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TERMINAL ILEUM INTUBATION – SUCCESS RATE AND DIAGNOSTIC YIELD DURING LOWER GASTROINTESTINAL ENDOSCOPY AT A TERTIARY CARE HOSPITAL

Original Research

Muhammad Umar Farooq[1]*, Arif Rasheed Siddiqui[2], Syed Afzal Ul Haq Haqqi[3], Zea Ul Islam Farrukh[4], Saad Niaz[5], Muhammad Danish Ashraf Wallam[6], Syed Rohail Ahmed Rizvi[7], Fahad Kakar[8]

[1]MBBS, Registrar, Department of Gastroenterology, Patel Hospital, Karachi, Pakistan.
[2]MBBS, FCPS (Med), MRCP (UK), Senior Consultant Gastroenterologist and Hepatologist, H.O.D Gastroenterology, Patel Hospital, Karachi, Pakistan.
[3]MBBS, MCPS, FCPS (Gastro), Senior Consultant Gastroenterologist and Hepatologist, Department of Gastroenterology, Patel Hospital, Karachi, Pakistan.
[4MBBS], FCPS (Med), FCPS (Gastro), Consultant Gastroenterologist and Hepatologist, Department of Gastroenterology, Patel Hospital, Karachi, Pakistan.
[5]MBBS (DOW), MRCP (UK), FRCP (LON), CCST Gastro (UK), Consultant Gastroenterologist and Hepatologist, Director, Endoscopy Department, Patel Hospital, Karachi, Pakistan.
[6]MBBS, Senior Registrar, FCPS Gastroenterology, Patel Hospital, Karachi, Pakistan.
[7]MBBS, Registrar, Department of Gastroenterology, Patel Hospital, Karachi, Pakistan.
[8]MBBS, FCPS (Med), Post Graduate Trainee, FCPS Gastroenterology, Department of Gastroenterology, Patel Hospital, Karachi, Pakistan.
Corresponding Author: Muhammad Umar Farooq, MBBS, Registrar, Department of Gastroenterology, Patel Hospital, Karachi, Pakistan.umar45@ymail.com
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ABSTRACT

Background: Terminal ileum intubation during lower gastrointestinal (LGI) endoscopy plays a crucial role in diagnosing inflammatory and infectious conditions such as Crohn's disease, tuberculosis, and eosinophilic enteritis. Its diagnostic utility varies based on clinical indications, with a higher yield observed in symptomatic patients. Despite its importance, the necessity of routine terminal ileum intubation remains debated. This study aimed to evaluate the diagnostic yield of terminal ileum intubation and assess its association with clinical indications in patients undergoing LGI endoscopy.

Objective: To determine the diagnostic yield of terminal ileum intubation in LGI endoscopy and analyze the association between clinical indications and positive endoscopic findings.

Methods: This prospective, cross-sectional, descriptive study was conducted at Patel Hospital, Karachi, over six months. A total of 437 patients aged 18 years and above, of both genders, who underwent colonoscopy were included. Demographic details, clinical history, and indications for terminal ileum intubation were recorded. Colonoscopies were performed using standard techniques, and bowel preparation was ensured. The primary outcome was the success rate of terminal ileum intubation and the presence of endoscopic abnormalities, including ulcers, nodularity, or erythema. Biopsies were obtained when necessary, and histopathological findings were analyzed. Statistical analysis was performed using SPSS Version 22.0, with associations evaluated using the chi-square test ($p < 0.05$ considered significant).

Results: Among 437 patients, 279 (63.8%) were male, and 122 (27.9%) were over 61 years of age. The most common indications for terminal ileum intubation were bleeding per rectum in 164 (37.5%) cases and weight loss in 143 (32.7%) cases. Terminal ileum intubation was successfully performed in 390 (89.2%) cases. Positive endoscopic findings, including ulcers, nodularity, and erythema, were detected in 32 (7.32%) cases. Biopsy results identified nonspecific chronic inflammation in 14 (3.2%) cases, Crohn's disease in 6 (1.4%) cases, tuberculosis in 4 (0.9%) cases, and eosinophilic enteritis in 2 (0.5%) cases. Significant associations were found between positive findings and diarrhea in 19 (59.4%) cases ($p < 0.001$) and weight loss in 20 (62.5%) cases ($p = 0.001$). The clinically significant diagnostic yield based on biopsy findings was 2.75%.

