbar spine. *Spine*, *25*(23), 3036–3044. <https://doi.org/10.1097/00007632-200012010-00011>
- Goethem JWM, V., Den Hauwe, V. L., & Belder, D. F. (2014). *Radiologic imaging of facet joints. 1.*
- Hides, J. A., Richardson, C. A., & Jull, G. A. (1996). Multifidus muscle recovery is not automatic after resolution of acute, first-episode low back pain. In *Spine* (Vol. 21, Issue 23, pp. 2763–2769). <https://doi.org/10.1097/00007632-199612010-00011>
- Indices of Paraspinal Muscles Degeneration: Reliability and Association with Facet Joint Osteoarthritis: Feasibility Study. Kalichman L, Klindukhov A, Li L, Linov L. J Spinal Disord Tech 2013 Apr 3. [Epub ahead of print]. (2013). *The Spine Journal*, *13*(11), 1712. <https://doi.org/10.1016/j.spinee.2013.10.010>
- Iorio, J. A., Jakoi, A. M., & Singla, A. (2016). Biomechanics of degenerative spinal disorders. *Asian Spine Journal*, *10*(2), 377–384. <https://doi.org/10.4184/asj.2016.10.2.377>
- Ishimoto, Y., Cooper, C., Ntani, G., Yamada, H., Hashizume, H., Nagata, K., Muraki, S., Tanaka, S., Yoshida, M., Yoshimura, N., & Walker-Bone, K. (2019). Is radiographic lumbar spondylolisthesis associated with occupational exposures? Findings from a nested case control study within the Wakayama spine study. *BMC Musculoskeletal Disorders*, *20*(1), 1–8. <https://doi.org/10.1186/s12891-019-2994-1>
- J.A., H., M.J., S., M., S., G.A., J., & D.H., C. (1994). Evidence of lumbar multifidus muscle wasting ipsilateral to symptoms in patients with acute/subacute low back pain. In *Spine* (Vol. 19, Issue 2, pp. 165–172). <http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L24047305>
- Jacobsen, S., Sonne-Holm, S., Røvsing, H., Monrad, H., & Gebuhr, P. (2007). Degenerative lumbar spondylolisthesis: An epidemiological perspective - The Copenhagen Osteoarthritis Study. *Spine*, *32*(1), 120–125.

<https://doi.org/10.1097/01.brs.0000250979.12398.96>

- Kader, D. F., Wardlaw, D., & Smith, F. W. (2000). Correlation between the MRI changes in the lumbar multifidus muscles and leg pain. *Clinical Radiology*, 55(2), 145–149. <https://doi.org/10.1053/crad.1999.0340>
- Kapetanakis, S., & Gkantsinikoudis, N. (2021). Anatomy of lumbar facet joint: A comprehensive review. *Folia Morphologica (Poland)*, 80(4), 799–805. <https://doi.org/10.5603/FM.A2020.0122>
- Ko, S., Vaccaro, A. R., Lee, S., Lee, J., & Chang, H. 2. (2014). The prevalence of lumbar spine facet joint osteoarthritis and its association with low back pain in selected Korean populations. *CiOS Clinics in Orthopedic Surgery*, 6(4), 385–391. <https://doi.org/10.4055/cios.2014.6.4.385>
- Kong, M. H., Morishita, Y., He, W., Miyazaki, M., Zhang, H., Wu, G., Hymanson, H. J., & Wang, J. C. (2009). Lumbar segmental mobility according to the grade of the disc, the facet joint, the muscle, and the ligament pathology by using kinetic magnetic resonance imaging. *Spine*, 34(23), 2537–2544. <https://doi.org/10.1097/BRS.0b013e3181b353ea>
- Lee, E. T., Lee, S. A., Soh, Y., Yoo, M. C., Lee, J. H., & Chon, J. (2021). Association of lumbar paraspinal muscle morphometry with degenerative spondylolisthesis. *International Journal of Environmental Research and Public Health*, 18(8). <https://doi.org/10.3390/ijerph18084037>
- Lee, H. J., Lim, W. H., Park, J. W., Kwon, B. S., Ryu, K. H., Lee, J. H., & Park, Y. G. (2012). The relationship between cross sectional area and strength of back muscles in patients with chronic low back pain. *Annals of Rehabilitation Medicine*, 36(2), 173–181. <https://doi.org/10.5535/arm.2012.36.2.173>
- Lefebvre, C. W., Babich, J. P., Grendell, J. H., Grendell, J. H., Heffner, J. E., Thibault, R., Pichard, C., Monnet, X., Teboul, J.-L., Sinderby, C. A., Beck, J., Onugha, O. I., Spain, D. A., Bensard, D. D., Partrick, D. A., Asensio, J. A., Verde, J. M., Yeh, D. D., Cohen, M., ... Muizelaar, J. P. (2012). Population Based. *Encyclopedia of Intensive Care Medicine*, 33(23), 1785–1785. [https://doi.org/10.1007/978-3-642-00418-6\\_3253](https://doi.org/10.1007/978-3-642-00418-6_3253)

- Leon, L. Wiltse, P.H., N. (n.d.). *Classification of Spondylolysis and Spondylolisthesis*.
- Matsunaga, S., Ijiri, K., & Hayashi, K. (2000). Nonsurgically managed patients with degenerative spondylolisthesis: A 10- to 18-year follow-up study. *Journal of Neurosurgery*, 93(2 SUPPL.), 194–198. <https://doi.org/10.3171/spi.2000.93.2.0194>
- Noonan, A. M., & Brown, S. H. M. (2021). Paraspinal muscle pathophysiology associated with low back pain and spine degenerative disorders. *JOR Spine*, 4(3), 1–12. <https://doi.org/10.1002/jsp2.1171>
- Pendleton, B., Carl, B., & Pollay, M. (1983). Spinal extradural benign synovial or ganglion cyst: case report and review of the literature. In *Neurosurgery* (Vol. 13, Issue 3, pp. 322–326). <https://doi.org/10.1227/00006123-198309000-00021>
- Permatasari, D., Jamaliyah, R., Khoirunnisa, E., & Lubis, S. M. A. (2022). Curiosity and Learning Motivation Toward Self-Regulated Learning Among Undergraduate Students. *AXIOM: Jurnal Pendidikan Dan Matematika*, 11(1), 48. <https://doi.org/10.30821/axiom.v11i1.10987>
- Perolat, R., Kastler, A., Nicot, B., Pellat, J. M., Tahon, F., Attye, A., Heck, O., Boubagra, K., Grand, S., & Krainik, A. (2018). Facet joint syndrome: from diagnosis to interventional management. *Insights into Imaging*, 9(5), 773–789. <https://doi.org/10.1007/s13244-018-0638-x>
- Section 15 Chapter 1: Degenerative Spondylolisthesis – Pathogenesis, Natural History and Classifications: Wheeless' Textbook of Orthopaedics*. (n.d.). Retrieved October 27, 2023, from <https://www.wheelessonline.com/issls/section-15-chapter-1-degenerative-spondylolisthesis-pathogenesis-natural-history-and-classifications/>
- Section 2. Chapter 10: Function and Dysfunction of the Facet Joint: Wheeless' Textbook of Orthopaedics*. (n.d.). Retrieved October 27, 2023, from <https://www.wheelessonline.com/issls/section-2-chapter-10-function-and-dysfunction-of-the-facet-joint/>
- Sengupta, D. K., & Herkowitz, H. N. (2005). Degenerative spondylolisthesis: Review

of current trends and controversies. *Spine*, 30(6 SPEC. ISS.), 71–81.  
<https://doi.org/10.1097/01.brs.0000155579.88537.8e>

