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Effect of Chair Aerobics on Physical Activity and Flexibility among Women Engaged in Desk Bound Jobs

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ABSTRACT

Background: Prolonged sitting among women in desk-bound occupations contributes to physical inactivity, reduced flexibility, and adverse health outcomes. Chair aerobics offers a simple, low-impact approach to improving physical activity and flexibility.

Objective: To evaluate the effect of chair aerobics on physical activity and flexibility among women engaged in desk-bound occupations.

Methodology: A pre–post experimental study was conducted among 30 women aged 35–55 years. Participants underwent a 12-week chair aerobics programme. Physical activity was assessed using the Occupational Sitting and Physical Activity Questionnaire (OSPAQ), while flexibility was evaluated using the Back Scratch Test and Chair Sit-and-Reach Test.

Results: Data were analysed using descriptive statistics and the paired-samples t-test, with $p < 0.05$ considered statistically significant. The results of the present study showed that physical activity and flexibility improved significantly. A significant reduction in sitting time was observed, while standing and walking activities, along with upper- and lower-body flexibility, showed significant improvements ($p < 0.001$).

Conclusion: A structured 12-week chair aerobics programme effectively improved physical activity and flexibility among women engaged in desk-bound occupations. Chair aerobics may serve as a practical, low-cost workplace intervention to reduce sedentary behaviour and promote musculoskeletal health.

Keywords: Chair aerobics, Physical activity, Flexibility, Desk-bound jobs, OSPAQ, Sedentary behaviour.

INTRODUCTION

Physical inactivity and sedentary behaviour are major public health concerns associated with increased risks of obesity, type 2 diabetes, cardiovascular diseases, and other chronic health conditions[1-6]. Sedentary behaviour refers to waking activities performed in a sitting or reclining posture with an energy expenditure of ≤1.5 metabolic equivalents (METs) [1]. Women engaged in desk-bound occupations are particularly exposed to prolonged sitting and reduced occupational physical activity, which may contribute

to increased body mass index (BMI), musculoskeletal discomfort, postural abnormalities, and reduced physical fitness[8,12,15].

Flexibility is an essential component of physical fitness, defined as the ability of a joint to move through its available range of motion[17]. Reduced flexibility can restrict functional mobility and interfere with activities of daily living[18,19]. Prolonged sitting may contribute to tightness of the iliopsoas and hamstring muscles, potentially altering pelvic alignment and increasing lumbar stress, thereby contributing to low back discomfort[20-22].

Regular physical activity plays an important role in maintaining cardiovascular health, controlling body weight, improving musculoskeletal function, and promoting psychological well-being[11,12]. Chair aerobics is a low-impact exercise approach involving rhythmic upper- and lower-limb movements performed in a seated position. It provides an accessible exercise alternative for individuals with limited opportunities for physical activity and those exposed to prolonged sitting[11-14].

The Occupational Sitting and Physical Activity Questionnaire (OSPAQ) is a practical and validated self-reported instrument used to assess occupational sitting, standing, walking, and heavy labour[23,24]. Upper-body flexibility can be evaluated using the Back Scratch Test, which assesses functional shoulder mobility[25-27]. Similarly, the Chair Sit-and-Reach Test provides a standardized assessment of lower-body flexibility, particularly hamstring flexibility[27-30]. These outcome measures offer a practical approach to evaluating changes in occupational physical activity and flexibility following an exercise intervention.

Although chair-based exercises have demonstrated benefits in improving functional fitness and mobility, their effects on occupational physical activity and upper- and lower-body flexibility among women engaged in desk-bound occupations require further investigation[29-32].

The present study aimed to evaluate the effect of a structured 12-week chair aerobics programme on physical activity and flexibility among women engaged in desk-bound occupations, using the OSPAQ, Back Scratch Test, and Chair Sit-and-Reach Test as outcome measures.

