


## The Effect of Using Thoracal Lumbar Sacral Orthosis (TLSO) on Alignment Kyphosis in the Elderly

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<p><b>Article History</b></p> <p>Received date: 06-02-2023          Revised date: 09-02-2023          Accepted date: 09-02-2023</p>	<p><b>Abstract</b></p>
<p><b>Keywords:</b></p> <p>(TLSO, Vertebral Alignment, Elderly)</p>	<p><b>Introduction:</b> The alterations that occur in the vertebrae are Kyphosis, Lordosis, and Scoliosis. Kyphosis affects many of the elderly. Kyphosis is a type of deformity wherein the human spine becomes bent. The most frequent alterations in the vertebrae are atilted head forward (cervical kyphosis), an increase in the thoracic kyphosis curve, a flattened lumbar curve (lumbar kyphosis), and a reduction in the width of the intervertebral discus, resulting in a lower height. The focus of this research was to study the effects of TLSO on vertebral alignment postures in older people with kyphosis. <b>Method:</b> This research is quasi-experimental research with one group pre and posttest design techniques. This research was conducted from March to October 2021 at the PosyanduLansia Sawahan, Ngemplak, Boyolali. Elderly who meet the requirements for this research subject include up to 30 elderly people. Each study subject will receive the TLSO intervention and then assess their spinal alignment before and after treatment. Paired Samples T-test was used to analyze the data in this study. <b>Result:</b> The application of TLSO had a statistically significant effect on alignment before and after the intervention (<math>t = 35.98</math>, mean difference = 8.34, and <math>p</math> value = 0.000). <b>Conclusion:</b> The use of TLSO has an impact on reducing spinal curvature so it is good for maintaining body posture according to normal alignment.</p>
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## Introduction

Aging, even in healthy elderly people, is accompanied by a reduction in muscle mass and muscle strength. The gradual loss of muscle strength (below a certain threshold) results in functional impairment, the need for assistance in the performance of daily activities, and an increased risk of falling and nonvertebral fractures. Therefore, the preservation of muscle strength in the elderly is of major importance (Janssen et al., 2002). Population aging is a global phenomenon that is associated with can be used for the progressive increase in life expectancy over the last few decades. Elderly patients present a variety of challenges for clinicians. Elderly patients tend to experience a decrease in bone mineral density (BMD) and a greater degree of spinal imbalance, therefore it can cause changes in vertebrae posture, namely kyphosis (Zhang et al., 2022).

In the elderly phase, physical, mental, social and health changes occur, this causes difficulties in performing ADLs, degenerative diseases, cognitive decline, balance disorders and others (Ariyanto et al., 2020). Maturity level changes cause a reduction in cognitive function, coordination, balance, muscle strength, reflexes, proprioception, changes in posture, and an increase in responsiveness (Wang et al., 2022). Functional muscle alterations include a reduction in muscular strength and contraction, elasticity and flexibility, as well as speed and reaction time. This creates changes in the structure of the bones, especially the vertebral column, affecting their posture (Ferrucci, L. et al., 2014). Kyphosis, lordosis, and scoliosis are all alterations that occur in the vertebrae. Kyphosis affects the majority of the elderly (Prastiwi et al., 2020).

Postural stability and balance decline with age. Furthermore, the magnitude of body shake increases with age (Alsubaie, S. F. 2020). Increased flexion postures occur in the elderly due to decreased stability of the soft tissues of the vertebrae, causing their center of gravity to collapse close to the stability limit. These changes can also occur in the elderly with kyphosis caused by osteoporosis (Sinaki et al., 2005).

In the elderly there will be an aging process, where this aging process is a process of slowly losing the ability of tissues to replace/repair themselves and maintain their normal functions so that they cannot survive infections and repair the damage suffered, functional changes in muscles, namely decreased muscle strength and contraction, muscle elasticity and flexibility, and speed and reaction time. Posture in maintaining balance is very important, especially for the elderly to carry out activities of daily life (Volpi et al., 2004). In addition, balance is also a cause of the risk of falling in the elderly (Bednarczuk, G., et al., 2022). Balance in the elderly consists of static balance (while still such as sitting, standing) and dynamic balance (when doing activities). There are several factors that affect balance in the elderly, including: Center of gravity (COG), line of gravity (Line of Gravity-LOG), fulcrum (Base of Support- BOS) (Sulaiman & Anggriani, 2018).