Simmonds, A. M., Rampersaud, Y. R., Dvorak, M. F., Dea, N., Melnyk, A. D., & Fisher, C. G. (2015). Defining the inherent stability of degenerative spondylolisthesis: A systematic review. *Journal of Neurosurgery: Spine*, 23(2), 178–189.  
<https://doi.org/10.3171/2014.11.SPINE1426>

Studies, B. (2020). *RELIABILITY OF WIDE CANAL SIGN IN DIFFERENTIATING BETWEEN DEGENERATIVE FROM ISTHAMIC* Dr Ravindra R Kalode , 2 Dr Swapnil Nawasthale Assistant Professor , Department of Radiodiagnosis , Dr Panjabrao Deshmukh Memorial Medical College , Amravati ( Maharashtra. 154–156.

Sun, D., Liu, P., Cheng, J., Ma, Z., Liu, J., & Qin, T. (2017). Correlation between intervertebral disc degeneration, paraspinal muscle atrophy, and lumbar facet joints degeneration in patients with lumbar disc herniation. *BMC Musculoskeletal Disorders*, 18(1), 1–7. <https://doi.org/10.1186/s12891-017-1522-4>

Teichtahl, A. J., Urquhart, D. M., Wang, Y., Wluka, A. E., Wijethilake, P., O’Sullivan, R., & Cicuttini, F. M. (2015). Fat infiltration of paraspinal muscles is associated with low back pain, disability, and structural abnormalities in community-based adults. *Spine Journal*, 15(7), 1593–1601.  
<https://doi.org/10.1016/j.spinee.2015.03.039>

wahyudhy utama, harry, Rahardjo dr Sp. Rad (K), P., & setiawati, rosy. (2022). Degenerative Spondylolisthesis Factors at Level L4–5: MR Imaging Findings. *International Journal of Research Publications*, 105(1), 644–653.  
<https://doi.org/10.47119/ijrp1001051720223627>

Wang, X., Jia, R., Li, J., Zhu, Y., Liu, H., Wang, W., Sun, Y., Zhang, F., Guo, L., & Zhang, W. (2021). Research Progress on the Mechanism of Lumbar multifidus Injury and Degeneration. *Oxidative Medicine and Cellular Longevity*, 2021.  
<https://doi.org/10.1155/2021/6629037>

Wang, Y. X. J., Káplár, Z., Deng, M., & Leung, J. C. S. (2017). Lumbar degenerative spondylolisthesis epidemiology: A systematic review with a focus on gender-

- specific and age-specific prevalence. *Journal of Orthopaedic Translation*, 11, 39–52. <https://doi.org/10.1016/j.jot.2016.11.001>
- Weishaupt, D., Zanetti, M., Boos, N., & Hodler, J. (1999). MR imaging and CT in osteoarthritis of the lumbar facet joints. *Skeletal Radiology*, 28(4), 215–219. <https://doi.org/10.1007/s002560050503>
- Woodham, M., Woodham, A., Skeate, J. G., & Freeman, M. (2014). *Long-Term Lumbar Multifidus Muscle Atrophy Changes Documented With Magnetic Resonance Imaging: A Case Series*. 5, 27–34. <https://doi.org/10.3941/jrcr.v8i5.1401>
- Yang, Q., Yan, D., Wang, L., Li, K., Liang, W., Zhang, W., Dong Liu, Y., Li, X. M., Blake, G. M., Konerth, N., Cheng, X., Tian, W., & Hind, K. (2022). Muscle fat infiltration but not muscle cross-sectional area is independently associated with bone mineral density at the lumbar spine. *British Journal of Radiology*, 95(1134). <https://doi.org/10.1259/bjr.20210371>
- Zeng, P., Wu, S., Han, Y., Liu, J., Zhang, Y., Zhang, E., Zhang, Y., Gong, H., Pang, J., Tang, Z., Liu, H., Zheng, X., & Zhang, T. (2015). Differences in body composition and physical functions associated with sarcopenia in Chinese elderly: Reference values and prevalence. *Archives of Gerontology and Geriatrics*, 60(1), 118–123. <https://doi.org/10.1016/j.archger.2014.08.010>
- Zhang, Y., Mandelli, F., Mündermann, A., Nüesch, C., Kovacs, B., Schären, S., & Netzer, C. (2021). Association between fatty infiltration of paraspinal muscle, sagittal spinopelvic alignment and stenosis grade in patients with degenerative lumbar spinal stenosis. *North American Spine Society Journal*, 5(December 2020), 100054. <https://doi.org/10.1016/j.xnsj.2021.100054>
- Zhou, X., Liu, Y., Zhou, S., Fu, X. X., Yu, X. L., Fu, C. L., Zhang, B., & Dai, M. (2016). The correlation between radiographic and pathologic grading of lumbar facet joint degeneration. *BMC Medical Imaging*, 16(1), 1–8. <https://doi.org/10.1186/s12880-016-0129-9>
- Zwambag, D. P., Ricketts, T. A., & Brown, S. H. M. (2014). Sarcomere length organization as a design for cooperative function amongst all lumbar spine

- muscles. *Journal of Biomechanics*, 47(12), 3087–3093. <https://doi.org/10.1016/j.jbiomech.2014.06.030>
- Akkawi, I., & Zmerly, H. (2021). *Degenerative Spondylolisthesis : A Narrative Review*. 92. <https://doi.org/10.23750/abm.v92i6.10526>
- Almeer, G., Azzopardi, C., Kho, J., Gupta, H., James, S. L., & Botchu, R. (2020). Anatomy and pathology of facet joint. *Journal of Orthopaedics*, 22(April), 109–117. <https://doi.org/10.1016/j.jor.2020.03.058>
- Anastasia, A., Sukmaningtyas, H., Priambodo, A., & Setiawati, E. (2022). Analysis of Risk Factors Affecting Lumbal Facet Joint Osteoarthritis in Mri Scan. *Diponegoro Medical Journal (Jurnal Kedokteran Diponegoro)*, 11(1), 19–23. <https://doi.org/10.14710/dmj.v11i1.32588>
- Barreras, D. M. T. (2006). Spinal Degeneration and Aging. *The Back Letter*, 21(12), 134. <https://doi.org/10.1097/00130561-200612000-00003>
- Bierry, G., Kremer, S., Kellner, F., Abu Eid, M., Bogorin, A., & Dietemann, J. L. (2008). Disorders of paravertebral lumbar muscles: From pathology to cross-sectional imaging. *Skeletal Radiology*, 37(11), 967–977. <https://doi.org/10.1007/s00256-008-0494-8>
- Boxal.D, Bradford, D.S, Winter, R. . (1979). *Management of Severe Spondylolisthesis in Children and Adolescence*. 1979.
- Bydon, M., Alvi, M. A., & Goyal, A. (2019). Degenerative Lumbar Spondylolisthesis Definition , Natural History , Conservative Management , and Surgical Treatment Degenerative spondylolisthesis Management Low back pain Spine surgery. *Neurosurgery Clinics of NA*, 30(3), 299–304. <https://doi.org/10.1016/j.nec.2019.02.003>
- Chou, P. H., Lin, H. H., Yao, Y. C., Wang, S. T., Chang, M. C., & Liu, C. L. (2021). Preoperative facet joint arthropathy does not impact long-term clinical outcomes after lumbar-stability-preserving decompression and dynesys fixation. *Scientific Reports*, 11(1), 1–9. <https://doi.org/10.1038/s41598-021-90967-0>
- Chua, M., Salame, K., Khashan, M., Ofir, D., Hochberg, U., Ankory, R., Lidar, Z., &