Conclusion: Terminal ileum intubation in LGI endoscopy demonstrated a modest diagnostic yield, with positive findings primarily in patients presenting with diarrhea and weight loss. The procedure remains an essential diagnostic tool in targeted clinical scenarios, enhancing the detection of inflammatory and infectious ileal diseases.

Keywords: Biopsy, Colonoscopy, Crohn's disease, Diagnostic yield, Diarrhea, Terminal ileum intubation, Weight loss.

INTRODUCTION

Terminal ileitis is a persistent inflammatory condition of the terminal ileum characterized by superficial and deeper ulcerations while sparing the ileocecal valve and colonic mucosa. Its clinical significance remains unclear, particularly in developing countries where both infectious and noninfectious etiologies contribute to its occurrence. The increased utilization of colonoscopy and terminal ileum intubation (TII) in recent years has led to a higher detection rate of terminal ileum lesions, raising interest in their clinical implications. These lesions may be discovered incidentally in asymptomatic individuals or may present with symptoms such as right lower quadrant abdominal pain, diarrhea, and fever. Acute infectious ileitis is often attributed to bacterial or viral pathogens, including cytomegalovirus (CMV), Salmonella, and Yersinia. Additionally, various conditions such as Crohn's disease (CD), tuberculosis, Behçet's disease, malignancies, and the use of nonsteroidal anti-inflammatory drugs (NSAIDs) have been identified as potential causes of ulcerations in the terminal ileum (1-4). The clinical presentation of terminal ileal pathology frequently mimics colonic diseases, making it prone to misdiagnosis or oversight. Patients may experience abdominal pain, diarrhea, hematochezia, anemia, and constipation, necessitating careful diagnostic evaluation. The growing refinement of colonoscopy and increased practice of TII have significantly contributed to the improved identification of terminal ileal lesions, enhancing the understanding of their prevalence and clinical relevance (5). Colonoscopy plays a vital role in reducing the incidence and mortality of colorectal cancer (CRC) by ensuring complete visualization of the colorectum. TII is widely regarded as the gold standard for achieving successful cecal intubation, offering a comprehensive examination of the distal small intestine. However, the necessity of incorporating TII into routine colonoscopic examinations remains a subject of debate due to variations in clinical utility, procedural complexity, and patient comfort (6-9).

Despite its feasibility in most patients, the reported success rate of TII varies widely, ranging from 12% to 96% across different studies. While some endoscopists routinely perform TII to confirm complete colonic visualization or to refine their technical skills, others limit its use due to procedural challenges, increased duration, and patient discomfort. The absence of standardized guidelines leaves the decision largely at the discretion of the endoscopist, leading to variability in its clinical application (10-12). The diagnostic yield of TII has been extensively studied, particularly in symptomatic patients presenting with diarrhea. While some research demonstrates high ileal intubation rates with significant diagnostic findings, others suggest that routine TII may have limited clinical value due to a relatively low prevalence of positive findings. Additionally, its potential role in improving lesion detection rates remains uncertain. Some studies propose that the time spent navigating the proximal colon during TII attempts may contribute to enhanced adenoma or sessile serrated lesion detection, although this remains an area of ongoing investigation (13-15). Endoscopic evaluation of the terminal ileum may reveal diverse pathological findings, including erythema, erosions, ulcers, mucosal friability, and granularity, which can result from conditions such as lymphoid hyperplasia, lymphoma, radiation enteritis, infections, ulcerative colitis, and CD (16,17). Among these, CD is the most frequently encountered disease affecting the terminal ileum. Recent evidence underscores the importance of early diagnosis and intervention in CD, suggesting that timely intensive treatment may lead to better clinical outcomes (18).

