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COMPARATIVE EFFECT OF SPENCER TECHNIQUE VS MULLIGAN MOBILIZATION ON ROM AND FUNCTIONAL DISABILITY AMONG ADHESIVE CAPSULITIS PATIENTS

Original Research

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ABSTRACT

Background: Adhesive capsulitis characterized by pain and limited ROM and functional disability. Manual therapy techniques such as Spencer and Mulligan promote shoulder function by increasing of ROM and reliving pain.

Objective: To find effect of spencer technique vs mulligan mobilization on rom and functional disability among adhesive capsulitis patients

Methods: A randomized clinical trial was conducted 38 frozen shoulder subjects. Data was gathered from Mian Munshi DHQ Teaching hospital ,Govt. THQ Mian Meer hospital Lahore on this basis of inclusion and exclusion criteria.2 intervention groups were made .Group A participants undergone spencer technique and group B received Mulligan Mobilization SPADI questionnaire utilized to find out functional disability and goniometer utilized to find ROM were utilized as assessment tool. Study ran April 2024 October 2024. SPSS version 22 employed for statistical analysis.

Results: Revealed group B demonstrated superior outcomes compared to Group A, with reductions in SPADI pain in the QoL score for all three domains: physical health ($p = .006$, disability ($p = .033$), and total scores $p = .007$. Showed within-group comparisons has significant reduction in pain, disability and total scores for both groups, more so Group B ($p < .001$). For shoulder ROM post-intervention Group B reported significantly improved flexion, extension, abduction, internal, and external rotations ($p < .05$) than Group A.

Conclusion: Conclusively both groups benefited in all parameters Although; Group B Mulligan Mobilization was more effective in pain and disability reduction and ROM improvement as compared to group B spencer technique.

Keywords: Adhesive Capsulitis, Frozen Shoulder, ROM, Pain, Mobilization, Spencer technique, Mulligan Mobilization.

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INTRODUCTION

Adhesive Capsulitis is a chronic progressive painful ailment marked by pain in the shoulder joints ,capsular pattern restriction and stiffness or loss of GH joint movement(1). Symptoms of the condition include pain, stiffness and reduced range of motion in the joints(2). The condition is characterized by capsular tightness restricted motions muscle guarding discomfort and a functional incapacity to execute an overhead movement. The preadhesive/inflammatory stage or stage 1 may extend for one to three months. Underlying capsule normal despite hypervascular synovitis. Patients had discomfort and end-range restriction. Step 2: Acute Adhesion often known as "Freezing" may last three to nine months(3). Reduction in hypervascular synovitis early adhesion development and thickening and contraction of the capsular membrane. Patients have an extensive amount of pain, limited passive and active movement, and increased pain toward the end of their range of motion. state 3: The "frozen" or fibrotic state More established adhesion in the axillary fold and capsule, but less synovitis. Patients report little discomfort but a considerable restriction in their range of motion. Phase 4: Severe capsular constriction without visible synovitis during the "thawing" stage. At this point, most people have painless range-of-motion restrictions, which normally improve with restructuring. Pain can be reduced and range of motion can be increased to show improvements(3).It is a very prevalent condition that affects 2 to 5% of the overall population(4). Individuals with a history of diabetes and hypothyroidism are more likely to develop adhesive capsulitis which is mostly an idiopathic ailment. It affects around 5% of people with a peak incidence occurring in people between the ages of 40 and 70. In 20–30% of instances it is bilateral and more prevalent in females (5). There is variability in the worldwide occurrence and estimated range is 2% to 5%. Both men and women are affected and the cause is mostly unidentified(6). There are limited statistics on the prevalence of adhesive capsulitis in South Asia. On the other hand the prevalence probably consistent with worldwide figure (7). Within India it is estimated that people with diabetes mellitus (DM) have an 11% to 30% higher incidence of adhesive capsulitis compared to those without diabetes (2% to 10%). According to Pakistani statistic 38% of people have adhesive capsulitis with 28.07% of men and 45.70% of women affected(8).

