

Musculoskeletal Pain of Gastrointestinal Endoscopists

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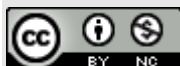
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ABSTRACT

Introduction: Prolonged and repetitive musculoskeletal injuries are common among gastroenterologists who are overwhelmed with complex endoscopic procedures. Data is sparse regarding procedure-related musculoskeletal pain among endoscopists in Bangladesh. The objective of the study was to find out the frequency, sites, severity and factors related to musculoskeletal pain of practicing GI endoscopists in Bangladesh.

Methods: This cross-sectional study was conducted using Google Forms (a pre-designed structured questionnaire) among 91 Gastrointestinal Endoscopists of different gastroenterology centers of Bangladesh from 1st October 2021 to 30th June 2022. Data were collected using the total population sampling technique.

Results: The average weekly duration of doing endoscopic procedures was 8.1 ± 7.7 hours (median 5 hours). More than half (52.7%) of the endoscopists had musculoskeletal pain. The most painful site was the low back. On average, the severity of pain on a numerical rating scale is 3.92 ± 1.74 out of 10. Musculoskeletal pain was significantly more common among endoscopists with more average weekly procedures ($p = 0.029$).

Conclusion: Musculoskeletal pain is frequent among endoscopists of Bangladesh. Reducing the number of procedures may help to some extent in this regard.

Keywords: Bangladesh, Endoscopy procedure, Gastroenterologist, Musculoskeletal injury, Musculoskeletal pain

Introduction

Occupational overuse injuries causing musculoskeletal pain are common in all interventionists, such as gastrointestinal endoscopists,¹⁻¹⁰ endoscopy nurses,¹¹ nursing assistants,¹² dentists,¹⁰ surgeons,¹³⁻¹⁶ and sonographers.¹⁰ Endoscopic procedures are an integral part of gastroenterology practice. With the progressive development of medical science, open surgical procedures are being converted to microsurgical and endoscopic interventions as much as possible. Newer modalities of endoscopic interventions and diagnostic procedures, like

endoscopic ultrasonography, are becoming popular and important tools for patient management.^{17,18} These changes are causing more burden to the endoscopic interventionists. Occupational overuse injuries, causing musculoskeletal pain and the occupational hazards¹⁹ of radiation, are important issues. In 2010, the American Society for Gastrointestinal Endoscopy published a paper on safety measures during endoscopy to prevent radiation exposure.²⁰ The prevalence of musculoskeletal pain in gastrointestinal endoscopists varies from 43% to

95.08% (95.08%,² 43%,⁶ 89.1%,⁷ 67%,⁹ 74%,²¹ 80%²²). The commonest sites of pain were the back, neck, wrist, fingers (especially the thumb), shoulder, and elbow.^{1,6,7,22} Studies found different risk factors for the injury, like an increased number of endoscopic procedures,²³ not taking breaks in between procedures,² age > 40 years, increased duration of a single procedure > half an hour, and > 3 procedures per day.¹ The American Society for Gastrointestinal Endoscopy published a guideline in 2023 on the role of ergonomics to prevent such injuries.²⁴ The setup and patient burden vary from country to country. Moreover, the number of gastroenterologists is very scarce in this densely populated country, where the doctor-patient ratio is 5.26 per 10000 population.²⁵ Hence, they are overwhelmed with endoscopic procedures, including gastroscopies, colonoscopies, enteroscopies, and endoscopic retrograde cholangiopancreatography (ERCP). However, there is sparse data related to musculoskeletal pain among gastrointestinal endoscopists in Bangladesh. Therefore, this study aims to evaluate the frequency, sites, severity, and factors related to musculoskeletal pain among gastrointestinal endoscopists in Bangladesh.

Methods

This cross-sectional research was carried out from October 1, 2021, to June 30, 2022, utilizing a pre-structured questionnaire. The questionnaire was piloted by ten gastroenterologists from the National Gastroenterology Institute and Hospital, who were not involved in this research, resulting in a few adjustments to create the final version. Subsequently, a Google Form was employed for data collection, using a total population sampling approach. The study focused on gastroenterologists in Bangladesh as the target population. This research was conducted at the National Gastroenterology Institute and Hospital in Dhaka, Bangladesh. A comprehensive list of

gastroenterologists (totaling 227), along with their email addresses, was obtained from the Bangladesh Gastroenterology Society, excluding 21 individuals whose email addresses were unavailable. The Google form was distributed via email to gastroenterologists employed at various hospitals across Bangladesh, both government and private. They were asked to complete the form containing the survey questions. Follow-up requests to fill out the form were made at least three times. The outcome variables included the average weekly duration of endoscopic procedures and the number of endoscopists experiencing musculoskeletal pain after beginning these procedures, as well as the locations and intensity of the pain. A total of 91 gastrointestinal endoscopists participated in the survey. Data collected from Google Forms was transferred to Microsoft Excel and subsequently imported into SPSS version 25 for analysis. Numerical data were represented as mean \pm standard deviation and median, while categorical data were shown as counts and percentages. The data were evaluated for normal distribution. Both parametric and non-parametric tests were employed to analyze data that were normally and non-normally distributed, respectively. The weekly average duration of endoscopy exhibited a non-normal distribution; therefore, to compare individuals with musculoskeletal pain to those without, the Mann-Whitney U test was utilized. All other numerical variables demonstrated a normal distribution; hence, a Student's t-test was conducted. To analyze categorical variables, the Pearson chi-Square test was applied. Before initiating this research, ethical approval was obtained from the institution's ethical review committee at the National Gastroenterology Institute and Hospital (ex-Sheikh Russel National Gastroenterology Institute and Hospital) in Dhaka, Bangladesh.