In Pakistan, gastrointestinal disorders such as chronic diarrhea, unexplained weight loss, and rectal bleeding present significant diagnostic challenges. Given the regional burden of inflammatory bowel disease and intestinal tuberculosis, terminal ileum intubation during lower gastrointestinal endoscopy serves as a crucial diagnostic tool for identifying these conditions. Evaluating the diagnostic yield of TII and its association with specific clinical indications may aid in optimizing its clinical utility. This study aims to assess the success rate and diagnostic yield of terminal ileum intubation during lower gastrointestinal endoscopy at a tertiary care hospital and explore the relationship between clinical indications and positive findings in the terminal ileum.

METHODS

This prospective, cross-sectional, descriptive study was conducted in the Department of Gastroenterology at Patel Hospital, Karachi, over six months, from October 1, 2023, to March 31, 2024. A consecutive sampling technique was employed to recruit participants. The study included adult patients above 18 years of age, of both genders, who underwent colonoscopy. Patients with known mechanical obstruction in the lower gastrointestinal (GI) tract were excluded to ensure feasibility and safety of terminal ileum intubation. Ethical approval was obtained from the Ethics Review Committee of Patel Hospital (ERC-Approval Form Number PH/IRB/2023/048), and written informed consent was obtained from all participants prior to enrollment. Demographic information, including age, gender, and

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relevant clinical history, was recorded. All colonoscopies were performed by experienced gastroenterologists using standard colonoscopes, ensuring uniform procedural quality. Proper bowel preparation was achieved using polyethylene glycol-based solutions, and patient compliance was confirmed before the procedure to optimize mucosal visualization. The primary objective was to achieve terminal ileum intubation in all patients, and abnormalities such as inflammation, ulceration, or other pathological lesions were systematically documented. When indicated, biopsy specimens were collected from abnormal terminal ileal lesions for histopathological analysis.

The study also assessed the primary indications for lower GI endoscopy, including chronic diarrhea, suspected inflammatory bowel disease, and unexplained abdominal pain, alongside the prevalence of positive findings in the terminal ileum. Data were analyzed using SPSS Version 22.0. Demographic variables, indications for terminal ileum intubation, and endoscopic findings were summarized using frequencies and percentages. A chi-square test was applied to determine associations between clinical indications and endoscopic findings. The diagnostic yield was reported as a percentage, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 437 patients underwent lower gastrointestinal endoscopy. The majority of patients were above 61 years of age, comprising 122 (27.9%) cases, followed by 115 (26.3%) patients aged 46–60 years, 83 (19.0%) patients aged 26–35 years, 59 (13.5%) patients aged 17–25 years, and 58 (13.3%) patients aged 36–45 years. The gender distribution showed a predominance of males, with 279 (63.8%) cases, while females accounted for 158 (36.2%) cases. Among the indications for terminal ileum intubation, bleeding per rectum was the most frequent, reported in 164 (37.5%) patients, followed by weight loss in 143 (32.7%) patients, constipation in 111 (25.4%) patients, and diarrhea in 90 (20.6%) patients. Anemia was observed as an indication in 82 (18.8%) cases, while altered bowel habits and abdominal pain were less frequently reported in 41 (9.4%) and 33 (7.6%) cases, respectively. Suspected inflammatory bowel disease (IBD) was the least common indication, found in only 4 (0.9%) cases.

Terminal ileum intubation was successfully achieved in 390 (89.2%) patients. Other extents of examination included the caecum in 23 (5.3%) cases, ascending colon in 10 (2.3%) cases, sigmoid colon in 8 (1.8%) cases, descending colon in 4 (0.9%) cases, and transverse colon in 2 (0.5%) cases. Positive colonoscopic findings were noted in 295 (67.5%) patients, while no abnormalities were identified in 142 (32.5%) cases. Endoscopic examination of the terminal ileum revealed positive findings such as ulcers, nodularity, or erythema in 32 (7.32%) cases. Normal terminal ileal mucosa was observed in 358 (81.9%) cases, while the examination was not performed in 47 (10.8%) cases. Biopsies were taken in 32 (7.32%) cases, whereas 405 (92.7%) patients did not undergo biopsy. Among the biopsy findings, nonspecific chronic inflammation was the most common diagnosis, reported in 14 (3.2%) cases, followed by Crohn's disease in 6 (1.4%) cases, nonspecific active inflammation in 4 (0.9%) cases, tuberculosis in 4 (0.9%) cases, eosinophilic enteritis in 2 (0.5%) cases, and lymphoid hyperplasia in 2 (0.5%) cases. A statistically significant association was found between positive terminal ileum findings and the indications of diarrhea and weight loss. Among patients presenting with diarrhea, 19 (59.4%) had positive findings ($p < 0.001$), while among those with weight loss, 20 (62.5%) had positive findings ($p = 0.001$). Other indications, including constipation, anemia, bleeding per rectum, altered bowel habits, abdominal pain, and suspected IBD, did not show significant associations with positive findings ($p > 0.05$). The diagnostic yield of terminal ileum intubation was 7.32%, based on the detection of ulcers, nodular changes, or erythema. Among the total 437 patients, 358 (81.9%) had negative findings, and 47 (10.8%) cases were not examined. The clinically significant diagnostic yield, based on histopathological findings, was 2.75%, with Crohn's disease diagnosed in 6 (1.4%) cases, tuberculosis in 4 (0.9%) cases, and eosinophilic enteritis in 2 (0.5%) cases.