- Regev, G. J. (2022). Facet overhang: A novel parameter in the pathophysiology of multifidus muscle atrophy. *Clinical Anatomy*, 35(8), 1123–1129. <https://doi.org/10.1002/ca.23923>
- Cooper, R. G., Forbes, W. S. C., & Jayson, M. I. V. (1992). Radiographic demonstration of paraspinal muscle wasting in patients with chronic low back pain. *Rheumatology*, 31(6), 389–394. <https://doi.org/10.1093/rheumatology/31.6.389>
- Cui, J., Zhou, R., Tian, N., Sui, X., Huang, M., Hao, D., & Xu, W. (2021). Correlation between lower lumbar multifidus muscles fatty atrophy and corresponding level degenerative diseases in patients with low back pain using MRI. *Chinese Journal of Academic Radiology*, 4(1), 63–70. <https://doi.org/10.1007/s42058-021-00054-6>
- Danneels, L., Vanderstraeten, G., Cambier, D., Witvrouw, E., & De Cuyper, H. (2000). CT imaging of trunk muscles. *Eur Spine J*, 9, 266–272.
- Dzefi-Tetty, K., Edzie, E. K. M., Mensah, S. K., Osei, S., Pierson, A. D., Amedi, M. K., Asemah, A. R., & Kusodzi, H. (2023). Lumbar facet joint arthrosis on magnetic resonance imaging and its association with low back pain in a selected Ghanaian population. *Journal of Neurosciences in Rural Practice*, 14(4), 681–685. [https://doi.org/10.25259/JNRP\\_94\\_2023](https://doi.org/10.25259/JNRP_94_2023)
- Evans, D. P. (1982). Osteoarthritis of the facet joints. *Backache: Its Evolution and Conservative Treatment*, 9(4), 157–159. [https://doi.org/10.1007/978-94-011-6672-0\\_14](https://doi.org/10.1007/978-94-011-6672-0_14)
- Faur, C., Patrascu, J. M., Haragus, H., & Anglitoiu, B. (2019). Correlation between multifidus fatty atrophy and lumbar disc degeneration in low back pain. *BMC Musculoskeletal Disorders*, 20(1), 414. <https://doi.org/10.1186/s12891-019-2786-7>
- Frost, B. A., Camarero-Espinosa, S., & Johan Foster, E. (2019). Materials for the spine: Anatomy, problems, and solutions. *Materials*, 12(2), 1–41. <https://doi.org/10.3390/ma12020253>

- Fujiwara, A., Lim, T. H., An, H. S., Tanaka, N., Jeon, C. H., Andersson, G. B. J., & Haughton, V. M. (2000). The effect of disc degeneration and facet joint osteoarthritis on the segmental flexibility of the lumbar spine. *Spine*, *25*(23), 3036–3044. <https://doi.org/10.1097/00007632-200012010-00011>
- Goethem JWM, V., Den Hauwe, V. L., & Belder, D. F. (2014). *Radiologic imaging of facet joints. 1.*
- Hides, J. A., Richardson, C. A., & Jull, G. A. (1996). Multifidus muscle recovery is not automatic after resolution of acute, first-episode low back pain. In *Spine* (Vol. 21, Issue 23, pp. 2763–2769). <https://doi.org/10.1097/00007632-199612010-00011>
- Indices of Paraspinal Muscles Degeneration: Reliability and Association with Facet Joint Osteoarthritis: Feasibility Study. Kalichman L, Klindukhov A, Li L, Linov L. J Spinal Disord Tech 2013 Apr 3. [Epub ahead of print]. (2013). *The Spine Journal*, *13*(11), 1712. <https://doi.org/10.1016/j.spinee.2013.10.010>
- Iorio, J. A., Jakoi, A. M., & Singla, A. (2016). Biomechanics of degenerative spinal disorders. *Asian Spine Journal*, *10*(2), 377–384. <https://doi.org/10.4184/asj.2016.10.2.377>
- Ishimoto, Y., Cooper, C., Ntani, G., Yamada, H., Hashizume, H., Nagata, K., Muraki, S., Tanaka, S., Yoshida, M., Yoshimura, N., & Walker-Bone, K. (2019). Is radiographic lumbar spondylolisthesis associated with occupational exposures? Findings from a nested case control study within the Wakayama spine study. *BMC Musculoskeletal Disorders*, *20*(1), 1–8. <https://doi.org/10.1186/s12891-019-2994-1>
- J.A., H., M.J., S., M., S., G.A., J., & D.H., C. (1994). Evidence of lumbar multifidus muscle wasting ipsilateral to symptoms in patients with acute/subacute low back pain. In *Spine* (Vol. 19, Issue 2, pp. 165–172). <http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L24047305>
- Jacobsen, S., Sonne-Holm, S., Røvsing, H., Monrad, H., & Gebuhr, P. (2007). Degenerative lumbar spondylolisthesis: An epidemiological perspective - The Copenhagen Osteoarthritis Study. *Spine*, *32*(1), 120–125.