Results

A total of 91 gastrointestinal endoscopists were enrolled. The mean age of the participants was 42.8

\pm 6.4 years. The average height was 65.6 \pm 2.8 inches, and the weight was 71.7 \pm 11.5 kg. The

mean body mass index (BMI) was 25.7 ± 2.8 ; 15 (16.5%) of them had a normal BMI (18.5 to 22.9), and the rest of them, 76 (83.5%), were either overweight or obese.

Among the participants, 50 (54.9%) were working both in government and private centers, 29 (31.9%) in government centers only, and 12 (13.2%) in private centers only. All of them were right-handed; 77 (84.6%) of them used 7-inch gloves. The average weekly duration of endoscopic procedures was 8.1 ± 7.7 hours (median 5 hours); 19 (20.9%) of them were engaged in endoscopic procedures for ≥ 15 hours weekly. Among the 91

study participants, all were doing upper gastrointestinal endoscopy (UGIE), 85 (93.4%) of them were doing colonoscopy, 28 (30.8%) endoscopists were doing ERCP, 10 (11%) endoscopists were assisting ERCP, 18 (19.8%) endoscopists were doing enteroscopy, and one (1.1%) was doing endoscopic ultrasonography. 54 (59.3%) of them received hands-on training on endoscopic procedures after completion of post-graduation. The completed year of doing different endoscopic procedures, the average number of procedures per week, and the lifetime total number of procedures are shown in Table 1.

Table 1: Number of endoscopic procedures by Endoscopists (n=91)

Name of procedure		Completed year of the procedure	Average number of procedures per week	Lifetime total number of procedures
UGIE [†] , n=91	Mean \pm SD [§]	6.5 ± 6.3	34.1 ± 29.7	9159.5 ± 13791
	Median	5	25	3500
Colonoscopy, n=85	Mean \pm SD	6.2 ± 5.5	14.5 ± 65.1	2298.0 ± 4352.5
	Median	5	5	600
ERCP [‡] , n=28	Mean \pm SD	4.9 ± 5.3	2.7 ± 2.2	1030 ± 2457.9
	Median	3	2	125

[†]UGIE-Upper Gastrointestinal endoscopy, [‡] ERCP-Endoscopic retrograde cholangiopancreatography, [§] SD-Standard deviation

For upper gastrointestinal endoscopy (UGIE), 70 (76.9%) used one hand, 6 (6.6%) used both hands simultaneously to do UGIE, and 15 (16.5%) of them sometimes used one hand, sometimes used both hands to do UGIE. Out of 91 participants, 85 (93.4%) did a colonoscopy; of them, 27 (31.7%) did it using a single hand. Regarding ERCP, 28 (30.8%) were doing ERCP, 10 (11.1%) were only assisting, and the rest were not involved in either doing or assisting ERCP. Among those who were either doing or assisting (n=38), 33 (86.8%) had a fixed ERCP team.

Regarding the musculoskeletal pain, out of 91 study participants, 48 (52.7%) endoscopists reported musculoskeletal pain. 10 (11%) of them had a different type of musculoskeletal pain before starting the endoscopy career; 4 had cervical spondylosis, 2 had lumbar spondylosis, 2 had gout, 1 had a prolapsed lumbar intervertebral disc, and 1 had pain in multiple joints diagnosis of which was not made. Among the persons (n=81) who did

not have any musculoskeletal pain before, 38 (46.9%) developed musculoskeletal pain after starting the endoscopy procedure; however, half of them, 19 people (50% of those who developed pain), did not have a diagnosis for the pain. The rest of the 19 people (50% of those who developed pain) had a diagnosis; 6 with cervical spondylosis, 5 with tennis elbow, 2 with lumbar spondylosis, 2 with de-Quervain's tenosynovitis, 2 with 1st carpometacarpal joint osteoarthritis, 1 with prolapsed lumbar vertebral disc with nerve root compression, and 1 with gout. Among these 38 persons who developed musculoskeletal pain after starting endoscopy careers, their mean age is 44.1 ± 6.4 years. 11 (28.9%) of them believe that his/her pain was surely related to the endoscopic procedure; 25 (65.8%) and 2 (5.3%) believe that the pain was possibly related and not related to the endoscopic procedure, respectively. The most painful sites perceived by endoscopists who developed pain after starting to do endoscopic procedures were the low back in 9, neck in 7, upper