There is moderate evidence according to a 2020 comprehensive review that manual mobilization treatments combined with exercise improve function and range of motion in people with frozen shoulder . (9) . In cases with ACS physical therapy has traditionally served as the first line of therapy. It is often used in combination with various alternatives such as analgesics TENS steroid injection and heat therapy or cryotherapy. Although there are still differences in physical therapy regimens across clinical settings and published works the fundamentals centre on a routine of supervised stretching and strength restoration. Gentle stretching movements during the early freezing stage. In the frozen stage strengthening activities such posterior capsular stretching and isometric shoulder external rotation may be implemented(10). To enhance range of motion during the thawing phase strengthening and stretching activities combined performed frequently or coupled with Maitland Grade 3^{rd} –4^{th} mobilization. Griggs et al. demonstrated that about 90% of patients at 22 months had a good outcome from a supervised stretching program (11). Working beyond the pain barrier or high-grade mobilization was shown to be slightly extra active than grade-1 mobilization or working within pain limitations by Vermeulen et al. Although physical therapy is widely used in ACS clinical settings there is currently insufficient high-level evidence to recommend physio therapy above treatment. The role of physical therapy and other therapeutic adjuncts in managing of ACS has to be further investigated(12).

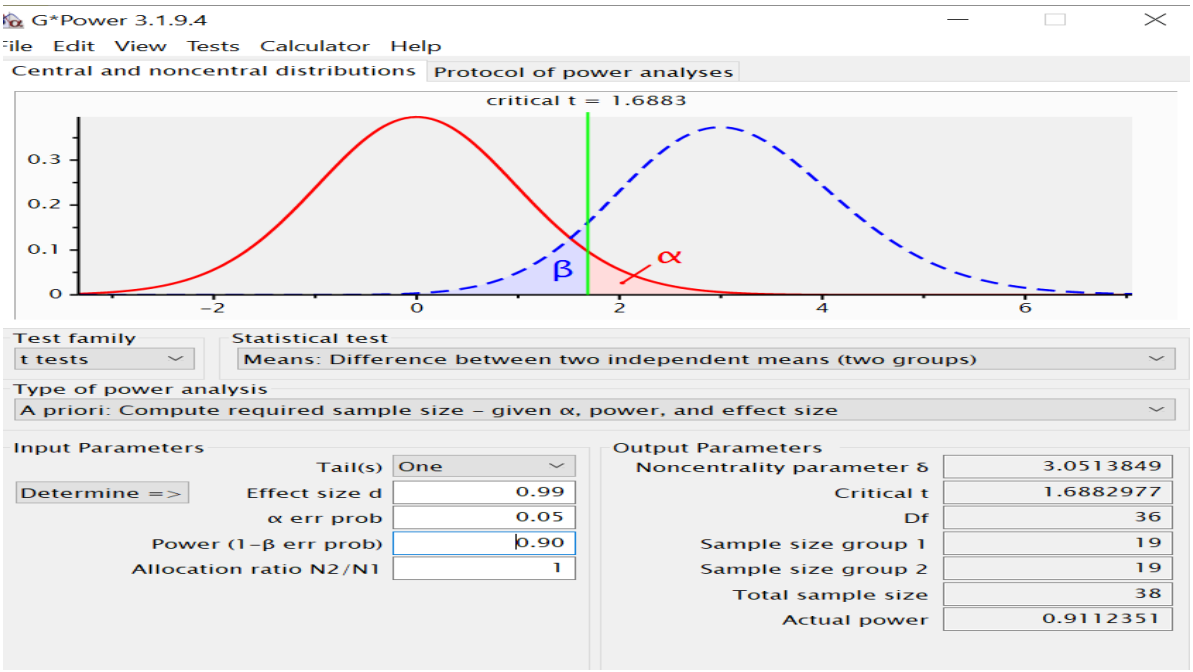
The Mulligan Concept posits that a primary cause of joint disease might be a "positional fault," characterized by a misalignment of the joint surfaces. This misalignment is indirectly evaluated by certain clinical examination techniques. This treatment encompasses many

techniques for improving mobility in the peripheral joints and spinal column. Mobilization with movement (MWM) is the first therapy technique for peripheral joints(13). The MWM idea developed by Mulligan aims to target joint dysfunctions in both the upper and lower limbs, with a specific emphasis on rapidly improving the whole range of motion without any discomfort. Mulligan mobilization provides up to fifty-five-degree improvement of the patient's ROM in adhesive capsulitis through engagement of capsular restrictive barrier and joint gliding. While the tissues are still mobile during active patient movement, the creation of sustained mobilization aids in disaggregation of all adherent structures and stimulation of mechanoreceptors, hence encouraging physiological movement. Mulligan mobilization has demonstrated substantial positive effects in decreasing global disability by providing relief to pain as well as improving muscle activation around the shoulder complex(14).