MATERIALS :

- Chair
- Inch tape to measure waist hip ratio
- Stadiometer to measure height
- Analog weighing bathroom scale to measure weight
- Consent form

METHODOLOGY :

- Study setting : Sri Venkateswara Institute of medical sciences,SVIMS,Tirupati
- Study design : pre and post experimental study
- Sampling method : convenient sampling technique
- Sample size : 30
- Treatment duration : 12 weeks

INCLUSION CRITERIA

- Gender : Females
- Age : 35-55 years

- Desk working professionals
- Subjects who are willing to participate in the study

EXCLUSION CRITERIA

- Subjects with uncontrolled Hypertension
- Subjects with uncontrolled Diabetes
- Physical impairments that preclude participation in exercise
- Individuals with any other neurological, cardiovascular, metabolic and psychological disorders
- Subjects with cognition deficit
- Subjects who are mentally unstable

OUTCOME MEASURES

- **Physical activity –** OSPAQ (Occupational sitting and physical activity questionnaire) in percentage (%).
- **FLEXIBILTY –** Back scratch test, Chair sit & reach test.

STUDY PROCEDURE

Participants fulfilling the inclusion criteria were informed about the study procedures, and written informed consent was obtained before enrolment. Baseline assessments included height, weight, body mass index (BMI), occupational physical activity, and flexibility. All outcome measures were reassessed following the 12-week intervention.

Body weight was measured using a calibrated digital weighing scale, with participants wearing light clothing and no footwear. Height was measured using a stadiometer with participants standing erect in the Frankfort horizontal plane. BMI was calculated using the formula:

BMI (kg/m^2) = Weight (kg) / Height^2 (m^2).

The recorded values were classified according to World Health Organization (WHO) guidelines.

Upper- and lower-body flexibility were assessed using the Back Scratch Test and Chair Sit-and-Reach Test, respectively.

The Back Scratch Test assessed shoulder flexibility by measuring the distance between the middle fingertips when participants attempted to reach behind their back with both hands. Scores were recorded in centimetres, with overlapping fingers represented by positive values, fingertip contact by zero, and a gap by negative values. The best of two trials on each side was considered.

The Chair Sit-and-Reach Test evaluated lower-body flexibility. Participants sat at the edge of a chair with one leg extended and attempted to reach towards the toes while maintaining the knee in extension. The distance between the fingertips and toes was recorded in centimetres. Reaching beyond the toes was scored positively, fingertip contact was scored as zero, and an inability to reach the toes was scored negatively. The best of three trials for each leg was recorded.

Occupational physical activity was evaluated using the Occupational Sitting and Physical Activity Questionnaire (OSPAQ). Participants reported the percentage of their typical working time spent sitting, standing, walking, and performing heavy labour. The responses were reviewed to ensure that the combined percentages accounted for 100% of the working time. Assessments were performed before and after the intervention to identify changes in occupational activity patterns.

Participants underwent a structured 12-week chair aerobics programme. Each session commenced with warm-up exercises consisting of active range of motion (AROM) movements for the upper and lower limbs, followed by chair-based aerobic exercises. Exercise frequency, intensity, duration, and type were progressively modified according to the FITT principle. Each session concluded with stretching and relaxation exercises as a cool-down phase.

INTERVENTION

S.NO	WEEK	MODE OF EXERCISE	REPETITIONS	SESSIONS	DURATION
1	1st to 6th WEEK	**WARM-UP SESSION** – free neck exercises – shoulder and elbow rotations – wrist curls and rotations – ankle toe movements – spine flexion and extension – spinal side rotation	10 REPETITIONS	3 DAYS/WEEK	10min
		CHAIR AEROBICS - Seated marches - Seated upper cut - Clapping over head - Knee lifts & Alternate Knee lifts - Diagonal toe touch - Half jack - V step	5 SETS 10 REPETITIONS	-	30-40mins

		COOL-DOWN SESSION – neck stretch – forearm stretch – triceps stretch – pectoral stretch – quadriceps stretch – hamstring stretch	stretches were sustained from 10 seconds and up to 30 seconds	-	10mins

S.NO	WEEK	MODE OF EXERCISE	REPETITIONS	SESSIONS	DURATION
1	7^{TH} to 12^{TH} WEEK	**WARM-UP SESSION** – free neck exercises – shoulder and elbow rotations – wrist curls and rotations – ankle toe movements – spine flexion and extension – spinal side rotation	10 REPETITIONS	5 DAYS/WEEK	10min
		CHAIR AEROBICS - Seated marches - Seated upper cut - Clapping over head	10 SETS 10 REPETITIONS	-	30-40mins

		- Knee lifts & Alternate Knee lifts - Diagonal toe touch - Half jack - V step			
		COOL-DOWN SESSION – neck stretch – forearm stretch – triceps stretch – pectoral stretch – quadriceps stretch – hamstring stretch	stretches were sustained from 10 seconds and up to 30 seconds	-	10mins

RESULTS :

The statistical analysis of the collected data was performed using IBM SPSS Statistics Version 20. Descriptive and inferential statistical analyses were carried out using SPSS, while the tables and graphical representations of the results were prepared using Microsoft Excel for clear presentation and interpretation of the findings.

