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EFFECT OF MODIFIED LONG STICK EXERCISE ON NECK AND UPPER BACK PAIN ALONGWITH HYPERKYPHOSIS IN BANK EMPLOYEES

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ABSTRACT

Introduction: Hyper-kyphosis, an excessive forward curvature of the thoracic spine, is prevalent among individuals in sedentary occupations, particularly bank employees. Prolonged sitting, repetitive tasks, and limited physical activity contribute to postural imbalances. Exercise interventions, such as the modified long stick exercise (LSE), offer a low-impact, accessible solution to improve spinal alignment, muscle strength, and flexibility, effectively mitigating the adverse effects of prolonged desk work on musculoskeletal health.

Purpose of Study: This study was conducted for the purpose of studying the effect of Modified Long Stick Exercise (LSE) on Neck and Upper back pain alongwith Hyper kyphosis in Bank Employees.

Material and Methodology: This study included 24 bank employees aged 35 to 55 years with mild to moderate hyper-kyphosis. Participants performed the Modified LSE program for 30 minutes per session, five days a week, for 12 weeks. The Visual Analog Scale (VAS) for neck

and upper back pain & Tragus to wall test were taken as outcome measures for hyper kyphosis pre- and post-intervention.

Result: Data was obtained from INSTAT software. After 12 weeks of training, subjects exhibited notable improvements, including a slight reduction in hyper kyphosis. Pain levels and tragus-to-wall distance significantly decreased ($p<0.0001$), indicating the effectiveness of the Modified LSE in enhancing posture and reducing discomfort.

Conclusion: The study concludes that the Modified LSE program effectively reduces neck and upper back pain along with hyper-kyphosis in bank employees, promoting proper posture and preventing associated musculoskeletal complications.

Keywords: Hyper-kyphosis, Modified long stick exercises, Bank Employees

INTRODUCTION

In today's technologically driven world, employment is increasingly dominated by desk-bound occupations. Among them, the banking sector stands out as one of the most sedentary professions due to prolonged hours spent working on computers, handling documentation, and engaging in limited physical activity. This inactive lifestyle substantially elevates the risk of developing postural disorders, particularly hyper-kyphosis. Hyper-kyphosis refers to an excessive forward curvature of the thoracic spine and can lead to complications such as restricted breathing, functional impairment, chronic musculoskeletal pain, and a diminished quality of life **[1]**.

Traditionally, hyper-kyphosis was considered a condition predominantly affecting older adults due to age-related degenerative changes. However, modern working conditions—especially poor ergonomics and long hours of uninterrupted sitting—have significantly increased its prevalence among younger professionals **[2]**. Bank employees are especially vulnerable due to the static and posture-challenging nature of their work environment. The habitual forward head posture, slouched sitting, and inadequate breaks contribute to spinal misalignments. Prolonged periods in a flexed seated posture result in weakened spinal extensor muscles, tightened pectoral musculature, and adaptive shortening of anterior spinal structures **[3]**. If left uncorrected, this abnormal curvature can severely impact balance, reduce pulmonary capacity, and cause chronic discomfort and pain in the upper back and neck regions **[4]**.

Although radiographic evaluation using the Cobb angle (greater than 40 degrees) remains the gold standard for diagnosing hyper-kyphosis, non-invasive tools such as flexicurve rulers and inclinometers have gained popularity in clinical practice for assessing spinal posture **[5]**. Treatment

typically varies based on severity, ranging from physical therapy and bracing to surgery in advanced cases. Nevertheless, for mild to moderate postural kyphosis, conservative treatment such as corrective exercise and physical therapy remains the first line of intervention, especially in younger or working populations **[6]**.

Recently, Modified Long Stick Exercises have emerged as a promising therapeutic strategy for addressing postural deficits. These exercises employ a long stick or dowel rod to create structured movement patterns aimed at activating spinal extensors, scapular stabilizers, and core musculature. They offer external tactile feedback that enhances body awareness and facilitates postural correction **[7]**. The updated version of this exercise protocol incorporates elements such as proprioceptive neuromuscular facilitation, breathing control, and core stabilization—components essential for lasting postural improvements **[8]**.