A popular collection of standardized shoulder therapies that may be utilized for diagnosis, prognosis, and therapy is called the Spencer method. The primary objective of this well-known osteopathic manipulative therapy is the mobility of the glenohumeral and scapulothoracic joints(15). It improves other cognitive, social, and emotional dimensions and improves the function of the restricted joints (16). Shoulder limitations resulting from adhesive capsulitis are treated using the seven various therapies of the Spencer technique. This method uses smooth, rhythmic, passive motions to release contracted muscles, ligaments, and capsules. Most of the force is applied in the last ROM. This technique enhances lymphatic flow, increases joint circulation, and stretches the tissues to enable range of motion without causing discomfort(17).

METHODS

A randomized clinical trial was conducted on 38 subjects diagnosed with frozen shoulder to compare the effectiveness of Spencer technique and Mulligan mobilization in improving shoulder function and range of motion (ROM). Participants were recruited from Mian Munshi DHQ Teaching Hospital and Government THQ Mian Meer Hospital, Lahore. Ethical approval was obtained prior to the commencement of the study, and informed consent was secured from all participants.



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The sample size of 38 was determined using G*Power 3.1.9.4 software, ensuring adequate statistical power. Subjects were randomly assigned to one of two intervention groups using simple random sampling. Group A received Spencer technique, while Group B underwent Mulligan mobilization, with both interventions administered four sessions per week for a duration of ten weeks.

Inclusion criteria required participants to be aged 40–55 years, of either gender, with a clinical diagnosis of adhesive capsulitis, unilateral shoulder stiffness persisting for more than two months, and a shoulder abduction of at least 50°. Exclusion criteria comprised a history of upper limb fractures, congenital shoulder abnormalities, shoulder subluxation, and systemic inflammatory conditions such as rheumatoid arthritis (RA).

Outcome measures included the Shoulder Pain and Disability Index (SPADI) to assess functional disability and a goniometer to measure ROM. Data collection was conducted over a six-month period, from April 2024 to October 2024. Statistical analysis was performed using SPSS version 22, with appropriate inferential tests applied to evaluate the effectiveness of each intervention.