STATISTICAL ANALYSIS AND RESULTS :

Descriptive Statistics

Table 1. Descriptive Statistics of Demographic Variables

Descriptive Statistics of Demographic Variables					
	N	**Minimum**	**Maximum**	**Mean**	**SD**
Age	30	38.00	55.00	44.30	5.42
Weight	30	48.00	102.00	70.20	15.38
Height	30	150.00	168.00	156.97	5.50
BMI	30	18.40	44.10	27.91	6.14
WHR	30	0.80	0.98	0.90	0.05

According to Table 1, the demographic characteristics of the 30 participants indicate that the mean age was 44.30 ± 5.42 years, with ages ranging from 38 to 55 years. The mean weight of a participant was 70.20 ± 15.38 kg and a mean height of 156.97 ± 5.50 cm. The average Body Mass Index (BMI) was 27.91 ± 6.14 kg/m², indicating that, on average, the participants were in the overweight category. The mean Waist-to-Hip Ratio (WHR) was 0.90 ± 0.05, indicating the overall body fat distribution of the study

population. These findings describe the baseline demographic profile of the participants included in the study.

Shapiro-wilk Test for Normality of Outcome Measures

Table 2. Test of Normality (Shapiro–Wilk Test)

Outcome Measure	Shapiro –Wilk Statistic (W)	P-value	Interpretation
Back Scratch Test (BST)	0.972	0.602	Normal
Chair Sit and Reach Test (CSRT)	0.968	0.488	Normal
Sitting Score	0.975	0.691	Normal
Standing Score	0.979	0.812	Normal
Walking Score	0.971	0.573	Normal

INTERPRETATION :

Table 2 : The Shapiro–Wilk test was used to assess the normality of the study variables. All outcome measures showed p-values greater than 0.05, indicating that the data followed a normal distribution. Therefore, the assumption of normality was satisfied, and parametric statistical analysis was considered appropriate for further analysis. This justified the use of the paired-samples *t*-test in the study. This matches the conclusion stated in your report that all outcome measures were normally distributed ($p > 0.05$)

Table 3. Descriptive Statistics of Outcome Measures at Pre-test and Post-test

Descriptive Statistics of Outcome Measures					
	N	Minimum	Maximum	Mean	SD
BST_PRE	30	8.70	13.50	10.64	1.33
BST_POST	30	5.00	9.40	6.76	1.21
CSRT_PRE	30	6.50	10.40	8.44	1.13
CSRT_POST	30	1.20	5.10	3.17	1.16
SITTING_PRE	30	80.00	85.00	82.43	1.55
SITTING_POST	30	71.00	76.00	73.47	1.50
STANDING_PRE	30	8.00	12.00	10.07	1.11
STANDING_POST	30	13.00	16.00	14.17	0.95
WALKING_PRE	30	6.00	7.00	6.47	0.51
WALKING_POST	30	10.00	12.00	11.37	0.67
PA_PRE	30	1.00	1.00	1.00	0.00
PA_POST	30	1.00	1.00	1.00	0.00

The descriptive analysis showed noticeable changes in all outcome measures following the intervention. The mean BST score decreased from 10.64 ± 1.33 at pre-test to 6.76 ± 1.21 at post-test. Similarly, the

mean CSRT score reduced from 8.44 ± 1.13 to 3.17 ± 1.16, while the Sitting score decreased from 82.43 ± 1.55 to 73.47 ± 1.50. In contrast, the mean Standing score improved from 10.07 ± 1.11 to 14.17 ± 0.95, and the Walking score increased from 6.47 ± 0.51 to 11.37 ± 0.67 after the intervention. The Physical Activity (PA) score remained unchanged at 1.00 throughout the study, indicating a heavy PA. Overall, the descriptive findings suggest improvements in the measured clinical outcomes following the intervention.