Table 1: Demographic details of patients with gastrointestinal endoscopy (n=437).

Variables		n (%)
Age groups	17- 25	59(13.5%)
(years)	26 - 35	83(19.0%)
	36 - 45	58(13.3%)
	46 - 60	115(26.3%)
	> 61	122(27.9%)

Variables		**n (%)**
Gender	Male	279(63.8%)
	Female	158(36.2%)

Table 2: The distribution of indication for terminal ileum intubation.

Variables			**Frequency (n)**	**Percentage (%)**
Indications for Terminal ileum intubation	Diarrhea	Yes	90	20.6
		No	347	79.4
	Constipation	Yes	111	25.4
		No	326	74.6
	Anemia	Yes	82	18.8
		No	355	81.2
	Weight loss	Yes	143	32.7
		No	294	67.3
	Bleeding Per Rectum	Yes	164	37.5
		No	273	62.5
	Altered bowel habits	Yes	41	9.4
		No	396	90.6
	Abdominal pain	Yes	33	7.6
		No	404	92.4
	Suspected Inflammatory bowel disease (IBD)	Yes	4	0.9
		No	433	99.1

Table 3: Extent of Examination, Colon Findings, and Endoscopic and biopsy Findings.

Variables		**Frequency (n)**	**Percentage (%)**
Extent of examination	Terminal Ileum	390	89.2
	caecum	23	5.3
	ascending colon	10	2.3
	transverse colon	2	0.5
	descending colon	4	0.9
	sigmoid colon	8	1.8
Colon Findings	Yes	295	67.5
	No	142	32.5

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Variables		Frequency (n)	Percentage (%)
Endoscopic findings in Terminal ileum intubation	Positive findings (Ulcer, nodular, erythema, polyp)	32	7.32
	Negative findings	358	81.9
	Not examined	47	10.8
Histopathological findings on biopsy	Non_specific_active_ inflammation	4	.9
	Crohns_disease	6	1.4
	TB	4	0.9
	Eosinophilic_enteritis	2	0.5
	Lymphoid_hyperplasia	2	0.5
	Non_specific_chronic_ inflammation	14	3.2
	Not_done	405	92.7

Table 4: Relationship of various indications for LGI Endoscopy with the positive or negative finding in Terminal Ileum.

Variables			Endoscopic Findings on terminal ileum intubation			
			Positive findings n(%)	Negative findings n(%)	Not examined n(%)	P-value
Indications for Terminal ileum intubation	Diarrhea	Yes	19(59.4%)	64(17.9%)	7(14.9%)	<0.001
		No	13(40.6%)	294(82.1%)	40(85.1%)	
	Constipation	Yes	4(12.5%)	97(27.1%)	10(21.3%)	0.151
		No	28(87.5%)	261(72.9%)	37(78.7%)	
	Anemia	Yes	3(9.4%)	70(19.6%)	9(19.1%)	0.368
		No	29(90.6%)	288(80.4%)	38(80.9%)	
	Weight loss	Yes	20(62.5%)	110(30.7%)	13(27.7%)	0.001
		No	12(37.5%)	248(69.3%)	34(72.3%)	
	Bleeding Per Rectum	Yes	9(28.1%)	139(38.8%)	16(34.0%)	0.426
		No	23(71.9%)	219(61.2%)	31(66.0%)	
	Altered bowel habits	Yes	2(6.3%)	36(10.0%)	2(4.3%)	0.359
		No	30(93.8%)	322(90.0%)	45(95.7%)	
	Abdominal pain	Yes	2(6.3%)	24(6.7%)	7(14.9%)	0.130
		No	30(93.8%)	334(93.3%)	40(85.1%)	
	Suspected Inflammatory bowel disease (IBD)	Yes	0(0.0%)	3(0.8%)	1(2.1%)	0.582
		No	32(100.0%)	355(99.2%)	46(97.9%)	