RESULTS

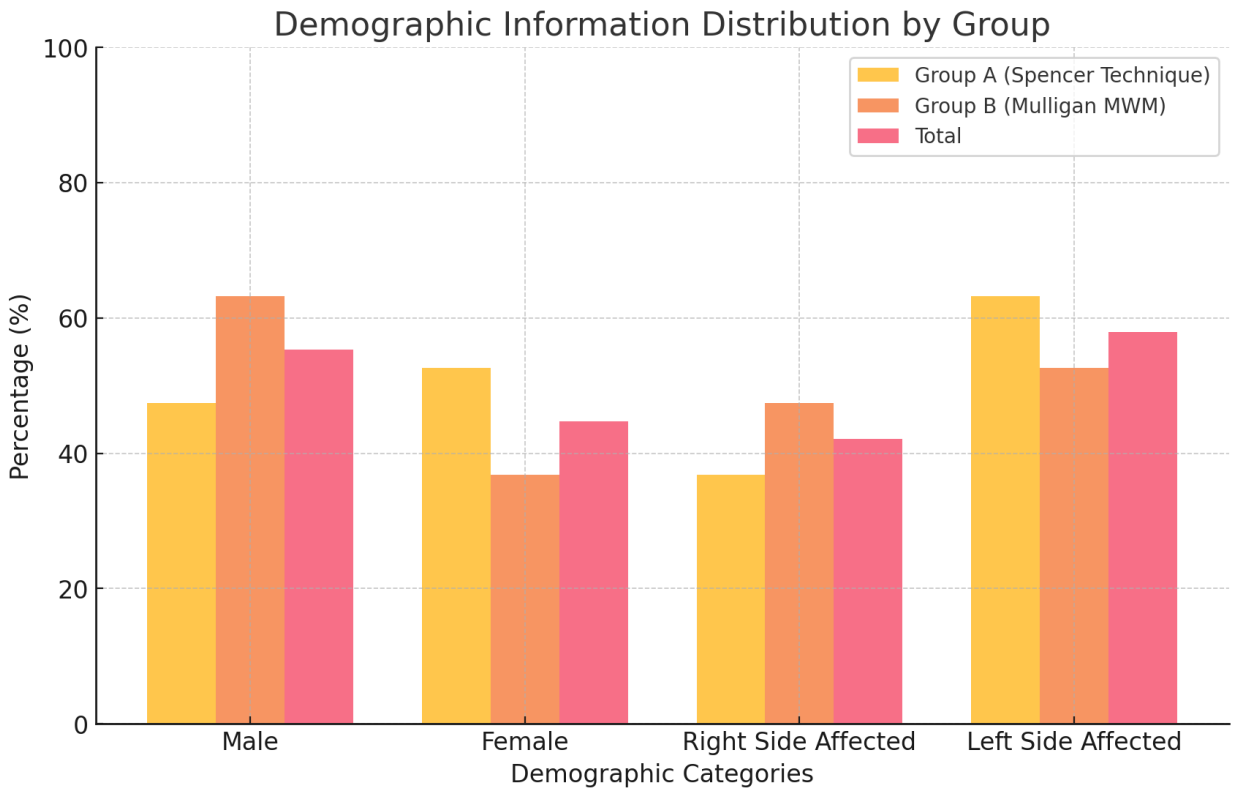

Figure 1 Demographic Information Distribution by Group

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Table 1: Paired Sample T-Test within Group Comparison of SPADI Pre- and Post-Intervention

Outcome Measure	Group	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	Paired Difference Mean ± SD	P-Value
SPADI Pain	Group A (Spencer Technique)	38.42 ± 6.98	25.78 ± 5.10	12.64 ± 2.55	<0.001
	Group B (Mulligan)	38.89 ± 6.12	18.37 ± 3.89	20.52 ± 3.01	<0.001
SPADI Disability	Group A (Spencer Technique)	58.92 ± 10.87	40.12 ± 9.55	18.80 ± 6.27	<0.001
	Group B (Mulligan)	56.58 ± 10.34	34.89 ± 7.30	21.69 ± 5.20	<0.001
SPADI Total	Group A (Spencer Technique)	94.42 ± 16.65	59.72 ± 14.89	34.70 ± 10.88	<0.001
	Group B (Mulligan)	92.42 ± 14.23	48.95 ± 9.01	43.47 ± 7.02	<0.001

Caption: The table presents the pre- and post-intervention comparisons of SPADI (Shoulder Pain and Disability Index) scores for Group A (Spencer Technique) and Group B (Mulligan Mobilization). Both groups demonstrated significant improvements ($p < 0.001$) in pain, disability, and total SPADI scores after the intervention. However, Group B (Mulligan Mobilization) showed a greater mean paired difference in all outcome measures, indicating superior effectiveness in reducing pain and disability compared to Group A (Spencer Technique).

Table 2: Independent Sample T-Test between Group Comparison of Shoulder ROM Pre- and Post-Intervention

Outcome Measure	Assessment	Group A (Spencer Technique) (N=19)	Group B (Mulligan) (N=19)	Mean Difference	P-Value
Shoulder Flexion	Pre-Intervention	88.42 ± 7.95	87.89 ± 7.00	0.53	0.741
	Post-Intervention	97.32 ± 6.21	126.58 ± 11.01	-29.26	<0.001
Shoulder Extension	Pre-Intervention	36.32 ± 9.88	34.47 ± 8.99	1.85	0.507
	Post-Intervention	56.84 ± 3.21	59.74 ± 1.22	-2.90	0.034
Shoulder Abduction	Pre-Intervention	58.11 ± 9.78	58.68 ± 8.01	-0.57	0.832
	Post-Intervention	87.79 ± 9.12	126.37 ± 7.98	-38.58	<0.001
Shoulder Adduction	Pre-Intervention	37.16 ± 5.12	36.74 ± 4.89	0.42	0.789