Multiple studies have demonstrated the effectiveness of stick-based exercises in correcting postural dysfunctions **[9]**. Exercise programs involving such movements have shown significant improvements in posture and reductions in back pain among sedentary individuals **[10]**. However, limited research has specifically addressed the bank employee population—a group marked by high ergonomic strain and few opportunities for workplace movement. The Modified Long Stick Exercise program presents a cost-effective, simple, and accessible intervention to counteract workplace-induced hyper-kyphosis. It emphasizes improving thoracic spine mobility, stretching shortened anterior musculature, and strengthening weakened posterior chain muscles such as the erector spinae, rhomboids, and lower trapezius **[11]**. Incorporating such routines into daily schedules improves postural awareness and promotes ergonomic practices, which are vital for sustaining long-term benefits. Regular participation in corrective exercises facilitates neuromuscular re-education and reduces habitual kyphotic posture tendencies **[12]**. Improved scapular control and core strength also contribute to reduced musculoskeletal complaints and enhance work efficiency **[13]**.

As musculoskeletal disorders continue to be leading causes of occupational disability and absenteeism, implementing posture-focused interventions is crucial for maintaining a healthy workforce **[14]**. Integrating Modified Long Stick Exercise programs into corporate wellness policies aligns with global occupational health goals by promoting early intervention, reducing injury risks, enhancing job satisfaction, and lowering healthcare costs **[15][16]**.

Objectives

To assess the impact of the Modified LSE program on neck and upper back pain using the Visual Analog Scale (VAS).

To determine improvements in postural alignment i.e Hyper-kyphosis through the Tragus-to-Wall Test pre- and post-intervention.

METHODS

- Study of design: Experimental study
- Study type: Interventional study
- Sample size: 24 Bank Employees
- Study population: Male and Female of 35 to 55 years

- Inclusion criteria
  1. Bank Employees
  2. 35 to 55 years age group
  3. Both gender male and female
  4. Diagnosed with postural hyper-kyphosis
  5. Engaged in sedentary desk work for at least 6 hours per day
  6. Working in Bank Profession for more than 10 years
- Exclusion criteria
  1. Spinal fractures in last 3 months
  2. Scheuermann's disease,
  3. Vertebral compression fractures
  4. Neuromuscular conditions like multiple sclerosis, Parkinson's.
  5. Current pregnancy or planning during study
  6. Already engaged in spinal/ physiotherapy or corrective exercise programs

Each participant was informed about the study methodology and written consent form was filled by all the participants and then detail assessment was taken using VAS for neck pain and upper back pain and Tragus to wall test as outcome measures to assess pain and hyper-kyphosis before and after the intervention. 24 Bank employees were selected using Convenience sampling method. The subjects did Modified LSE programme for 30 minutes. The intervention was given to the individuals for the duration of 5 days a week in continuation for 12 weeks and confidentiality of the data was assured.

Modified Long Stick Exercise intervention [17]

Exercise	Dosage	Weeks
1. Stretch pectoralis minor muscle: Participant lifted a stick 45 degrees obliquely to the top and held it	**30 sec hold, 2 reps for each side**	**1-12**
2. Stretch latissimus dorsi muscle: Participant lifted and held the stick while leaning to the side	**30 sec hold, 2 reps for each side**	**1-12**
3. Scapula movement: Participant held stick in two hands and rotated in a circle from left to right	**8 reps 8 reps (hold 5 secs) 8 reps x 2 8 reps x 2 (hold 5secs)**	**1-3 4-6 7-9 10-12**
4. Strengthen rhomboid and middle trapezius muscles: Participant lifted stick to chest level and pushed elbows back	**8 reps 8 reps (hold 5 secs) 8 reps x 2 8 reps x 2 (hold 5secs)**	**1-3 4-6 7-9 10-12**
5. Retract scapula: Participant held stick in two hands, lifted stick to chest level and then pushed elbows back	**8 reps 8 reps (hold 5 secs) 8 reps x 2 8 reps x 2 (hold 5secs)**	**1-3 4-6 7-9 10-12**
6. Spinal extension movement: Participant held stick in two hands and lifted stick above the head but not above shoulder level	**8 reps 8 reps (hold 5 secs) 8 reps x 2 8 reps x 2 (hold 5secs)**	**1-3 4-6 7-9 10-12**
7. Retract scapula and strengthen lower trapezius and serratus anterior muscles: Participant lifted stick above the head and pressed elbows down	**8 reps 8 reps (hold 5 secs) 8 reps x 2 8 reps x 2 (hold 5secs)**	**1-3 4-6 7-9 10-12**
8. Strengthen lower trapezius and serratus anterior muscles: Participant held stick in two hands and moved stick in frontal plane (shoulder abduction) to the end of the movement	**8 reps 8 reps (hold 5 secs) 8 reps x 2 8 reps x 2 (hold 5secs)**	**1-3 4-6 7-9 10-12**

