FR582

# Efficacy of Core Strengthening Exercise in Patient with Subacute and Chronic Work-Related Neck Pain

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Exercise is considered the recommended evidence-based approach for chronic neck pain management. Cervico-scapulothoracic strengthening or scapular stabilization exercise has proven to improve pain and neck disability index. However, there has yet to be a consensus on the specific type of exercise that is most effective for treating chronic neck pain. The scapular stabilization exercise, which is in the prone position, is laborious to do correctly and can lead to lower lumbar muscle fatigue. Meanwhile, basic core stabilization exercises such as Dead Bug, which are more accessible and can activate scapular stabilizer muscles, have not been studied in therapeutic exercises for neck pain. This study investigated the efficacy of core stability exercise with shoulder flexion movement (dead bug exercise) compared to scapular stabilization in the prone position with shoulder forward flexion and scapular retraction (prone Y lift exercise).

## Objectives

To study the efficacy of dead bug exercise compare to prone Y, the standard exercise in subacute and chronic work-related non-specific neck pain in pain score (NRS) and neck disability index (NDI) in short, intermediate and long term.

## Method

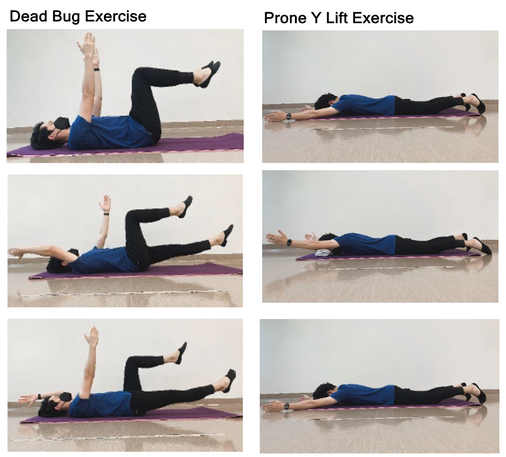
The study design was randomized control trial, assessor blind, non-inferiority trial. The study were approved by the ethical committee of the Institutional Review Board of the Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand.

Patients working in the same task 4 hours/day or 20 hours/week, aged 18-60 years old, with at least one month of neck pain and a pain score of 3-7 out of 10, were included. Patients were excluded if the neck pain was associated with trauma; patients had underlying rheumatological diseases, neurological diseases, spinal surgery, and adhesive capsulitis of the shoulder. Sixty-four patients were randomized into intervention (dead bug) and control (prone Y lift) groups. All participants received an education in working ergonomics, stretching exercises, and supervised exercise by a different physiotherapist for each group for two sessions, followed by a video call once a week. The exercise protocol was 3 sets/session, at least 3 sessions/week for six weeks. The exercise intensity progressed every 2 weeks by increase the repetition from 10 to 15 and 20 repetitions/set respectively. The NRS and NDI were collected before and after the 6-week exercise, 6-month and 12 months after the complete exercise program.

Table 1 Baseline Characteristics

| | Dead Bug group (n = 32) | Prone Y lift group (n = 32) | p-value |
|---|---|---|---|
| **Age (years), mean (SD)** | 38.66 (9.59) | 38.53 (9.35) | 0.96 |
| **Female, n (%)** | 26 (81.25) | 24 (75) | 0.76 |
| **BMI (kg/m2), mean (SD)** | 22.44 (3.85) | 23.33 (4.10) | 0.37 |
| **Duration of symptoms (years), median (IQR)** | 2.5 (1, 5) | 4 (1.5, 7) | 0.20 |
| **Work hours per week (hours), median (IQR)** | 40 (35, 43.5) | 35.5 (30, 43.5) | 0.35 |
| **NRS** | 5.75(1.02) | 5.43(1.16) | 0.256 |
| **NDI** | 13(4.25) | 14.97(4.61) | 0.080 |

Figure 1 Dead Bug and Prone Y Exercise




## Results

Sixty four patients were recruited and randomized into two groups (dead bug n= 32, prone Y n=32). All baseline characteristic are presented in Table 1. The results of the research showed that after 6-week exercise program, NRS and NDI decreased from baseline in both groups as shown in table 2. The mean change NRS for the dead bug group after 6-week of exercise was -2.53 (95% CI: -2.95 to -2.10, p<0.001) and for the prone Y lift group was -1.88 (95% CI: -2.36 to -1.39, p<0.001) (table 3). The mean change NDI for the dead bug group was -6.18, 95% CI: -7.77 to -4.60, p<0.001 and for the prone Y group was -6.61, 95% CI: -8.53 to -5.22, p<0.001) (table 3). NRS change in dead bug group was non-inferior to prone Y group as shown in figure 2. In addition, there was significant difference in the amount of change in NRS values of the dead bug group than the prone Y group (d= -0.66, p=0.042) (table 3). At sixth month and one year after complete the exercises program, the mean difference of NRS and NDI of both exercises still lower than baseline. In addition, the mean difference of NRS and NDI of dead bug group was non-inferior to prone Y lift group (table 3). The exercise adherence at 6-month follow-up, there were 13 participants in dead bug group and 15 participants in prone Y lift group routinely did exercise at least once at week and at 12-month follow-up, there were 11 and 12 participants in dead bug and prone Y lift group, respectively (graph 1)

