Follistatin and Pulmonary Function: Interlinked Factors in Weakness Among Aging Adults

Hsiao-Chin Shen [1,2,3], Wei-Ju Lee[4,5*], Chuan-Yen Sun [1,2], Wen-Kuang Yu[1,2], Wei-Chih Chen[1,2], Kuang-Yao Yang[1,2,6,10*], Liang-Kung Chen[4,11,12]

[1]Department of Chest Medicine, Taipei Veterans General Hospital, Taipei, Taiwan

[2]National Yang Ming Chiao Tung University School of Medicine, Taipei, Taiwan

[3]Division of Evidence-based Medicine, Department of Medical Education, Taipei Veterans General Hospital, Taipei, Taiwan

[4]Center for Healthy Longevity and Aging Sciences, National Yang Ming Chiao Tung University, Taipei, Taiwan

[5]Department of Family Medicine, Taipei Veterans General Hospital Yuanshan Branch, Yilan, Taiwan

[6]Institute of Emergency and Critical Care Medicine, National Yang Ming Chiao Tung University, Taipei, Taiwan

[10]Cancer and Immunology Research Center, National Yang Ming Chiao Tung University, Taipei, Taiwan

[11]Center for Geriatrics and Gerontology, Taipei Veterans General Hospital, Taipei, Taiwan

[12]Taipei Municipal Gan-Dau Hospital (Managed by Taipei Veterans General Hospital), Taipei, Taiwan.

Corresponding author: Prof. Kuang-Yao Yang

Department of Chest Medicine, Taipei Veterans General Hospital

No. 201, Sec. Shih-Pai Road, Taipei 11217, Taiwan

Email: kyyang@vghtpe.gov.tw

TEL: +886-2-28757455

FAX: +886-2-28757610

Abstract

Rationale:

Although the link between old age, weakness and pulmonary function decline has been mentioned in numerous studies, the mechanism has not been explored. Serum follistatin have been recognized as indicators of muscle degeneration and low-grade inflammation. This longitudinal cohort study initially assessed the relationship between serum follistatin, weakness, and pulmonary function decline in aging adults. Subsequently, we further evaluated the associations of serum follistatin, weakness, and pulmonary function decline with mortality.

Methods:

Data from community-dwelling middle-aged adults were gathered from the I-Lan Longitudinal Aging Study (ILAS) between 2018 and 2019. Participants were further divided into groups based on weakness and non-weakness criteria, which were determined using demographic data. Additionally, serum

follistatin levels and spirometry results were collected. Mediator analysis and trend analysis were performed.

Results:

Among 888 enrolled patients, 120 (13.5%) of them had weakness. Weakness was an independent factor of decreased peak expiratory flow (PEF, aOR = 1.541, 95% CI =1.004 - 2.365, p = 0.048). Moreover, higher follistatin was independently correlated with weakness (aOR = 1.699, 95% CI =1.087 - 2.655, p = 0.02). Meanwhile, higher follistatin level correlated with worse pulmonary function. Patients with the concurrent presence of higher follistatin, weakness, and decreased PEF were independently associated with mortality (aHR = 2.28, CI =1.04 – 5.03, p = 0.04). Further trend analysis revealed that an increased mortality rate is associated with the cumulative presence of these factors (p = 0.017).

Conclusion:

Higher follistatin correlates with pulmonary function decline and weakness. Higher mortality rates are independently linked to the combined presence of higher follistatin, weakness, and decreased PEF.

Keywords: Pulmonary function, aging, weakness, muscle atrophy, frailty, follistatin.