

The Relationship between Gastroesophageal Reflux Disease (GERD) and Musculoskeletal Complaints

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ABSTRACT:

Background: Gastroesophageal reflux disease (GERD) is a common gastrointestinal problem that can affect many body systems. Studies have suggested a possible connection between GERD and musculoskeletal complaints, but the relationship is not fully clear

Objective: This study examined the relationship between GERD and musculoskeletal complaints in patients treated at Siloam Hospitals Balikpapan.

Methods: This cross-sectional study included 60 participants, divided into 30 GERD and 30 non-GERD patients. Musculoskeletal symptoms were measured using the Indonesian version of the Nordic Musculoskeletal Questionnaire. Data were analyzed with the Shapiro–Wilk test, Spearman correlation, and Mann–Whitney U test.

Results: Back pain (55%), waist pain (45%), and left shoulder pain (41.7%) were the most frequent complaints. The total musculoskeletal score was higher in the GERD group (279) than in the non-GERD group (65). The data were not normally distributed ($p < 0.001$). There was a moderate positive correlation between GERD and musculoskeletal complaints ($r = 0.460$, $p < 0.001$). The Mann–Whitney test also showed a significant difference between groups ($U = 283.5$, $Z = -3.536$, $p < 0.001$).

Conclusion: GERD is related to higher and more widespread musculoskeletal complaints. Screening for musculoskeletal symptoms in GERD patients may help improve early management and patient quality of life.

KEYWORDS: Dysbiosis, GERD, Musculoskeletal Pain, Gut–Muscle Axis, Gut–Joint Axis, Systemic Inflammation.

INTRODUCTION

Gastroesophageal reflux disease (GERD) is a chronic condition where stomach acid moves upward into the esophagus, causing burning pain and discomfort.¹ The number of GERD cases is increasing worldwide because of modern eating habits, reduced physical activity, and rising obesity rates.² GERD can also affect other body systems through inflammatory and neurogenic pathways.³ Musculoskeletal complaints such as back pain, neck stiffness, and shoulder pain are among the most common health problems. They limit mobility, reduce productivity, and affect daily activities.⁴ Recent findings suggest that gut health and the musculoskeletal system are connected through the gut–muscle and gut–joint axes.⁵ Disruptions in the gut microbiome and chronic inflammation may influence muscle strength, joint stability, and pain perception.⁶

GERD may trigger systemic inflammation through repeated acid exposure and gut microbiota imbalance.⁷ This process can release cytokines that affect muscle and joint tissues, leading to discomfort or pain.⁸ Although previous studies have discussed links between gastrointestinal and musculoskeletal disorders, the relationship involving GERD specifically is not well understood.⁹ This study aimed to explore the association between GERD and musculoskeletal complaints among patients at Siloam Hospitals Balikpapan. The findings are expected to provide better insight into the systemic impact of GERD and support more comprehensive patient management.

METHODS

This research used a cross-sectional correlational design and was conducted at Siloam Hospitals Balikpapan from July to August 2025. The study involved 60 participants, consisting of 30 patients diagnosed with GERD and 30 non-GERD patients. Participants



were selected using simple random sampling. Inclusion criteria were adults aged 17–55 years with a confirmed diagnosis of GERD and willingness to participate. Exclusion criteria included musculoskeletal disorders caused by injury, congenital disease, or other chronic conditions. Musculoskeletal complaints were measured using the Indonesian version of the Nordic Musculoskeletal Questionnaire (NMQ), which has good reliability with a Cronbach’s Alpha of 0.726. The questionnaire covers 28 body regions and uses a 4-point scale (0–3). The total score categories were defined as 28 for no pain, 29–57 for mild pain, 58–86 for moderate pain, and ≥ 87 for severe pain. Data were collected through interviews and medical record review, and each participant completed the NMQ under researcher supervision. Data were analyzed using SPSS version 25. The Shapiro–Wilk test was applied to assess data normality. Spearman’s correlation test was used to determine the relationship between GERD and musculoskeletal complaints, while the Mann–Whitney U test was used to compare the two groups. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 60 respondents participated in this study, consisting of 30 GERD patients and 30 non-GERD patients. Most respondents were female (56.7%) and aged between 21 and 54 years, with a mean age of 32.43 years. The characteristics of respondents are presented in Table 1.