INSIGHTS-JHR
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Table 5: Diagnostic yield of terminal ileum intubation and biopsy findings.

Variables			Diagnostic Yield (%)
Total Examined Cases of Terminal Ileum intubation	Positive Findings (Ulcer/Nodular/ erythema)	32(7.32%)	7.32
	Negative Findings	358(81.9%)	
	Not examined cases of Terminal ileum	47(10.8%)	
Clinically significant findings on biopsy	Crohn's disease	6(1.4%)	2.75
	TB	4(0.9%)	
	Eosinophilic_enteritis	2(0.5%)	
	Not sent	405(92.7%)	

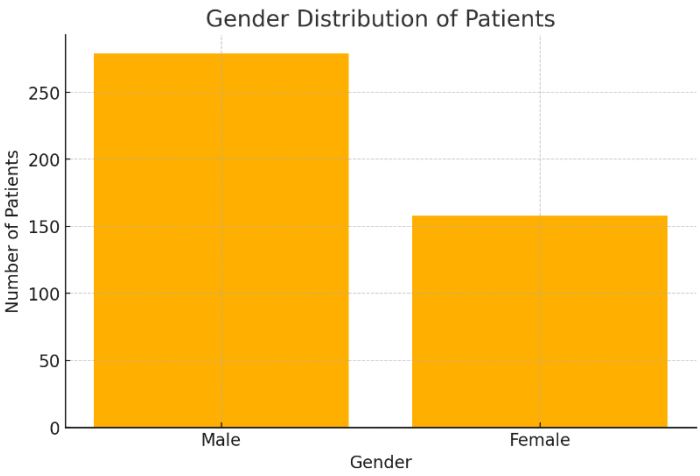

Figure 2 Gender Distribution of Patients

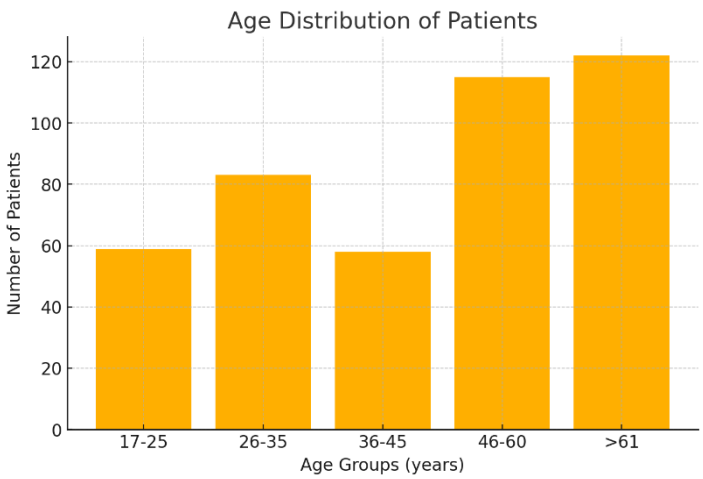

Figure 1 Age Distribution of Patients

DISCUSSION

Terminal ileum intubation is a valuable diagnostic procedure performed during colonoscopy, allowing for a more comprehensive examination of the lower gastrointestinal tract. It serves as a marker of complete colonic visualization and enhances the detection of pathological conditions such as inflammatory bowel disease (IBD), specific infections, and terminal ileal abnormalities identified on imaging. The present study aimed to evaluate the diagnostic yield of terminal ileum intubation in lower gastrointestinal endoscopy, comparing findings with previously published literature (19). The diagnostic yield of terminal ileum intubation varies based on the patient population and clinical indications. Studies have reported success rates of terminal ileum intubation ranging from 87% to 90%, with positive endoscopic findings observed in 6% to 7% of cases, predominantly in symptomatic patients. The present study aligns with these findings, reporting a terminal ileum intubation success rate of 89.2%, with pathological findings in 7.32% of cases. Among these, histopathological analysis revealed clinically significant conditions in 2.75% of cases, including Crohn's disease and tuberculosis. This reinforces the role of terminal ileum intubation in diagnosing inflammatory and infectious conditions, particularly in symptomatic patients (20).

Several studies have emphasized the limited diagnostic value of routine ileal inspection in asymptomatic individuals. Some reports indicate that endoscopic abnormalities in the terminal ileum occur in only 1.8% to 3.7% of asymptomatic cases, with most findings being nonspecific ileitis. The present study, however, primarily focused on symptomatic individuals and demonstrated that positive findings were more frequent in patients presenting with diarrhea and weight loss, with statistically significant associations ($p < 0.001$ and $p = 0.001$, respectively). These findings suggest that terminal ileum intubation has greater diagnostic utility when performed for

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specific clinical indications rather than as a routine component of colonoscopy (21). The low clinical significance of incidental terminal ileal ulcers has been highlighted in previous literature, where spontaneous resolution of such lesions has been observed on follow-up colonoscopy. The present study supports these findings, as a significant proportion of patients with terminal ileum abnormalities had nonspecific chronic inflammation on biopsy rather than a definitive diagnosis of Crohn's disease or other major pathologies. This suggests that while terminal ileum intubation enhances diagnostic yield, not all detected abnormalities translate into clinically significant disease (23,24).