RESULTS

Table 1 indicates the mean scores of VAS for neck pain of participants (n=24) before and after the intervention program. The pre-test score reached 7.25±1.073 and post-test score showed 2.79±1.141 with t value of 13.940 followed by $p<0.0001$ which is considered as extremely significant. This interprets noticeable lowering in the pre and post scores in group.

In **Table 2** the mean VAS scores for participants' (n=24) upper back discomfort before and after the intervention program are shown. T value is 14.989 & P-value is < 0.0001, pre-test score was 7.46±1.042, and the post-test score was 3.04±1.122. Both results are regarded as highly significant.

In **Table 3** the mean scores of tragus to wall test in participants (n = 24) before and after the intervention program are displayed. The pre-test score was 11.56±2.700, the post-test score was 6.58±1.060, and the t value was 8.520 with a p-value below 0.0001. Both findings are thought to be quite important. The group's before and after scores show a discernible decline as a result.

Table 1: Mean scores of VAS for neck pain of participants before and after the intervention

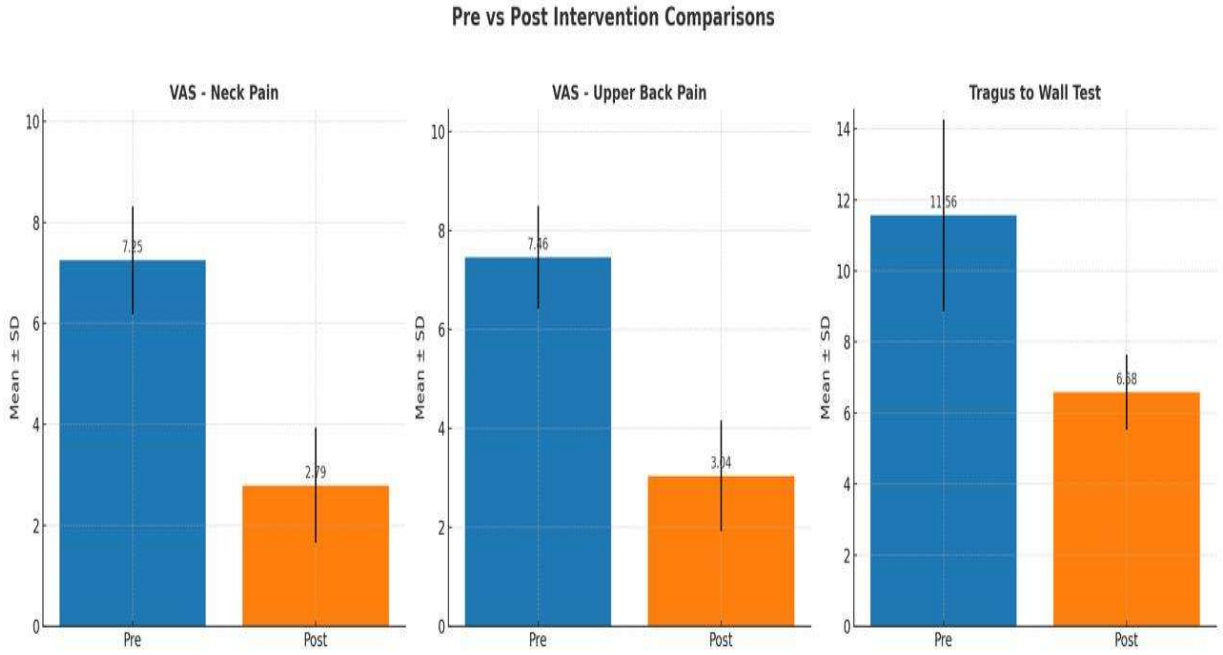
VAS (FOR NECK PAIN)	PRE	POST	T VALUE	P VALUE	INFERENCE
n=24	7.25±1.073	2.79±1.141	13.940	<0.0001	Considered extremely significant