<https://doi.org/10.1097/01.brs.0000250979.12398.96>

- Kader, D. F., Wardlaw, D., & Smith, F. W. (2000). Correlation between the MRI changes in the lumbar multifidus muscles and leg pain. *Clinical Radiology*, 55(2), 145–149. <https://doi.org/10.1053/crad.1999.0340>
- Kapetanakis, S., & Gkantsinikoudis, N. (2021). Anatomy of lumbar facet joint: A comprehensive review. *Folia Morphologica (Poland)*, 80(4), 799–805. <https://doi.org/10.5603/FM.A2020.0122>
- Ko, S., Vaccaro, A. R., Lee, S., Lee, J., & Chang, H. 2. (2014). The prevalence of lumbar spine facet joint osteoarthritis and its association with low back pain in selected Korean populations. *CiOS Clinics in Orthopedic Surgery*, 6(4), 385–391. <https://doi.org/10.4055/cios.2014.6.4.385>
- Kong, M. H., Morishita, Y., He, W., Miyazaki, M., Zhang, H., Wu, G., Hymanson, H. J., & Wang, J. C. (2009). Lumbar segmental mobility according to the grade of the disc, the facet joint, the muscle, and the ligament pathology by using kinetic magnetic resonance imaging. *Spine*, 34(23), 2537–2544. <https://doi.org/10.1097/BRS.0b013e3181b353ea>
- Lee, E. T., Lee, S. A., Soh, Y., Yoo, M. C., Lee, J. H., & Chon, J. (2021). Association of lumbar paraspinal muscle morphometry with degenerative spondylolisthesis. *International Journal of Environmental Research and Public Health*, 18(8). <https://doi.org/10.3390/ijerph18084037>
- Lee, H. J., Lim, W. H., Park, J. W., Kwon, B. S., Ryu, K. H., Lee, J. H., & Park, Y. G. (2012). The relationship between cross sectional area and strength of back muscles in patients with chronic low back pain. *Annals of Rehabilitation Medicine*, 36(2), 173–181. <https://doi.org/10.5535/arm.2012.36.2.173>
- Lefebvre, C. W., Babich, J. P., Grendell, J. H., Grendell, J. H., Heffner, J. E., Thibault, R., Pichard, C., Monnet, X., Teboul, J.-L., Sinderby, C. A., Beck, J., Onugha, O. I., Spain, D. A., Bensard, D. D., Partrick, D. A., Asensio, J. A., Verde, J. M., Yeh, D. D., Cohen, M., ... Muizelaar, J. P. (2012). Population Based. *Encyclopedia of Intensive Care Medicine*, 33(23), 1785–1785. [https://doi.org/10.1007/978-3-642-00418-6\\_3253](https://doi.org/10.1007/978-3-642-00418-6_3253)

- Leon, L. Wiltse, P.H., N. (n.d.). *Classification of Spondylolysis and Spondylolisthesis*.
- Matsunaga, S., Ijiri, K., & Hayashi, K. (2000). Nonsurgically managed patients with degenerative spondylolisthesis: A 10- to 18-year follow-up study. *Journal of Neurosurgery*, 93(2 SUPPL.), 194–198. <https://doi.org/10.3171/spi.2000.93.2.0194>
- Noonan, A. M., & Brown, S. H. M. (2021). Paraspinal muscle pathophysiology associated with low back pain and spine degenerative disorders. *JOR Spine*, 4(3), 1–12. <https://doi.org/10.1002/jsp2.1171>
- Pendleton, B., Carl, B., & Pollay, M. (1983). Spinal extradural benign synovial or ganglion cyst: case report and review of the literature. In *Neurosurgery* (Vol. 13, Issue 3, pp. 322–326). <https://doi.org/10.1227/00006123-198309000-00021>
- Permatasari, D., Jamaliyah, R., Khoirunnisa, E., & Lubis, S. M. A. (2022). Curiosity and Learning Motivation Toward Self-Regulated Learning Among Undergraduate Students. *AXIOM: Jurnal Pendidikan Dan Matematika*, 11(1), 48. <https://doi.org/10.30821/axiom.v11i1.10987>
- Perolat, R., Kastler, A., Nicot, B., Pellat, J. M., Tahon, F., Attye, A., Heck, O., Boubagra, K., Grand, S., & Krainik, A. (2018). Facet joint syndrome: from diagnosis to interventional management. *Insights into Imaging*, 9(5), 773–789. <https://doi.org/10.1007/s13244-018-0638-x>
- Section 15 Chapter 1: Degenerative Spondylolisthesis – Pathogenesis, Natural History and Classifications: Wheeless' Textbook of Orthopaedics*. (n.d.). Retrieved October 27, 2023, from <https://www.wheelessonline.com/issls/section-15-chapter-1-degenerative-spondylolisthesis-pathogenesis-natural-history-and-classifications/>
- Section 2. Chapter 10: Function and Dysfunction of the Facet Joint: Wheeless' Textbook of Orthopaedics*. (n.d.). Retrieved October 27, 2023, from <https://www.wheelessonline.com/issls/section-2-chapter-10-function-and-dysfunction-of-the-facet-joint/>
- Sengupta, D. K., & Herkowitz, H. N. (2005). Degenerative spondylolisthesis: Review

of current trends and controversies. *Spine*, 30(6 SPEC. ISS.), 71–81.  
<https://doi.org/10.1097/01.brs.0000155579.88537.8e>

Simmonds, A. M., Rampersaud, Y. R., Dvorak, M. F., Dea, N., Melnyk, A. D., & Fisher, C. G. (2015). Defining the inherent stability of degenerative spondylolisthesis: A systematic review. *Journal of Neurosurgery: Spine*, 23(2), 178–189.  
<https://doi.org/10.3171/2014.11.SPINE1426>

Studies, B. (2020). *RELIABILITY OF WIDE CANAL SIGN IN DIFFERENTIATING BETWEEN DEGENERATIVE FROM ISTHAMIC* Dr Ravindra R Kalode , 2 Dr Swapnil Nawasthale Assistant Professor , Department of Radiodiagnosis , Dr Panjabrao Deshmukh Memorial Medical College , Amravati ( Maharashtra. 154–156.

Sun, D., Liu, P., Cheng, J., Ma, Z., Liu, J., & Qin, T. (2017). Correlation between intervertebral disc degeneration, paraspinal muscle atrophy, and lumbar facet joints degeneration in patients with lumbar disc herniation. *BMC Musculoskeletal Disorders*, 18(1), 1–7. <https://doi.org/10.1186/s12891-017-1522-4>

Teichtahl, A. J., Urquhart, D. M., Wang, Y., Wluka, A. E., Wijethilake, P., O’Sullivan, R., & Cicuttini, F. M. (2015). Fat infiltration of paraspinal muscles is associated with low back pain, disability, and structural abnormalities in community-based adults. *Spine Journal*, 15(7), 1593–1601.  
<https://doi.org/10.1016/j.spinee.2015.03.039>

wahyudhy utama, harry, Rahardjo dr Sp. Rad (K), P., & setiawati, rosy. (2022). Degenerative Spondylolisthesis Factors at Level L4–5: MR Imaging Findings. *International Journal of Research Publications*, 105(1), 644–653.  
<https://doi.org/10.47119/ijrp1001051720223627>

Wang, X., Jia, R., Li, J., Zhu, Y., Liu, H., Wang, W., Sun, Y., Zhang, F., Guo, L., & Zhang, W. (2021). Research Progress on the Mechanism of Lumbar multifidus Injury and Degeneration. *Oxidative Medicine and Cellular Longevity*, 2021.  
<https://doi.org/10.1155/2021/6629037>

Wang, Y. X. J., Káplár, Z., Deng, M., & Leung, J. C. S. (2017). Lumbar degenerative spondylolisthesis epidemiology: A systematic review with a focus on gender-