back in 4, shoulder in 3, elbow in 4, wrist in 5, thumb in 3, fingers in 2, and great toe in 1 study participant. The severity of pain on a numerical rating scale was 3.92 ± 1.74 out of 10. Among these 38 endoscopists, those who developed pain after starting to do endoscopy found that pain used to interfere with activities of daily life in 13 (34.2%). 16 (42.1%) of them needed to take painkillers, 9 (23.7%) modified their endoscopy practice to reduce pain, and 10 (26.3%) consulted a physician for the management of pain. Among 91 study

participants, 52 (57.1%) have height-adjustable endoscopy procedure tables. Only 18 (19.8%) of them used to take regular breaks in between procedures, 48 (52.7%) occasional breaks, and 25 (27.5%) no breaks. On average, the break time duration was 5.85 ± 6.78 min. Among those who developed musculoskeletal pain after starting the endoscopy career, their weekly average duration was more than that of those who did not develop pain (p-value .029) (Table 2).

Table 2: Musculoskeletal pain after starting endoscopy career (n=38)

				Musculoskeletal pain after starting the endoscopy career	<i>p</i> -value	
				Yes (n=38)	No (n=43)	
Having height-adjustable procedure table	height	Yes		20 (43.5%)	26 (56.5%)	.478 [†]
		No		18 (51.4%)	17 (48.6%)	
The weekly average duration of endoscopy				19.2 ± 9.1	6.3 ± 6.2	.029 ^{††}
Body mass index (BMI)				26.1 ± 3.4	25.4 ± 2.3	.306 [§]
Taking a break in between procedures		No break		12 (52.2%)	11 (47.8%)	.695 [†]
		Occasional break		19 (47.5%)	21 (52.5%)	
		Regular break		7 (38.9%)	11 (61.1%)	

[†]Pearson Chi-square test, [§]Students t-test, ^{††}Mann-Whitney U test

Discussion

In this study, out of 91 endoscopists, 48 (52.7%) had musculoskeletal pain. A survey-based study showed the prevalence of musculoskeletal injury pain from 37% to 89%.²⁶ The American Society of Gastroenterology (ASGE) survey revealed that about 35.3% of American endoscopists experienced endoscopy-related musculoskeletal injuries.²⁷ A study conducted in Canada noted that 67% of endoscopists out of 114 participants had endoscopy-related musculoskeletal pain. On the contrary, 95.08% of endoscopists among 61 respondents had musculoskeletal injuries in Pakistan.² The vast majority of the endoscopists (83%) in our study were either overweight or obese, which reflects that inadequate exercise, as well as the increased weight of the body, might have worked as a contributing factor to the pathogenesis of musculoskeletal pain amongst endoscopists of our study.²⁸ The most frequent

painful site is the right thumb (51.6%), followed by low back (6.6%) and the neck (5.5%). The weekly average duration of endoscopy was significantly associated with musculoskeletal pain (Table 2) ($p < 0.029$). Several factors come into play to cause musculoskeletal pain among endoscopists. Repetitive hand movements, repetitive torquing of the shafts of the scopes, and fine maneuvers of the scope knobs or wheels cause mechanical stress on the hand joints. Prolonged stress causes inflammation and damage to the joint tissues. Hence, pain ensues. Moreover, prolonged working hours cause repetitive tissue injuries to aggravate. Also, prolonged standing and bad postures while performing endoscopies contribute to musculoskeletal pain.^{4,19} Our study showed, taking regular breaks while performing endoscopies reduced the frequency of having musculoskeletal pain, although the result was not significant. Similar findings were also found in

studies done in Canada and Pakistan.^{2,9} Taking regular breaks might reduce the repetitive damage to the collagen tissues and provide adequate time for the already compromised connective tissue to heal.⁷

Most musculoskeletal injuries are easily avoidable. Regular breaks between endoscopic procedures and reducing the volume of procedures per week are of utmost importance. Moreover, avoiding awkward postures and providing adequate height-adjusted tables are other notable measures to be taken as preventive measures²⁹. Moreover, regular exercises provide an excellent mechanism to remain fit, reducing the chances of developing musculoskeletal pain.²⁹ The present study showed that only 23.7% of endoscopists modified their endoscopy practices, and 26.3% of endoscopists sought professional advice to alleviate the musculoskeletal pains. More awareness among the endoscopists regarding the ergonomic factors related to musculoskeletal pain needs to be raised. Moreover, endoscopists are also reluctant to consult professionals regarding their musculoskeletal pain.²⁹ So, endoscopists should be educated to consult professionals as soon as they experience any musculoskeletal pain.

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Limitations

This study is not without of limitations. The sample size is small. The questionnaire was filled out by the respondents using Google Forms. Therefore, the chances of recall bias could not be alleviated. However, our study will stimulate to conduct of the large-scale survey to find out the factors related to musculoskeletal pain among endoscopists and will help policymakers to take necessary steps to help endoscopists get rid of the endoscopy-related musculoskeletal pains.

Conclusion

In conclusion, the frequency of musculoskeletal pains among endoscopists is high. A high weekly average duration of procedure was found to be a factor associated with pain in this study. Raising awareness regarding their occupational musculoskeletal injuries and educating them to prevent those injuries is of utmost importance, as the number of endoscopists is very low in this populous country.

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