Table 2: Mean scores of VAS for upper back pain of participants before and after the intervention

VAS (FOR UPPER BACK PAIN)	PRE	POST	T VALUE	P VALUE	INFERENCE
n=24	7.46±1.042	3.04±1.122	14.989	<0.0001	Considered extremely significant

Table 3: Mean scores of Tragus to wall test of participants before and after the intervention

TRAGUS TO WALL TEST	PRE	POST	T VALUE	P VALUE	INFERENCE
n=24	11.56±2.700	6.58±1.060	8.520	<0.0001	Considered extremely significant



Graph 1: Pre Vs Post Intervention Comparisions

DISCUSSION

This study evaluated the effectiveness of a 12-week Modified Long Stick Exercise (LSE) program on hyper-kyphosis in bank employees. Statistically significant improvements were seen across all outcome measures. Notably, the Tragus-to-Wall Test revealed enhanced postural alignment and reduced neck and upper back pain ($p < 0.0001$), highlighting the benefits of focused exercise in sedentary populations.

Hyper-kyphosis, defined as thoracic curvature exceeding 40°, is often caused by poor posture, muscle imbalances, and prolonged sitting—common among bank workers. Katzman *et al*. (2014) emphasized that kyphosis not only affects appearance but also respiratory and physical function

[20]. Postural stress due to long screen hours likely contributed to baseline findings.

The Modified LSE targeted the key deficits in hyper-kyphosis: weak posterior muscles, tight anterior structures, and poor scapular control. Stretching the pectoralis and latissimus dorsi, and strengthening spinal extensors such as the erector spinae, rhomboids, and lower trapezius, led to better postural outcomes, evidenced by reduced Tragus-to-Wall distance **[21],[22]**.

VAS scores showed significant pain reduction post-intervention, consistent with Kim *et al*. (2016), who observed decreased discomfort in office workers after corrective exercises. Mechanisms include improved circulation, muscle support, and joint mechanics **[23]**.

The Tragus-to-Wall Test is a valid, reliable measure of thoracic kyphosis and supported by Shaffer *et al*. (2013) in showing correctable spinal curvature through exercise **[24],[25]**.

The stick in LSE enhanced proprioceptive feedback and facilitated dynamic stretching. Park *et al*. (2017) emphasized these aspects in correcting poor motor patterns **[26]**.

Despite the small sample size (n=24), lack of control group, and potential bias, the program proved safe, feasible, and well-tolerated. Future research should include larger randomized trials and radiographic assessments.

Modified LSE offers an accessible intervention for workplace-related postural issues and supports integrating physiotherapy into occupational health strategies **[27],[28],[29]**.

CONCLUSION

The present research showed that bank employees' postural alignment and pain related to hyper-kyphosis were considerably alleviated by the Modified Long Stick Exercise (LSE) program. Participants' thoracic posture significantly improved after 12 weeks of organized instruction, as evidenced by a significant decrease in the Tragus-to-Wall Test distance. Additionally, as indicated by the reduced VAS scores in the upper back and neck areas.

According to these results, the Modified LSE program is a safe, affordable, and simple-to-implement intervention that can be included in occupational health plans, especially for people who work at desks for extended periods of time. This exercise program is a useful tool in the prevention and treatment of postural disorders like hyperkyphosis since it increases spinal mobility, strengthens postural muscles, and raises ergonomic awareness.

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