- specific and age-specific prevalence. *Journal of Orthopaedic Translation*, 11, 39–52. <https://doi.org/10.1016/j.jot.2016.11.001>
- Weishaupt, D., Zanetti, M., Boos, N., & Hodler, J. (1999). MR imaging and CT in osteoarthritis of the lumbar facet joints. *Skeletal Radiology*, 28(4), 215–219. <https://doi.org/10.1007/s002560050503>
- Woodham, M., Woodham, A., Skeate, J. G., & Freeman, M. (2014). *Long-Term Lumbar Multifidus Muscle Atrophy Changes Documented With Magnetic Resonance Imaging: A Case Series*. 5, 27–34. <https://doi.org/10.3941/jrcr.v8i5.1401>
- Yang, Q., Yan, D., Wang, L., Li, K., Liang, W., Zhang, W., Dong Liu, Y., Li, X. M., Blake, G. M., Konerth, N., Cheng, X., Tian, W., & Hind, K. (2022). Muscle fat infiltration but not muscle cross-sectional area is independently associated with bone mineral density at the lumbar spine. *British Journal of Radiology*, 95(1134). <https://doi.org/10.1259/bjr.20210371>
- Zeng, P., Wu, S., Han, Y., Liu, J., Zhang, Y., Zhang, E., Zhang, Y., Gong, H., Pang, J., Tang, Z., Liu, H., Zheng, X., & Zhang, T. (2015). Differences in body composition and physical functions associated with sarcopenia in Chinese elderly: Reference values and prevalence. *Archives of Gerontology and Geriatrics*, 60(1), 118–123. <https://doi.org/10.1016/j.archger.2014.08.010>
- Zhang, Y., Mandelli, F., Mündermann, A., Nüesch, C., Kovacs, B., Schären, S., & Netzer, C. (2021). Association between fatty infiltration of paraspinal muscle, sagittal spinopelvic alignment and stenosis grade in patients with degenerative lumbar spinal stenosis. *North American Spine Society Journal*, 5(December 2020), 100054. <https://doi.org/10.1016/j.xnsj.2021.100054>
- Zhou, X., Liu, Y., Zhou, S., Fu, X. X., Yu, X. L., Fu, C. L., Zhang, B., & Dai, M. (2016). The correlation between radiographic and pathologic grading of lumbar facet joint degeneration. *BMC Medical Imaging*, 16(1), 1–8. <https://doi.org/10.1186/s12880-016-0129-9>
- Zwambag, D. P., Ricketts, T. A., & Brown, S. H. M. (2014). Sarcomere length organization as a design for cooperative function amongst all lumbar spine

muscles. *Journal of Biomechanics*, 47(12), 3087–3093.  
<https://doi.org/10.1016/j.jbiomech.2014.06.030>

# Lampiran

## Lampiran 1. Ethical Clearance



KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET DAN TEKNOLOGI  
 UNIVERSITAS HASANUDDIN FAKULTAS KEDOKTERAN  
 KOMITE ETIK PENELITIAN UNIVERSITAS HASANUDDIN  
 RSPTN UNIVERSITAS HASANUDDIN  
 RSUP Dr. WAHIDIN SUDIROHUSODO MAKASSAR  
 Sekretariat : Lantai 2 Gedung Laboratorium Terpadu  
 JL.PERINTIS KEMERDEKAAN KAMPUS TAMALANREA KM.10 MAKASSAR 90245.  
 Contact Person: dr. Agusnalm Bukhari, MMed, PhD, SpGK. TELP. 081241850858, 0411 5780103, Fax : 0411-581431



### REKOMENDASI PERSETUJUAN ETIK

Nomor : 233/UN4.6.4.5.31/ PP36/ 2024

Tanggal: 4 April 2024

Dengan ini Menyatakan bahwa Protokol dan Dokumen yang Berhubungan Dengan Protokol berikut ini telah mendapatkan Persetujuan Etik :

No Protokol	UH24030191	No Sponsor	
Peneliti Utama	<b>dr. Chin Edward Chandra</b>	Sponsor	
Judul Peneliti	Hubungan antara Grading Infiltrasi Lemak Musculus Multifidus dan Derajat Facet Joint Arthropathy dengan Degenerative Spondylolisthesis pada MRI Vertebra Lumbosacral		
No Versi Protokol	<b>1</b>	Tanggal Versi	<b>22 Maret 2024</b>
No Versi PSP		Tanggal Versi	
Tempat Penelitian	RSUP Dr. Wahidin Sudirohusodo Makassar		
Jenis Review	<input type="checkbox"/> Exempted <input checked="" type="checkbox"/> Expedited <input type="checkbox"/> Fullboard Tanggal	Masa Berlaku <b>4 April 2024</b> sampai <b>4 April 2025</b>	Frekuensi review lanjutan
Ketua KEP Universitas Hasanuddin	<b>Prof. dr. Muh Nasrum Massi, PhD, SpMK, Subsp. Bakt(K)</b>	Tanda tangan	
Sekretaris KEP Universitas Hasanuddin	<b>dr. Firdaus Hamid, PhD, SpMK(K)</b>	Tanda tangan	

Kewajiban Peneliti Utama:

- Menyerahkan Amandemen Protokol untuk persetujuan sebelum di implementasikan
- Menyerahkan Laporan SAE ke Komisi Etik dalam 24 Jam dan dilengkapi dalam 7 hari dan Laporan SUSAR dalam 72 Jam setelah Peneliti Utama menerima laporan
- Menyerahkan Laporan Kemajuan (progress report) setiap 6 bulan untuk penelitian resiko tinggi dan setiap setahun untuk penelitian resiko rendah
- Menyerahkan laporan akhir setelah Penelitian berakhir
- Melaporkan penyimpangan dari prokol yang disetujui (protocol deviation / violation)
- Mematuhi semua peraturan yang ditentukan