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	Post-Intervention	49.21 ± 3.22	49.84 ± 1.45	-0.63	0.602
Shoulder Internal Rotation	Pre-Intervention	50.16 ± 5.34	48.95 ± 5.17	1.21	0.478
	Post-Intervention	78.32 ± 6.18	83.05 ± 4.03	-4.73	0.003
Shoulder External Rotation	Pre-Intervention	48.47 ± 5.01	47.74 ± 6.01	0.73	0.621
	Post-Intervention	75.26 ± 4.23	83.16 ± 3.91	-7.90	<0.001

The table compares the pre- and post-intervention shoulder range of motion (ROM) outcomes between Group A (Spencer Technique) and Group B (Mulligan Mobilization). Both groups showed significant improvements in shoulder flexion, extension, abduction, adduction, internal rotation, and external rotation post-intervention. However, Group B (Mulligan Mobilization) demonstrated significantly greater gains in flexion (-29.26, $p<0.001$), abduction (-38.58, $p<0.001$), internal rotation (-4.73, $p=0.003$), and external rotation (-7.90, $p<0.001$) compared to Group A. These results indicate that Mulligan Mobilization was more effective in enhancing shoulder ROM, particularly in flexion, abduction, and rotation movements.

Table 3: Paired Sample T-Test within Group Comparison of Shoulder ROM Pre- and Post-Intervention

Outcome Measure	**Group**	**Pre-Intervention Mean ± SD**	**Post-Intervention Mean ± SD**	**Paired Difference Mean ± SD**	**P-Value**
Shoulder Flexion	Group A (Spencer Technique)	88.42 ± 7.95	97.32 ± 6.21	8.90 ± 2.65	<0.001
	Group B (Mulligan)	87.89 ± 7.00	126.58 ± 11.01	38.69 ± 9.02	<0.001
Shoulder Extension	Group A (Spencer Technique)	36.32 ± 9.88	56.84 ± 3.21	20.52 ± 6.67	<0.001
	Group B (Mulligan)	34.47 ± 8.99	59.74 ± 1.22	25.27 ± 7.89	<0.001
Shoulder Abduction	Group A (Spencer Technique)	58.11 ± 9.78	87.79 ± 9.12	29.68 ± 8.93	<0.001
	Group B (Mulligan)	58.68 ± 8.01	126.37 ± 7.98	67.69 ± 11.02	<0.001
Shoulder Internal Rotation	Group A (Spencer Technique)	50.16 ± 5.34	78.32 ± 6.18	28.16 ± 4.52	<0.001
	Group B (Mulligan)	48.95 ± 5.17	83.05 ± 4.03	34.10 ± 4.85	<0.001
Shoulder External Rotation	Group A (Spencer Technique)	48.47 ± 5.01	75.26 ± 4.23	26.79 ± 5.34	<0.001
	Group B (Mulligan)	47.74 ± 6.01	83.16 ± 3.91	35.42 ± 5.96	<0.001

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The table presents a comparison of pre- and post-intervention shoulder range of motion (ROM) outcomes between Group A (Spencer Technique) and Group B (Mulligan Mobilization). Both groups exhibited significant improvements ($p<0.001$) in shoulder flexion, extension, abduction, internal rotation, and external rotation following the interventions. However, Group B (Mulligan Mobilization) demonstrated greater mean paired differences across all movements, particularly in shoulder flexion (38.69° vs. 8.90°), abduction (67.69° vs. 29.68°), and external rotation (35.42° vs. 26.79°). These findings suggest that Mulligan Mobilization is more effective than the Spencer Technique in enhancing shoulder mobility, particularly in flexion, abduction, and rotation. The results highlight the superior clinical efficacy of Mulligan Mobilization for improving shoulder function and range of motion in frozen shoulder patients.