Inferential Statistics

Table 4. Paired Samples t-test Comparing Pre-test and Post-test Outcome Measures

Null Hypothesis (H_0): There is no significant difference between the pre-test and post-test mean scores of the outcome measures following the intervention.

Alternative Hypothesis (H_1): There is a significant difference between the pre-test and post-test mean scores of the outcome measures following the intervention.

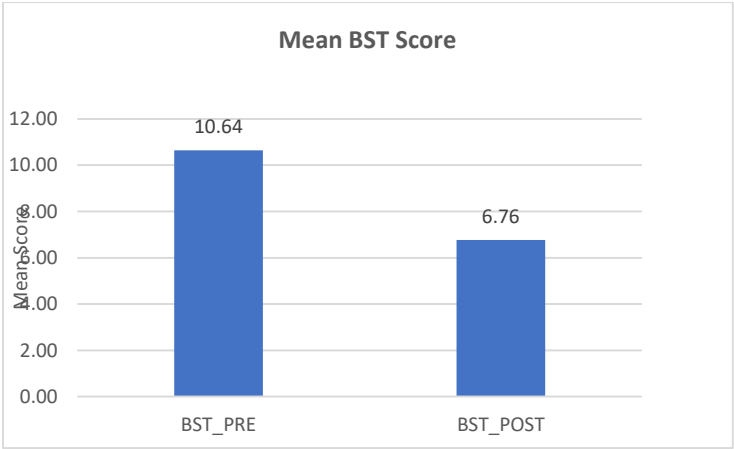
The normality assessment revealed that all outcome measures had p-values greater than 0.05, indicating that the data were normally distributed. Therefore, the assumption of normality was satisfied, justifying the use of the Paired-Samples t-test for comparing the pre-test and post-test outcome measures.

Output of Paired Samples t-test:

Paired Samples t-test					
Pair	**Outcome Measures**	Mean	SD	**T**	**P-value**
Pair 1	BST_PRE	10.64	1.33	67.81	0.000
	BST_POST	6.76	1.21		
Pair 2	CSRT_PRE	8.44	1.13	213.05	0.000
	CSRT_POST	3.17	1.16		
Pair 3	SITTING_PRE	82.47	1.50	118.67	0.000
	SITTING_POST	73.47	1.50		
Pair 4	STANDING_PRE	10.07	1.11	-73.60	0.000
	STANDING_POST	14.17	0.95		
Pair 5	WALKING_PRE	6.47	0.51	-87.96	0.000
	WALKING_POST	11.37	0.67		

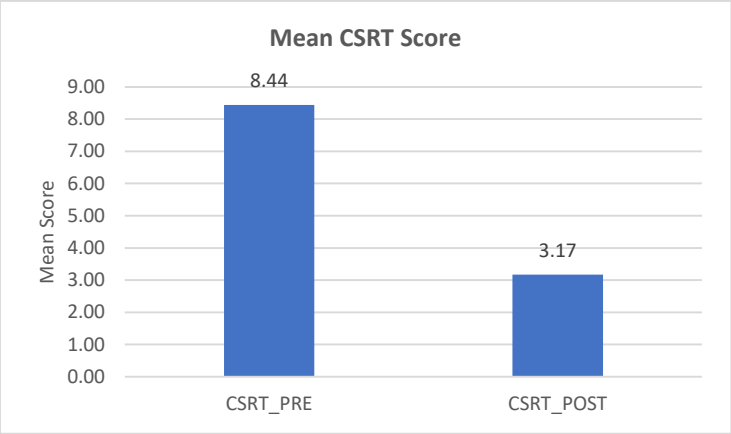
Interpretation:

