

**ANALISIS HUBUNGAN ANTARA TINGKAT SPIRITUALITAS  
TERHADAP DISABILITAS FUNGSIONAL DAN AKTIVITAS  
GELOMBANG OTAK BERBASIS QEEG PADA PASIEN *CHRONIC  
LOW BACK PAIN***

Dwianggriany Adhetia Piesca Widoretno<sup>1</sup>, Taufiq Fredik Paisak<sup>2</sup>, Tiwuk Susantiningsih<sup>3</sup>

**ABSTRAK**

**Latar Belakang:** *Chronic Low Back Pain* merupakan kondisi nyeri kronis yang kompleks, melibatkan mekanisme sensitisasi sentral dan neuroplastisitas maladaptif. Spiritualitas diketahui berperan sebagai mekanisme koping psikologis dalam manajemen nyeri, namun bukti objektif mengenai hubungannya dengan disabilitas fungsional dan aktivitas neurofisiologis otak masih terbatas.

**Metode:** Penelitian ini merupakan studi observasional analitik dengan desain *cross-sectional* yang melibatkan 19 subjek laki-laki dengan *Chronic Low Back Pain*. Tingkat spiritualitas diukur menggunakan kuesioner PASH-BRAINS, dan disabilitas fungsional diukur menggunakan *Oswestry Disability Index*. Perekaman aktivitas listrik otak dilakukan menggunakan qEEG pada kondisi mata tertutup (*eyes closed*) untuk menganalisis parameter *Z-score* gelombang otak..

**Hasil:** Profil qEEG mengungkap pola neurofisiologis yang khas, ditandai dengan elevasi aktivitas gelombang lambat (*Z-score Theta* = 0,87; TBR = 1,52) yang merefleksikan mekanisme sensitisasi sentral. Mayoritas subjek menunjukkan tingkat spiritualitas optimal (84,2%) dengan disabilitas sedang (63,2%). Analisis korelasi memperlihatkan tren hubungan negatif dengan kekuatan sedang antara spiritualitas dan disabilitas ( $r=-0,302$ ) serta *Z-score Alpha* ( $r=-0,348$ ). Meskipun signifikansi statistik belum tercapai ( $p>0,05$ ), arah korelasi ini mengindikasikan bahwa spiritualitas yang lebih tinggi cenderung berasosiasi dengan penurunan beban disabilitas dan modulasi stabilitas kortikal.

**Kesimpulan:** Pasien CLBP menunjukkan dominasi Theta dan peningkatan rasio Theta/Beta sebagai indikator sensitisasi sentral. Meskipun belum signifikan, spiritualitas yang lebih baik berkaitan dengan preservasi Alpha dan supresi High Beta, mengindikasikan stabilitas kortikal dan potensi peran modulatif dalam nyeri kronis.

**Kata Kunci:** *Chronic Low Back Pain, qEEG, brain waves, Spirituality, Functional Disability, Transcendental Executive Function.*

# ANALYSIS OF THE RELATIONSHIP BETWEEN SPIRITUALITY LEVEL AND FUNCTIONAL DISABILITY AND QEEG-BASED BRAIN WAVE ACTIVITY IN PATIENTS WITH CHRONIC LOW BACK PAIN

Dwianggriany Adhetia Piesca Widoretno<sup>1</sup>, Taufiq Fredik Paisak<sup>2</sup>, Tiwuk Susantiningsih<sup>3</sup>

## ABSTRACT

**Background:** Chronic Low Back Pain is a complex chronic pain condition involving central sensitization mechanisms and maladaptive neuroplasticity. While spirituality is recognized as a psychological coping mechanism in pain management, objective evidence linking it to functional disability and brain neurophysiological activity remains limited..

**Methods:** : This research is an analytic observational study with a cross-sectional design involving 19 male subjects with Chronic Low Back Pain. Spirituality levels were measured using the PASH-BRAINS questionnaire, and functional disability was assessed using the Oswestry Disability Index. Brain electrical activity was recorded using qEEG under eyes-closed conditions to analyze brain wave Z-score parameters.

**Results** The qEEG profiles revealed distinct neurophysiological patterns characterized by elevated slow-wave activity (Theta Z-score = 0.87; TBR = 1.52), reflecting central sensitization mechanisms. The majority of subjects demonstrated optimal spirituality levels (84.2%) and moderate disability (63.2%). Correlation analysis showed a moderate negative trend between spirituality and disability ( $r=-0.302$ ) as well as Alpha Z-score ( $r=-0.348$ ). Although statistical significance was not reached ( $p>0.05$ ), the direction of these correlations indicates that higher spirituality tends to be associated with a reduced disability burden and the modulation of cortical stability.

**Conclusion:** Patients with CLBP exhibited dominant Theta activity and an increased Theta/Beta ratio, indicating central sensitization. Although not statistically significant, higher spirituality was associated with Alpha preservation and High Beta suppression, suggesting cortical stability and a potential modulatory role in chronic pain.

**Keyword :** *Chronic Low Back Pain, qEEG, brain waves, Spirituality, Functional Disability, Transcendental Executive Function,*