DISCUSSION

Current RCT conducted on 38 subjects having adhesive capsulitis 2 interventions were applied Group A participants undergone spencer technique and group B received Mulligan Mobilization 4 session per week up to 10 weeks. SPADI questionnaire utilized to find out functional disability and goniometer utilized to find ROM were utilized as assessment tool.

Current study revealed SPADI scores had highly significant improvement in the scores in both groups after the intervention. Group B demonstrated superior outcomes compared to Group A, with greater reductions in SPADI pain these results were accordance to Chandrasekaran et al. (2021) study conducted to found out Mulligan Mobilization with Movement and Proprioceptive Neuromuscular Facilitation to reducing pain among frozen shoulder. Utilized SPADI pain scale for accessing pain pre and post treatment demonstrated that the Mulligan MWM technique was considerably more efficient in dropping of pain (18).

Current study suggested there were significant differences in the QoL score for all three domains: physical health (mean difference: 355, $p = .006$), disability (mean difference: 4.84, $p = .033$), and total scores (mean difference: 10.881, $p = .007$). Within-group comparisons showed significant reduction in pain, disability and total scores for both groups, more so Group B ($p < .001$ for improvement in all three measurements) these results were compatible to Haveela B et al.study (19).

Ongoing study demonstrated shoulder ROM post-intervention Group B reported significantly improved flexion, extension, abduction, internal, and external rotations ($p < .05$) than Group A these results were consistent to Arif B et al. study (20).

Notably, Group B achieved the highest gains in flexion (mean difference: Additionally, there was a significant decrease for both flexion (Mean change = -28.86, $p < .001$) and abduction (Mean change = - 38.61, $p< .001$). Table 6 revealed significant increased in ROM in both groups for all the measures though Group B was again more superior ($p < 0.001$). However, in adduction, as seen in the table below, there was no observable difference between the groups post-intervention in this regard ($p = .801$) these were accordance to Iqbal M et al. and Phansopkar P et al. studies (21, 22).

A recent randomized controlled trial by Khyathi et al. compared the effectiveness of Mulligan's Mobilization with Movement (MWM) and the Spencer technique in patients with frozen shoulder. The study involved 40 participants who were randomly assigned to either the MWM group or the Spencer technique group. Both groups received their respective interventions along with conventional exercises over a period of five days. Outcome measures included pain assessment using the Visual Analog Scale (VAS), shoulder abduction and external rotation range of motion (ROM) measured with a goniometer, and functional disability evaluated by the Shoulder Pain and Disability Index (SPADI). The results indicated significant improvements in pain reduction, shoulder mobility, and functional disability within both groups. However, the MWM group demonstrated a greater percentage of improvement in shoulder abduction, external

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rotation ROM, and functional disability compared to the Spencer technique group. The authors concluded that while both interventions are effective in the short term, Mulligan's MWM may offer superior benefits in enhancing shoulder mobility and reducing functional impairment in individuals with frozen shoulder (23).

CONCLUSION

Both Spencer Technique (Group A) and Mulligan Mobilization (Group B) were effective in improving pain, disability, and shoulder range of motion (ROM) in patients with frozen shoulder. However, Group B (Mulligan Mobilization) demonstrated significantly greater improvements in all measured parameters compared to Group A (Spencer Technique). The reductions in SPADI pain and disability scores were more pronounced in Group B, indicating superior pain relief and functional recovery. Additionally, the gains in ROM, particularly in shoulder flexion, abduction, and external rotation, were considerably higher in Group B, suggesting greater joint mobility restoration. These differences highlight the therapeutic advantage of Mulligan Mobilization, which likely facilitates better joint mobilization and biomechanical correction. The statistically significant improvements ($p<0.001$) further support its clinical superiority over the Spencer Technique. Hence, Mulligan Mobilization emerges as the more effective intervention for enhancing shoulder function and reducing disability in adhesive capsulitis patients.

Author Contribution

Author	Contribution
Hifza Riaz*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Adiba Javed	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
Hamad Ali	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Yasir Ali Kazmi	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Safiya Naz	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Sazeen	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Zeeshan Javed	Contributed to study concept and Data collection Has given Final Approval of the version to be published

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