## Lampiran 2. Data Sampel Penelitian

Usia	klinis	BMI	Pekerjaan	Riwayat Fisioterapi	Level Spondylolisthesis	Spinal Canal ratio	Grading spondylolisthesis	Grading Musculus multifidus	Derajat Facet joint arthropathy
58	LBP	20.9	Kontraktor (aktivitas ringan)	ada	L5/S1		0.57 grade I (4.7%)	grade II	derajat 1
52	LBP + kram kaki kanan	18.6	Guru (aktivitas ringan)	tidak ada	L4/L5		1.17 grade I (19%)	Grade I	derajat 2
58	LBP	20.3	Guru (aktivitas ringan)	ada	L4/L5		0.75 grade I (20%)	grade III	derajat 3
58	LBP	23	Guru (aktivitas ringan)	tidak ada	L4/L5		0.76 grade I (9%)	grade III	derajat 4
60	LBP	18.5	Guru (aktivitas ringan)	tidak ada	L5/S1		0.83 grade I (15%)	grade III	derajat 3
52	LBP	22	Guru (aktivitas ringan)	ada	L4/L5		0.86 grade I (7.9%)	Grade II	derajat 3
58	LBP	21	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L3/L4		0.8 grade I (8%)	Grade II	derajat 2
60	LBP	18.7	Guru (aktivitas ringan)	tidak ada	L4/L5		0.93 grade I (19%)	grade IV	derajat 3
52	LBP	19.2	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L3/L4		1 grade I (11%)	Grade III	derajat 2
50	LBP	20.2	Guru (aktivitas ringan)	tidak ada	L5/S1		0.76 grade I (17%)	Grade II	derajat 1
57	LBP	18	Nelayan (aktivitas berat)	tidak ada	L3/L4		1 grade I (6.6%)	grade II	derajat 2
74	LBP	19.7	Pensiunan (aktivitas ringan)	ada	L4/L5		0.77 grade I (5.3%)	grade I	derajat 2
50	LBP	18.6	Petani (aktivitas berat)	ada	L4/L5		1.08 grade I (8.5%)	grade II	derajat 2
55	LBP	22	Guru (aktivitas ringan)	tidak ada	L5/S1		0.85 grade I (12.5%)	Grade I	derajat 2
63	LBP	23	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L4/L5		0.81 grade I (14.7%)	grade IV	derajat 4
63	LBP	19.5	pedagang (aktivitas ringan)	tidak ada	L4/L5		0.92 grade I (15.4%)	Grade IV	derajat 4
52	LBP	23.1	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.75 grade I (9%)	Grade II	derajat 3
68	LBP	21.3	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L3/L4		0.75 Grade I (10%)	Grade II	derajat 3
63	LBP	19.2	Pedagang (aktivitas ringan)	tidak ada	L4/L5		0.86 Grade I (12.9%)	grade II	derajat 2
57	LBP	22.9	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		0.63 Grade I (9.4%)	Grade III	derajat 4
52	LBP	24	Pekerja kantor negeri sipil(aktivitas ringan)	ada	L3/L4		0.74 Grade I (12.4%)	grade III	derajat 4
51	LBP	22.7	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.58 grade I (11.7%)	Grade II	derajat 2
62	LBP	25.1	pedagang (aktivitas ringan)	tidak ada	L4/L5		0.82 grade I (10.4%)	grade III	derajat 2
74	LBP	26.4	Tidak bekerja (aktivitas ringan)	tidak ada	L4/L5		0.67 grade I (15%)	Grade III	derajat 3
59	LBP	23.3	Guru (aktivitas ringan)	ada	L3/L4		0.5 grade I (11.5%)	Grade II	derajat 3
50	LBP	22.9	Petani (aktivitas berat)	tidak ada	L5/S1		0.98 grade I (4.6%)	Grade II	derajat 2
52	LBP	27.8	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		0.99 Grade I (7.7%)	Grade II	derajat 2
52	LBP	24.44	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L5/S1		0.85 Grade I (9.3%)	Grade II	derajat 3
63	LBP	22.43	Tidak bekerja (aktivitas ringan)	ada	L4/L5		0.97 Grade I (11.8%)	Grade IV	derajat 3
62	LBP	22.8	Guru (aktivitas ringan)	tidak ada	L5/S1		0.93 Grade I (10.1%)	Grade I	derajat 2
59	LBP	23.5	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L5/S1		0.63 grade I (5.2%)	Grade III	derajat 4
69	LBP	22.9	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L4/L5		0.63 grade I (18.6%)	Grade III	derajat 2
64	LBP	27.7	Pensiunan (aktivitas ringan)	ada	L4/L5		0.81 grade I (18.6%)	Grade II	derajat 3
56	LBP	25.7	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L4/L5		0.63 grade II (27%)	Grade III	derajat 4
59	LBP	24.1	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L5/S1		0.74 Grade I (11.3%)	Grade IV	derajat 3
54	LBP	26.7	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L5/S1		0.57 grade I (10.3%)	Grade IV	derajat 4
55	LBP	24.3	Pekerja kantor swasta (Aktivitas ringan)	ada	L4/L5		0.57 Grade I (20%)	Grade IV	derajat 4
69	LBP	25.6	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L4/L5		0.97 Grade I (8.4%)	Grade III	derajat 4
52	LBP	26.6	Pekerja kantor swasta (Aktivitas ringan)	tidak ada	L4/L5		0.73 Grade I (7.9%)	Grade II	derajat 3
62	LBP	24.6	Pekerja kantor swasta (Aktivitas ringan)	ada	L4/L5		0.8 Grade I (8.9%)	Grade II	derajat 2
70	LBP	25.9	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L3/L4		0.46 Grade I (11%)	Grade II	derajat 2
56	LBP	24.7	Pekerja kantor negeri sipil(aktivitas ringan)	ada	L4/L5		0.9 Grade I (5.3%)	Grade I	derajat 2
52	LBP	23.5	Tidak bekerja (aktivitas ringan)	tidak ada	L5/S1		0.45 Grade I (16.2%)	Grade II	derajat 3
63	LBP	27.2	Cleaning service (aktivitas berat)	tidak ada	L3/L4		0.79 Grade I (18.3%)	Grade III	derajat 2
58	LBP	23.2	Petani (aktivitas berat)	tidak ada	L4/L5		0.66 Grade I (14.5%)	Grade IV	derajat 4
55	LBP	23.4	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L3/L4		0.62 Grade I (9.2%)	Grade IV	derajat 4
61	LBP	27.7	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L3/L4		1.17 Grade I (14.6%)	Grade III	derajat 2
56	LBP	26.7	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.65 Grade I (12.3%)	Grade II	derajat 2
55	LBP	25.7	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		0.69 Grade I (9.7%)	Grade II	derajat 3
71	LBP	27.8	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L4/L5		0.8 Grade I (5.6%)	Grade IV	derajat 3
53	LBP	24.8	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		0.8 Grade I (7.7%)	Grade III	derajat 3
53	LBP	26.6	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L5/S1		0.84 Grade I (18%)	Grade I	derajat 2
57	LBP	27.3	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L5/S1		0.8 grade I (11.8%)	Grade III	derajat 4
59	LBP	27.9	Guru (aktivitas ringan)	tidak ada	L4/L5		0.54 Grade I (13.8%)	Grade III	derajat 4
53	LBP	24.3	Guru (aktivitas ringan)	ada	L4/L5		0.93 Grade I (17%)	Grade I	derajat 3
65	LBP	26.7	Pekerja kantor negeri sipil(aktivitas ringan)	ada	L4/L5		0.96 grade I (15%)	Grade II	derajat 2
57	LBP	22.1	Petani (aktivitas berat)	ada	L4/L5		0.8 Grade I (8.2%)	Grade I	derajat 2
55	LBP	25.6	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.9 Grade I (21%)	Grade I	derajat 2
53	LBP	18.7	pedagang (aktivitas ringan)	tidak ada	L5/S1		0.94 Grade I (15%)	Grade II	derajat 2
70	LBP	24.9	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.46 Grade I (16.5%)	Grade III	derajat 2
54	LBP	24.7	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.69 Grade II (29%)	Grade II	derajat 4
69	LBP	25.6	Guru (aktivitas ringan)	ada	L3/L4		0.75 Grade I (12%)	Grade I	derajat 2
65	LBP	23.1	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L5/S1		0.72 Grade I (7%)	Grade I	derajat 2
65	LBP	25.4	Ibu Rumah Tangga (Aktivitas Sedang)	ada	L4/L5		0.46 Grade I (10%)	Grade I	derajat 3
55	LBP	20.1	Pekerja kantor negeri sipil(aktivitas ringan)	ada	L5/S1		0.89 Grade I (15%)	Grade I	derajat 1
59	LBP	18.1	Petani (aktivitas berat)	tidak ada	L4/L5		0.95 Grade I (14%)	Grade I	derajat 2
53	LBP	26.7	Guru (aktivitas ringan)	ada	L5/S1		1.19 Grade I (4.7%)	Grade I	derajat 2
60	LBP	27.3	Pekerja kantor swasta (Aktivitas ringan)	ada	L5/S1		0.85 Grade I (11.2%)	Grade I	derajat 1
57	LBP	25.4	Pekerja kantor negeri sipil(aktivitas ringan)	ada	L4/L5		0.29 Grade I (12%)	Grade I	derajat 1
66	LBP	24.3	Tidak bekerja (aktivitas ringan)	tidak ada	L4/L5		0.63 Grade I (19%)	Grade I	derajat 2
70	LBP	23.1	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.88 Grade I (13%)	Grade II	derajat 2
56	LBP	24.7	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.85 Grade I (11%)	Grade III	derajat 2
56	LBP	25.1	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		0.76 Grade I (9%)	Grade II	derajat 3
73	LBP	19	Pensiunan (aktivitas ringan)	tidak ada	L3/L4		0.71 Grade I (12%)	Grade I	derajat 2
72	LBP	19.7	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		1.02 Grade I (21%)	Grade III	derajat 3
53	LBP + Lumbal facet arthrits	25.9	Tidak bekerja (aktivitas ringan)	tidak ada	L4/L5		0.7 Grade I (9.2%)	Grade I	derajat 1
58	LBP	24.3	pedagang (aktivitas ringan)	tidak ada	L5/S1		0.81 Grade I (15%)	Grade I	derajat 2
73	LBP	23.6	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.85 Grade I (23%)	Grade IV	derajat 3
65	LBP	27.9	Tidak bekerja (aktivitas ringan)	tidak ada	L4/L5		0.62 Grade I (13%)	Grade III	derajat 3
54	LBP	26.4	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.9 Grade I (12%)	Grade III	derajat 4
53	LBP	26.9	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.85 Grade I (13%)	Grade II	derajat 3
64	LBP	25.4	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.66 Grade I (8%)	Grade II	derajat 2
51	LBP	26.7	Petani (aktivitas berat)	tidak ada	L4/L5		0.76 Grade I (10.9%)	Grade II	derajat 3
57	LBP	28.1	pedagang (aktivitas ringan)	tidak ada	L4/L5		0.6 Grade I (8.5%)	Grade IV	derajat 3
52	LBP	27.1	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		0.82 Grade I (18%)	Grade I	derajat 3
65	LBP	25.4	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L3/L4		0.83 Grade I (9%)	Grade II	derajat 2
51	LBP	26.1	pedagang (aktivitas ringan)	tidak ada	L5/S1		0.65 Grade I (10.6%)	Grade I	derajat 2
52	LBP	25.6	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L5/S1		0.66 Grade I (17.2%)	Grade IV	derajat 4
59	LBP	28.7	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.79 Grade I (16.6%)	Grade IV	derajat 4
58	LBP	27.3	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L3/L4		0.75 Grade I (8.2%)	Grade I	derajat 2
59	LBP	26.5	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.73 Grade I (8.6%)	Grade IV	derajat 3
82	LBP	23.4	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		0.71 Grade I (19%)	Grade III	derajat 4
51	LBP	27.6	pedagang (aktivitas ringan)	tidak ada	L5/S1		1.15 Grade I (11%)	Grade II	derajat 2
59	LBP	28.1	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.71 Grade I (13%)	Grade III	derajat 3
61	LBP	28.3	Tidak bekerja (aktivitas ringan)	tidak ada	L3/L4		0.64 Grade I (14%)	Grade II	derajat 2
65	LBP	26.6	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		0.84 Grade I (12%)	Grade II	derajat 2
62	LBP	28.3	Pensiunan (aktivitas ringan)	tidak ada	L5/S1		0.93 Grade I (12%)	Grade I	derajat 2
67	LBP	27.6	Ibu Rumah Tangga (Aktivitas Sedang)	tidak ada	L4/L5		0.94 Grade I (15.9%)	Grade IV	derajat 4
75	LBP	23.4	Petani (aktivitas berat)	tidak ada	L4/L5		0.8 Grade I (13%)	Grade III	derajat 2
61	LBP	24.1	Pekerja kantor negeri sipil(aktivitas ringan)	tidak ada	L4/L5		0.92 Grade I (11%)	Grade II	derajat 2