## Conclusion

Dead bug exercise was non-inferior and superior to prone Y lift in pain improvement after complete 6-week exercise program. In addition, dead bug exercise was non-inferior to prone Y lift in pain improvement at 6- and 12-month follow up and neck disability improvement after 6-week exercise, 6-, and 12-month follow up.

## Clinical Implication

- ✓ Dead bug exercise and Prone Y lift exercise, as this study has shown, have the potential to significantly improve pain and neck disability after six weeks of exercise. This finding should instill a sense of hope and optimism in the potential of these exercises for chronic neck pain management.
- ✓ At least six weeks of exercise, with three sessions/week and intensity progression every two weeks, can improve short-, intermediate, and long-term pain.
- ✓ It's important to note that, as with many long-term treatments, adherence to the exercise regimen tends to decrease over time. This understanding of the challenges in chronic neck pain management is crucial for developing effective strategies to maintain patient engagement.

Table 2 NRS and NDI at Baseline, post-exercise, 6-mo follow-up and 12-mo follow-up

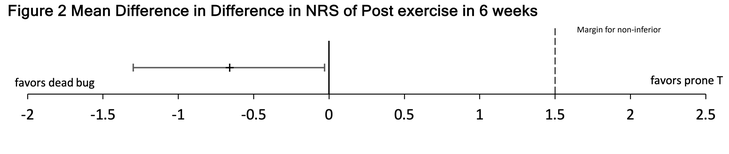
| | Dead Bug (n = 32) Mean (SD) | Prone Y (n =32) Mean (SD) | Mean difference (95% CI) |
|---|---|---|---|
| **NRS** | | | |
| **Baseline** | 5.75 (1.02) | 5.43 (1.16) | 0.31 (-0.23, 0.85) |
| **Post-exercise** | 3.22 (1.21) | 3.56 (1.44) | -0.34 (-1.01, 0.32) |
| **6-mo follow-up** | 3.47 (2.42) | 4.13 (1.95) | -0.47 (-1.58, 0.64) |
| **12-mo follow-up** | 3.65 (2.00) | 4.19 (2.28) | -0.44 (-1.52, 0.64) |
| **NDI** | | | |
| **Baseline** | 13 (4.26) | 14.97 (4.61) | -1.97 (-4.19, 0.25) |
| **Post-exercise** | 6.81 (3.68) | 8.09 (3.36) | -1.28 (-3.04, 0.48) |
| **6-mo follow-up** | 7.84 (5.16) | 10.66 (5.18) | -2.81 (-5.40, -0.23) |
| **12-mo follow-up** | 7.81 (4.40) | 10.44 (5.92) | -2.63 (-5.23, -0.02) |

Table 3 NRS and NDI at Baseline, post-exercise, 6-mo follow-up and 12-mo follow-up

| | Dead Bug (n = 32) Mean Difference in Change from Baseline (95% CI) | Prone Y lift (n =32) Mean Difference in Change from baseline (95% CI) | Mean Difference in Difference (95% CI) |
|---|---|---|---|
| **NRS** | | | |
| **Post-exercise** | -2.53 (-2.96, -2.10) | -1.88 (-2.36, -1.39) | **-0.66 (-1.29, -0.02) *** |
| **6 months** | -2.09 (-2.79, -1.39) | -1.31 (-1.92, -0.71) | -0.78 (-1.69, 0.12) |
| **12 months** | -2.06 (-2.69, -1.31) | -1.25 (-2.04, -0.46) | -0.75 (-1.77, 0.27) |
| **NDI** | | | |
| **Post-exercise** | -6.19 (-7.77, -4.60) | -6.88 (-8.53, -5.22) | 0.69 (-1.55, 2.93) |
| **6 months** | -5.16 (-7.29, -3.02) | -4.76 (-6.91, -2.61) | -0.74 (-3.77, 2.29) |
| **12 months** | -5.19 (-7.38, -3.00) | -4.53 (-6.39, -2.67) | -0.66 (-3.47, 2.16) |

Margin for non-inferior for NRS is defined as upper limit of 95%CI < 1.5
Margin for non-inferior for NDI is defined as upper limit of 95%CI < 14
*; significantly different in mean difference between group

Figure 2 Mean Difference in Difference in NRS of Post exercise in 6 weeks




Graph 1 Exercise Adherence at 6- and 12-Month Follow-up