Changes in pain and disability secondary to shoe lift intervention in subjects with limb length inequality and chronic low back pain: a preliminary report.

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FROM ABSTRACT

STUDY DESIGN: Pre-assessment and post-assessment of treatment intervention.

OBJECTIVE: To determine the changes in pain and disability secondary to shoe lift intervention for subjects with chronic low back pain (LBP) who have a limb length inequality (LLI).

BACKGROUND: Previous reports have suggested that LLI may be a cause of LBP. Most prior studies of lift therapy for management of LLI in patients with LBP have lacked clear guidelines for clinicians regarding the implementation of shoe lift intervention.

METHODS AND MEASURES: Twelve subjects (6 male, 6 female) between the ages of 19 and 62 years with LLI (6.4-22.2 mm) and chronic LBP (1-30 years) participated.

Visual analog scale pain ratings and disability questionnaire scores were acquired before and after lift intervention. Subjects determined their lift height based on resolution of LBP symptoms.

RESULTS: Subjects experienced relief of general pain symptoms and pain associated with standing following lift intervention, with clinically important reductions in general pain for 9 of 12 subjects and reductions in standing pain for 8 of 10 subjects.

Subjects also had less disability on the disability questionnaire following the intervention, with 9 of 12 subjects experiencing reductions in disability.

CONCLUSION: Shoe lifts may reduce LBP and improve function for patients who have chronic LBP and an LLI. Randomized controlled trials are needed to assess the efficacy of this intervention.
THESE AUTHORS ALSO NOTE:

“Low back pain (LBP) is a considerable health and socioeconomic problem affecting 70% to 80% of adults at some time in their lives.”

“LBP is the most frequent cause of activity limitation in individuals younger than 45 years and is the second most common reason for doctor visits in the US.”

“Over $25 billion is spent annually to treat LBP, not including the additional societal costs associated with time away from work and disability.”

Limb length inequality (LLI) may be a cause of LBP.

Patients with LLI often have increased pain from standing for 20 to 30 minutes, followed by immediate relief upon sitting. [Important]

Multiple studies report higher prevalence of LLI in individuals with LBP compared to control subjects.

Clinical (non radiographic) methods to detect LLI have less reliability and validity than radiographic methods.

Additional evidence to support the association between LLI and LBP is provided by studies showing significant improvement in patient’s low back symptoms following insertion of a shoe lift.

These authors assessed pain (using a visual analog scale) and disability (using the Oswestry questionnaire) in 12 patients with chronic LBP before heal lift insertion and approximately 1 month after achieving optimum shoe lift height.

The minimum LLI required for inclusion in this study was 1/4 inch (6.4 mm) as measured by a radiographic technique (below).

These authors note that shoe wear and orthotics have the potential to influence foot posture and therefore functional leg length.

“Radiographs were used to determine the magnitude of the LLI and not for any diagnostic purpose,” as follows:

1) A carpenters level is used to ensure the floor is level.
2) Subjects stand with equal weight on each foot.
3) Both knees are fully extended.
4) The feet are positioned so that the distance between the ankle joints are nearly the same as the distance between the two anterior superior iliac spines.
5) The central ray had to be positioned within 20 mm (less than 1 inch) of the upper level of the most superior femoral head. [Essentially, the central ray has to be as close as possible to the height of the higher femur head].

6) The difference between the most superior aspect of the two femur heads is measured to the nearest millimeter.

7) The magnitude of LLI is then multiplied by 0.8 to account for the magnification of the radiographic procedure to determine the actual LLI.

Shoe lift therapy was the only intervention the subjects received. Subjects were required to wear the shoe lift when they were walking or standing during the study.

Full-length shoe lifts were used until the shoe or height of the lift was not accommodating.

Shoe lift height began at 1/8 of an inch (3.18 mm) and was increased in increments of 1/8 inch every 7 to 10 days until optimum height was obtained based upon patient’s symptomatology. Other studies recommend increasing the height at intervals of every 1 to 2 weeks.

“Subjects were not allowed to use a magnitude of lift correction that exceeded the magnitude of their LLI.”

Twelve subjects, 6 women and 6 men were eligible and completed the study. The mean age for these subjects was 37 years (range 22 to 51). The mean duration of symptoms was 10.8 years (range 2 to 19 years). This indicates that their symptoms were chronic.

The mean percentage of LLI correction to become symptom free was 61.3% of the LLI determined by measuring of the radiographs (above).

The subjects in this study had received multiple treatments from healthcare providers, including:
83% had used over-the-counter pain drugs
50% had seen a chiropractor
42% had seen a physical therapist
33% had taken prescription pain drugs

“A majority of the subjects demonstrated improvement in the outcome measures between the two times of measurement, while approximately a third or less of the subjects demonstrated no change in the measures.”