### Lampiran 3. Data Statistik Penelitian

#### Crosstab

Count

		GradingMusculusmultifidus				Total
		Grade 1	grade 2	grade 3	grade 4	
JenisKelamin	Laki-laki	20	9	6	2	37
	Perempuan	5	24	19	15	63
Total		25	33	25	17	100

#### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	27.627 <sup>a</sup>	3	.000
Likelihood Ratio	28.229	3	.000
Linear-by-Linear Association	20.344	1	.000
N of Valid Cases	100		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.29.

#### Crosstab

Count

		GradingMusculusmultifidus				Total
		Grade 1	grade 2	grade 3	grade 4	
Usia	46-55 tahun	10	16	4	4	34
	56-65 tahun	11	14	14	10	49
	>65 tahun	4	3	7	3	17
Total		25	33	25	17	100

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	9.248 <sup>a</sup>	6	.160
Likelihood Ratio	9.592	6	.143
Linear-by-Linear Association	3.158	1	.076
N of Valid Cases	100		

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 2.89.

### Crosstab

Count

		GradingMusculusmultifidus				Total
		Grade 1	grade 2	grade 3	grade 4	
IMT	underweight	1	1	1	0	3
	normal	7	10	4	3	24
	overweight	5	7	8	7	27
	obseitas	12	15	12	7	46
Total		25	33	25	17	100

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	4.834 <sup>a</sup>	9	.849
Likelihood Ratio	5.286	9	.809
Linear-by-Linear Association	.362	1	.547
N of Valid Cases	100		

a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is .51.

### Crosstab

Count

		GradingMusculusmultifidus				Total
		Grade 1	grade 2	grade 3	grade 4	
Aktivitas	ringan	19	17	13	5	54
	sedang	4	12	10	11	37
	berat	2	4	2	1	9
Total		25	33	25	17	100

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	11.368 <sup>a</sup>	6	.078
Likelihood Ratio	11.649	6	.070
Linear-by-Linear Association	3.849	1	.050
N of Valid Cases	100		

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is 1.53.

### Crosstab

Count

		GradingMusculusmultifidus				Total
		Grade 1	grade 2	grade 3	grade 4	
LevelSPinal	L3/L4	3	7	4	1	15
	L4/L5	12	19	19	12	62
	L5/S1	10	7	2	4	23
Total		25	33	25	17	100

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	9.480 <sup>a</sup>	6	.148
Likelihood Ratio	9.944	6	.127
Linear-by-Linear Association	.815	1	.367
N of Valid Cases	100		

a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is 2.55.

### Crosstab

Count

		DerajatFacetjointarthropathy				Total
		Derajat 1	Derajat 2	Derajat 3	Derajat 4	
JenisKelamin	Laki-laki	4	22	8	3	37
	Perempuan	2	23	22	16	63
Total		6	45	30	19	100

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	10.035 <sup>a</sup>	3	.018
Likelihood Ratio	10.423	3	.015
Linear-by-Linear Association	9.668	1	.002
N of Valid Cases	100		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.22.