BST Score



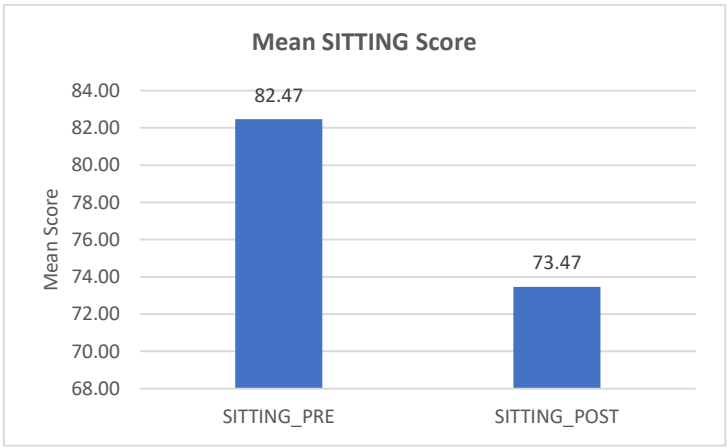
Since the p-value of the test statistic is less than 0.05, we reject the null hypothesis at the 5% level (t = 67.81, p = 0.000 < 0.05). In addition, the mean BST score decreased from 10.64 ± 1.33 at pre-test to 6.76 ± 1.21 at post-test, indicating a reduction in BST score following the intervention. Hence, the evidence is sufficient to conclude that there is a significant reduction in BST score from pre-test to post-test.

CSRT Score:



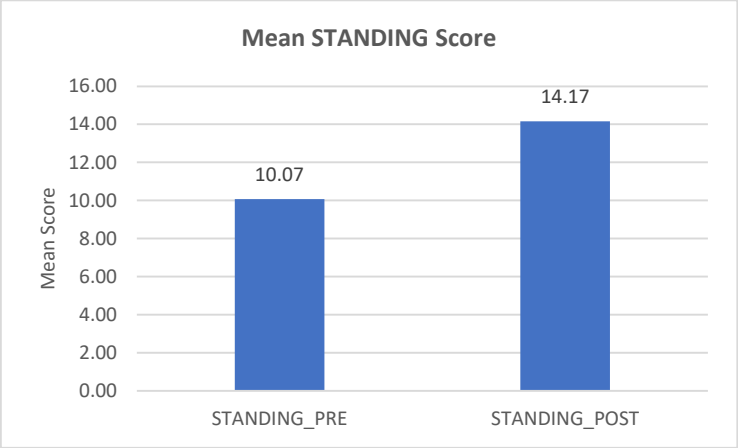
Since the p-value of the test statistic is less than 0.05, we reject the null hypothesis at 5% level (t = 213.05, p = 0.000 < 0.05). In addition, the mean CSRT score decreased from 8.44 ± 1.13 at pre-test to 3.17 ± 1.16 at post-test, indicating a reduction in CSRT score following the intervention. Hence, the evidence is sufficient to conclude that there is a significant reduction in CSRT score from pre-test to post-test.

Sitting Score:



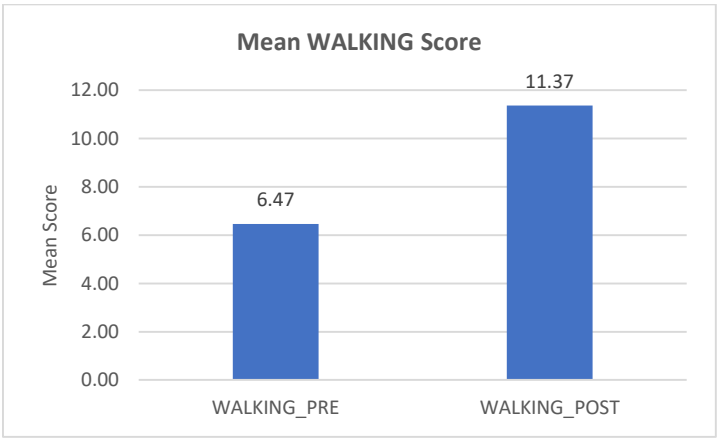
Since the p-value of the test statistic is less than 0.05, we reject the null hypothesis at 5% level (t = 118.67, p = 0.000 < 0.05). In addition, the mean Sitting score decreased from 82.43 ± 1.55 at pre-test to 73.47 ± 1.50 at post-test, indicating an improvement following the intervention. Hence, the evidence is sufficient to conclude that there is a significant reduction in Sitting score from pre-test to post-test.

Standing Score:



Since the p-value of the test statistic is less than 0.05, we reject the null hypothesis at the 5% level ($t = -73.60$, $p = 0.000 < 0.05$). In addition, the mean Standing score increased from 10.07 ± 1.11 at pre-test to 14.17 ± 0.95 at post-test, indicating an improvement in Standing performance following the intervention. Hence, the evidence is sufficient to conclude that there is a significant improvement in Standing score from pre-test to post-test.