75% of the subjects “had a clinically significant decrease in their general pain symptoms.”
70% of the subjects had a clinically significant decrease in their general pain symptoms associated with standing.
“These results are in agreement with previous lift intervention studies for which investigators reported significant relief of LBP after lift therapy for individuals with LLI. The results for the disability questionnaire suggests that a majority of our subjects had a clinically significant improvement in their function following corrective lift intervention.” [Important]

“The reduction in general pain and pain experienced with standing, and improvement in function were noted approximately 1 week following establishment of final lift intervention height.”

The lift therapy used in this study “had positive results for most subjects and was implemented at relatively little cost.”

Previous long-term (up to 15 years duration) shoe lift studies for patients with chronic LLI “reported significant long-term improvements relative to relief of low back symptoms.”

Increasing the height of the shoe life in increments of 1/8 inch was tolerated well by all subjects. Using this protocol, optimum shoe lift correction was achieved in an average of 28 days (range 15 to 41 days), with the exception of 2 subjects who also had a structural scoliosis. The 2 subjects with structural scoliosis required additional time to accommodate to the increase in shoe lift height.

“Radiographic methods are the gold standard for measuring LLI, as compared to clinical methods.” [Important]

Clinical methods to measure LLI are associated with error. The mean error magnitude in this study was 4.7 mm, with an upper range of 13.5 mm.

“Based on these preliminary results, we recommend that the total amount of LLI should not be corrected, and that the patient should determine the lift height based on their response to gradual lift intervention.”

CONCLUSIONS:

“Shoe lifts may reduce LBP and improve function for individuals who have chronic LBP and an LLI.”

“Clinicians should consider selecting the amount of corrective lift height based on the patient’s response to gradual increases in corrective lift, rather than correcting a fixed percentage of the LLI.”
KEY POINTS FROM DAN MURPHY

1) “Low back pain (LBP) is a considerable health and socioeconomic problem affecting 70% to 80% of adults at some time in their lives.”

2) “LBP is the most frequent cause of activity limitation in individuals younger than 45 years and is the second most common reason for doctor visits in the US.”

3) “Over $25 billion is spent annually to treat LBP, not including the additional societal costs associated with time away from work and disability.”

4) Limb length inequality (LLI) may be a cause of LBP.

5) Patients with LLI often have increased pain from standing for 20 to 30 minutes, followed by immediate relief upon sitting. [Important]

6) Multiple studies report higher prevalence of LLI in individuals with LBP compared to control subjects.

7) Clinical (non radiographic) methods to detect LLI have less reliability and validity than radiographic methods.

8) Additional evidence to support the association between LLI and LBP is provided by studies showing significant improvement in patient’s low back symptoms following insertion of a shoe lift.

9) Shoe wear and orthotics can influence foot posture and therefore leg length.

10) Clinical methods to measure LLI are associated with error. The mean error magnitude in this study was 4.7 mm, with an upper range of 13.5 mm.

11) “Radiographic methods are the gold standard for measuring LLI, as compared to clinical methods.” [Important] The best radiographic protocol for assessing LLI includes the following steps:
    A)) A carpenters level is used to ensure the floor is level.
    B)) Subjects stand with equal weight on each foot.
    C)) Both knees are fully extended.
    D)) The feet are positioned so that the distance between the ankle joints are nearly the same as the distance between the two anterior superior iliac spines.
    E)) The central ray is positioned within 20 mm (less than 1 inch) of the upper level of the most superior femoral head. [Essentially, the central ray has to be as close as possible to the height of the higher femur head]
    F)) The difference between the most superior aspect of the two femur heads is measured to the nearest millimeter.
12) Full-length shoe lifts are superior to heal lifts alone, as long as the shoe can accommodate the full-length lift.

13) Elevated shoe lift height should begin at 1/8 of an inch (3.18 mm). The height of the shoe lift should be increased in increments of 1/8 inch every 7 to 14 days until optimum height is obtained based upon patients symptomology.

14) Patients with structural scoliosis require additional time (more than 2 weeks) to accommodate to the increase in shoe lift height.

15) The total amount of LLI should not be corrected, and the patient should determine the lift height based on their response to gradual lift intervention. In this study, the average shoe lift used was 61% of the radiographic measured LLI.

16) Patients should not use a lift that exceeds the magnitude of their LLI.

17) Typically, the reduction in chronic LBP pain and improvement in function were noted approximately 1 week following establishment of final lift intervention height.

18) This study was able to obtain positive results in the treatment of chronic low back pain patients who had failed treatment by over-the-counter pain drugs (83%), chiropractic (50%), physical therapy (42%), and prescription pain drugs (33%).

19) In this study, 75% of the subjects “had a clinically significant decrease in their general pain symptoms.”

20) The lift therapy used in this study “had positive results for most subjects and was implemented at relatively little cost.”

21) Previous long-term (up to 15 years duration) shoe lift studies for patients with chronic LLI “reported significant long-term improvements relative to relief of low back symptoms.”

22) “Shoe lifts may reduce LBP and improve function for individuals who have chronic LBP and an LLI.”