Table 1. Characteristics Of Respondents

Variable	GERD (n = 30)	Non-GERD (n = 30)	Total (n = 60)
Gender			
Male	13 (43.3%)	13 (43.3%)	26 (43.3%)
Female	17 (56.7%)	17 (56.7%)	34 (56.7%)
Age (years)			
Mean ± SD	32.43 ± 7.58	—	32.43 ± 7.58
Minimum–Maximum	21–54	—	21–54

The most frequently reported musculoskeletal complaints were back pain (55%), waist pain (45%), and left shoulder pain (41.7%). The distribution of complaints by location is shown in Table 2.

Table 2. Distribution of Musculoskeletal Complaints

Location of Complaint	GERD (n = 30)	Non-GERD (n = 30)	Total (n = 60)	Percentage (%)
Back	21	12	33	55.0
Waist	18	9	27	45.0
Left Shoulder	16	9	25	41.7

The total musculoskeletal score was higher in the GERD group (279) than in the non-GERD group (65). The Shapiro–Wilk test indicated that the data were not normally distributed ($p < 0.001$). The Spearman correlation test showed a moderate positive relationship between GERD and musculoskeletal complaints ($r = 0.460$, $p < 0.001$). The Mann–Whitney U test confirmed a significant difference between groups ($U = 283.5$, $Z = -3.536$, $p < 0.001$). A summary of statistical analyses is provided in Table 3.

Table 3. Statistical Analysis Results

Test	Result	p-value	Interpretation
Shapiro–Wilk	Non-normal distribution	< 0.001	Data not normal
Spearman Correlation	$r = 0.460$	< 0.001	Moderate positive correlation
Mann–Whitney U Test	$U = 283.5$; $Z = -3.536$	< 0.001	Significant difference between groups

DISCUSSION

This study found that musculoskeletal complaints were more common and more severe among patients with GERD. The symptoms most frequently reported were back pain, waist pain, and shoulder pain. The correlation and comparative analyses confirmed that GERD is significantly related to musculoskeletal discomfort. These findings suggest that GERD may contribute to systemic effects that extend beyond the gastrointestinal tract. A possible explanation for this relationship lies in the inflammatory response associated with GERD. Chronic exposure to refluxate can disturb the gut microbiota and increase intestinal permeability, allowing inflammatory mediators to enter systemic circulation. This process can trigger cytokine release, such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF- α), which affect muscle fibers and joint tissues. Persistent low-grade inflammation may alter muscle tone, reduce flexibility, and create sensations of stiffness or pain. These mechanisms are consistent with the concept of the gut–muscle and gut–joint axes, which describe how gastrointestinal health can influence musculoskeletal function.¹⁰⁻¹² Previous studies have shown similar results. Miura et al. reported that patients with GERD were more likely to experience chronic back and shoulder pain than those without GERD.¹⁰ Wang et al. also observed a higher incidence of musculoskeletal symptoms among patients with reflux disease, emphasizing the potential role of systemic inflammation.¹¹ The present study adds to this evidence by confirming that GERD and musculoskeletal complaints are significantly correlated, especially in a clinical setting in Indonesia.

From a clinical perspective, this finding highlights the need for a more integrated approach to managing GERD. Physicians should be aware that GERD may present with symptoms beyond the digestive system. Assessing musculoskeletal complaints in GERD patients may help identify underlying inflammation and improve overall management. For example, addressing lifestyle factors that worsen reflux—such as diet, posture, and physical inactivity—may also help reduce musculoskeletal symptoms. Although this study provides meaningful insights, it has limitations. The cross-sectional design does not allow for causal interpretation, and the sample size was relatively small. Future research using longitudinal or experimental designs is needed to confirm the direction of this relationship and to explore specific inflammatory or microbiota changes in GERD patients with musculoskeletal pain.

Overall, these findings strengthen the evidence that GERD is not merely a local esophageal disorder but a condition with potential systemic implications. Understanding this broader connection can help clinicians develop more comprehensive treatment strategies that address both digestive and musculoskeletal health.

CONCLUSION

This study found a clear link between gastroesophageal reflux disease (GERD) and musculoskeletal complaints. Patients with GERD experienced pain more often and in more body areas, especially in the back, waist, and shoulders. These results suggest that GERD may influence musculoskeletal health through inflammatory and systemic mechanisms. Recognizing musculoskeletal symptoms in GERD patients can help clinicians manage the condition more effectively. A simple assessment of body pain during consultation could provide early clues about the broader impact of GERD. Collaboration between gastroenterologists, general practitioners, and rehabilitation specialists may also improve patient outcomes. Future research should involve larger and more diverse populations to better understand how reflux-related inflammation affects muscles and joints over time. Exploring the role of gut microbiota could also open new approaches for prevention and treatment.

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