### Crosstab

Count

		DerajatFacetjointarthropathy				
		Derajat 1	Derajat 2	Derajat 3	Derajat 4	Total
Usia	46-55 tahun	3	13	11	7	34
	56-65 tahun	3	23	14	9	49
	>65 tahun	0	9	5	3	17
Total		6	45	30	19	100

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	2.268 <sup>a</sup>	6	.893
Likelihood Ratio	3.234	6	.779
Linear-by-Linear Association	.006	1	.939
N of Valid Cases	100		

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is 1.02.

### Crosstab

Count

		DerajatFacetjointarthropathy				
		Derajat 1	Derajat 2	Derajat 3	Derajat 4	Total
IMT	underweight	0	2	1	0	3
	normal	3	13	6	2	24
	overweight	0	10	9	8	27
	obseitas	3	20	14	9	46
Total		6	45	30	19	100

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	8.611 <sup>a</sup>	9	.474
Likelihood Ratio	10.688	9	.298
Linear-by-Linear Association	1.721	1	.190
N of Valid Cases	100		

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .18.

### Crosstab

Count

		DerajatFacetjointarthropathy				Total
		Derajat 1	Derajat 2	Derajat 3	Derajat 4	
Aktivitas	ringan	6	23	18	7	54
	sedang	0	15	11	11	37
	berat	0	7	1	1	9
Total		6	45	30	19	100

### Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	12.337 <sup>a</sup>	6	.055
Likelihood Ratio	14.426	6	.025
Linear-by-Linear Association	.756	1	.385
N of Valid Cases	100		

a. 6 cells (50.0%) have expected count less than 5. The minimum expected count is .54.

### Crosstab

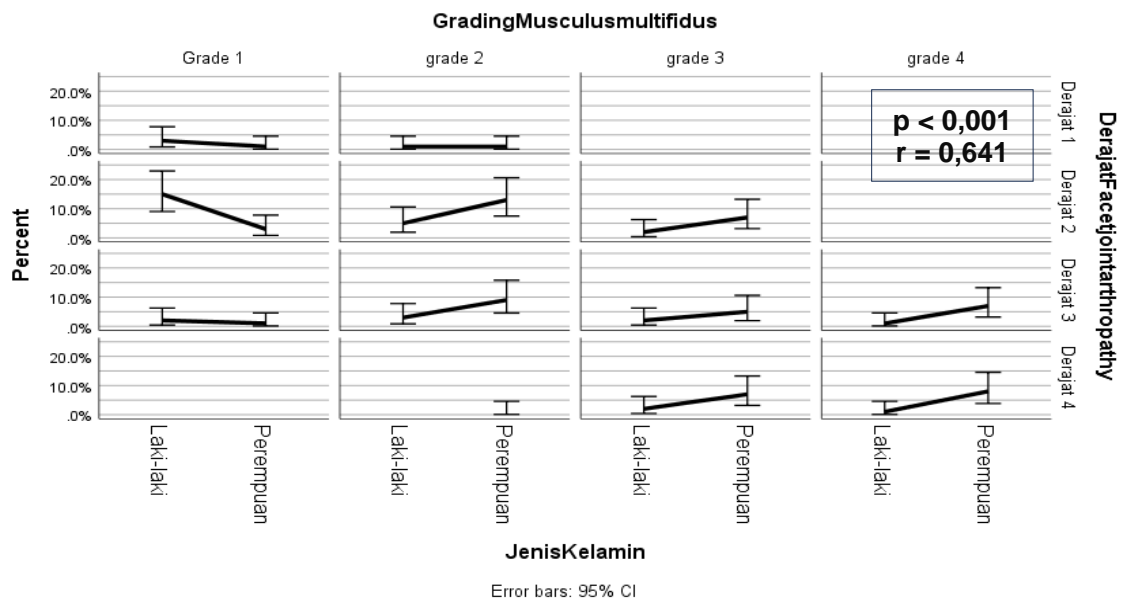
Count

		DerajatFacetjointarthopathy				Total
		Derajat 1	Derajat 2	Derajat 3	Derajat 4	
LevelSPinal	L3/L4	0	11	2	2	15
	L4/L5	2	23	23	14	62
	L5/S1	4	11	5	3	23
Total		6	45	30	19	100

### Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.301 <sup>a</sup>	6	.026
Likelihood Ratio	13.695	6	.033
Linear-by-Linear Association	.565	1	.452
N of Valid Cases	100		

a. 6 cells (50.0%) have expected count less than 5. The minimum expected count is .90.





### Correlations

			GradingMusculusmultifidus	DerajatFacetjointarthropathy
Spearman's rho	GradingMusculusmultifidus	Correlation Coefficient	1.000	.641**
		Sig. (2-tailed)	.	.000
		N	100	100
	DerajatFacetjointarthropathy	Correlation Coefficient	.641**	1.000
		Sig. (2-tailed)	.000	.
		N	100	100

\*\* . Correlation is significant at the 0.01 level (2-tailed).

## Lampiran 4. Curriculum Vitae

# CURICULUM VITAE

### Data Umum

Nama : dr. Chin Edward Chandra

Tempat/ Tanggal Lahir : Balikpapan, 26 Juni 1991

Jenis kelamin : Laki-laki

Alamat : Jl. Griya Tumaritis No. 43 RT 65, kelurahan Graha  
Indah, Kecamatan Balikpapan Utara, Kota Balikpapan

Telepon : +6282252006432

Agama : Kristen Protestan

Status : Menikah

Pekerjaan : Dokter

### Pendidikan:

2009-2013 : **SARJANA KEDOKTERAN** – Universitas Katolik  
Indonesia Atmajaya, Jakarta -Indonesia.

2013-2015 : **PENDIDIKAN PROFESI DOKTER** – Universitas Katolik  
Indonesia Atmajaya, Jakarta -Indonesia.

2016-2017 : **INTERNSHIP:** RSUD Natuna & Puskesmas Ranai, Natuna –  
Indonesia

2017 : **ACLS Training** - PERKI – Indonesia2017 : **ATLS Training** –  
Komisi Trauma IKABI – Indonesia

2021-Sekarang : **PENDIDIKAN DOKTER SPESIALIS** – Universitas Hasanuddin,Makassar-  
Indonesia

Pengalaman Kerja:

2017-2021: Dokter umum RS Restu Ibu, Balikpapan, Kalimantan Timur, Indonesia

Karya Ilmiah/Research Papers:

1. Studi korelasi antara grading infiltrasi lemak musculus multifidus dan derajat facet joint arthropathy pada pasien dengan degenerative spondylolisthesis berdasarkan MRI vertebra lumbosacral

Symposium / Acara Ilmiah:

1. E-poster competition and webinar participants pada Asian Congress "Abdominal Radiology", 2023
2. Symposium dan Workshop, ANNUAL SCIENTIFIC MEETING NEURORADIOLOGY HEAD AND NECK XIX "Intracranial, Head & Neck and Spinal Tumor Imaging from A to Z",2023