Walking Score:



Since the p-value of the test statistic is less than 0.05, we reject the null hypothesis at the 5% level ($t = -87.96$, $p = 0.000 < 0.05$). In addition, the mean Walking score increased from 6.47 ± 0.51 at pre-test to 11.37 ± 0.67 at post-test, indicating an improvement in Walking performance following the intervention. Hence, the evidence is sufficient to conclude that there is a significant improvement in Walking score from pre-test to post-test.

DISCUSSION

The present study evaluated the effect of a structured 12-week chair aerobics programme on physical activity and flexibility among women engaged in desk-bound occupations. The findings demonstrated statistically significant improvements in all primary outcome measures ($p < 0.001$), indicating positive changes in occupational activity patterns and upper- and lower-body flexibility following the intervention. Regarding physical activity, OSPAQ results showed a significant reduction in occupational sitting time, accompanied by increased standing and walking durations. These changes suggest that chair aerobics may encourage greater movement and awareness of physical activity among individuals exposed to prolonged

sitting. The findings are supported by Kurko et al. (2012), who established the validity of OSPAQ for assessing occupational activity patterns[23]. Furthermore, previous research by Thorp et al. and Wilmot et al. highlighted the adverse health consequences of prolonged sedentary behaviour and the benefits of increasing physical activity[5,6].

The findings are also consistent with Lohana and Yadav (2020), who reported improvements following chair aerobics among sedentary obese individuals[11]. Previous studies have additionally demonstrated the feasibility of chair-based exercise in populations with low physical fitness and limited opportunities for physical activity[12,31]. These findings support the potential application of chair aerobics as a workplace exercise intervention.

Significant improvements were also observed in the Back Scratch Test and Chair Sit-and-Reach Test, indicating enhanced shoulder and lower-body flexibility, respectively. These improvements may be attributed to repetitive upper- and lower-limb movements, increased joint mobility, and stretching exercises incorporated into the intervention. Regular movement through functional ranges may help counteract the mobility restrictions associated with prolonged sitting. Similar findings were reported by Liao et al. (2025), who demonstrated improvements in flexibility and functional fitness following a 12-week chair-based exercise programme in older females. The functional relevance of these changes is further supported by the established use of the Back Scratch and Chair Sit-and-Reach Tests for assessing flexibility[27-30].

The mean BMI of participants was 27.91 kg/m², indicating an overweight profile. Despite this, significant improvements in physical activity and flexibility were observed, suggesting that chair aerobics may be a feasible exercise option for overweight women with sedentary occupational habits.

The statistically significant pre- and post-intervention differences support the rejection of the null hypothesis and acceptance of the alternative hypothesis. Overall, the findings suggest that a structured 12-week chair aerobics programme can improve occupational physical activity and flexibility among women engaged in desk-bound occupations. Its low-impact nature, minimal equipment requirements, and workplace applicability make it a potentially useful preventive physiotherapy intervention.

Strengths

The study addressed an important occupational health issue by focusing on women engaged in desk-bound jobs who are at high risk of physical inactivity and reduced flexibility.

A structured 12-week chair aerobics programme based on the FITT principle was implemented, making the intervention practical, safe, and easily applicable in workplace settings.

Validated and reliable outcome measures (OSPAQ, Back Scratch Test, and Chair Sit-and-Reach Test) were used to objectively assess changes in physical activity and flexibility.

Limitations

The study was conducted with a relatively small sample size, limiting the generalizability of the findings.

The absence of a control group restricted direct comparison and reduced the strength of causal inference.

The study included only female desk-bound workers; therefore, the findings cannot be generalized to males or other occupational populations.

Future Recommendations

Future studies should employ larger sample sizes with randomized controlled designs to strengthen the evidence regarding the effectiveness of chair aerobics.

Further research should investigate the long-term effects of chair aerobics and evaluate its impact on additional outcomes such as posture, musculoskeletal health, cardiovascular fitness, and quality of life.

CONCLUSION

In this pre–post study of 30 women engaged in desk-bound occupations, a structured 12-week chair aerobics programme was associated with significant changes in occupational sitting, standing and walking percentages and in the recorded upper- and lower-body flexibility measures. Chair aerobics may therefore be considered a practical, low-cost workplace physiotherapy strategy for reducing prolonged sitting and promoting regular movement and flexibility. Controlled studies with larger samples are required to confirm effectiveness and clinical relevance.

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