The findings of this study are further supported by research indicating that the most common indications for terminal ileum intubation include unexplained gastrointestinal symptoms such as chronic diarrhea, abdominal pain, weight loss, and rectal bleeding. Consistent with these findings, the present study observed that rectal bleeding was the most common indication (37.5%), followed by weight loss (32.7%) and constipation (25.4%). The results also reinforce previous observations that terminal ileum intubation is most beneficial when performed for indications suggestive of inflammatory or infectious pathology, as opposed to general screening (25). Despite its strengths, the study has certain limitations. The relatively low number of positive findings restricts the generalizability of the results. Additionally, the lack of standardized criteria for terminal ileum biopsy could influence the diagnostic yield, as biopsies were only performed in cases with visible abnormalities. The absence of long-term follow-up data to assess the clinical significance of incidental findings limits the ability to determine whether detected lesions had lasting clinical implications. Furthermore, the exclusion of patients with known mechanical obstruction may have led to an underrepresentation of certain pathologies (26). Future research should focus on prospective studies with larger sample sizes to validate these findings. Standardized guidelines for terminal ileum biopsy and long-term follow-up studies could provide more clarity on the clinical impact of incidental findings. Further investigation into the role of terminal ileum intubation in asymptomatic patients may help refine recommendations regarding its routine use in colonoscopy.

CONCLUSION

This study highlights the diagnostic value of terminal ileum intubation in lower gastrointestinal endoscopy, particularly in patients presenting with specific clinical indications such as diarrhea and weight loss. The procedure proved to be an effective tool for detecting inflammatory and infectious conditions, with biopsy findings supporting its role in identifying clinically significant diseases. While the overall diagnostic yield remained modest, its targeted use in symptomatic patients enhances its clinical utility. These findings reinforce the importance of careful patient selection when considering terminal ileum intubation, optimizing its role in guiding diagnosis and management in gastrointestinal disorders.

AUTHOR CONTRIBUTIONS

Author	Contribution
Muhammad Umar Farooq*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Arif Rasheed Siddiqui	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Syed Afzal Ul Haq Haqqi	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Zea Ul Islam Farrukh	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Saad Niaz	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Danish Ashraf Wallam	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Syed Rohail Ahmed Rizvi	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Fahad Kakar	Writing - Review & Editing, Assistance with Data Curation

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