The orthotist/prosthetist's job in this case is to assist in the form of TLSO, Thoraco Lumbo Sacral Orthosis, which is an orthosis that corrects the alignment of the vertebrae, including the thoracic lumbar sacrum (Agabegi, S. S., et al., 2010). The usage of TLSO is intended to lower the kyphosis curve, lowering the tendency to fall in the elderly. Considering the effect and problems of stumbles in the elderly, it is vital to assess the factors that influence the incidence of falls in the elderly, one of which is improving vertebral alignment posture (Mousavi, M. E., et al., 2019).

## Methods

This study used a quasi-experimental design technique with one group pretest-posttest design. This research was conducted from March to October 2021 at the Sawahan Elderly Posyandu, Ngemplak, Boyolali. The elderly population at the Posyandu was 52 elderly, then a sample was selected using a purposive sampling method and 30 elderly people who met the requirements were the subjects of this study. In the first stage each research subject was taken pre-test data by measuring the curvature of kyphosis. In the second stage 30 subjects will receive TLSO intervention for 2 weeks and then post-test spinal alignment data will be collected. The independent variable in this study is the use of TLSO, and the dependent variable is spinal alignment. Ratio scale is the type

of data on this variable. Paired Samples T-test was used to analyze the data of this study.

## Results

Characteristics of continuous data study subjects in this study included age, arch length, alignment examination before treatment, and alignment examination after treatment. The

results of descriptive statistics on the characteristics of continuous data research subjects can be seen in table 1 as follows:

**Table 1. Characteristics of continuous data subjects**

Variabel	n	Min.	Max.	Mean	Std.Dev
Age	30	64	80	70,67	4,3
The length of the kyphosis arch	30	40	54	49,03	2,99
Alignment Pretreatment	30	26	34	29,47	2,2
Alignment Post alignment	30	16	27	21,13	2,59

Source: research data (2021)

The characteristics of the categorical data research subjects in this study were gender. The results of descriptive statistics on the characteristics of research subjects, categorical data, can be seen in Table 2 as follows:

**Table 2. Categorical Data Subject Characteristics**

Gender	f	Persentase(%)
Man	7	23,3
Woman	23	76,7
Total	30	100,0

Source: research data (2021)

The results of the normality employing the Shapiro Wilk test reveal that the pre-

alignment and post-alignment variables are normally distributed, specifically p-value Pre-alignment = 0.191, Post-alignment (p-value = 0.213). The paired samples t-test will be used to test the analysis. The results are as follows: the pre-alignment and post-alignment variables are normally distributed, with p-values for pre-alignment = 0.191 and p-value for post-

alignment = 0.213. The paired samples t-test will be used to test the analysis. The results are as follows:

**Table 3. Uji Paired Samples T-test (N=30)**

Variable	Mean	t	P value
Prealignment	29,47		
Post alignment	21,13	35,98	0,000

Source: research data (2021)

The results of the Paired Samples T-test on alignment obtained a t value of 35.98 with a mean difference of 8.34 and a p value of 0.000 where the p value < 0.05, it can be concluded that there is a difference in alignment before and after the intervention which is statistically significant. Research with the title The effect of using TSLO on alignment in the elderly who experience kyphosis at Poslansia Sawahan, Ngemplak, Boyolali shows that there is a difference in alignment before and after the intervention which is statistically significant (t = 35.98, mean difference 8.34 and p value = 0.000).

This means that the smaller the alignment value, the more parallel and aligned with the whole body so that it can improve alignment towards normal. Increasing age changes the view of the elderly by decreasing color acuity and vision which will affect balance and postural instability in the elderly, this is what causes the elderly to maintain body posture according to normal alignment.

## Discussion

Research entitled the effect of using TSLO on alignment in the elderly with kyphosis in Poslansia Ndibal, Ngemplak, Boyolali showed that there were differences in alignment before and after the intervention which were statistically significant (t = 35.98, mean difference 8.34 and p value = 0.000). This means that the smaller the alignment value, the more aligned and aligned with the

whole body so as to reduce the risk of falling. This is supported by a study which states that increasing age changes the view of the elderly by decreasing color acuity and sight vision which will affect balance and postural instability in the elderly, this is what causes the elderly to have a high risk of falling.

The accelerated growth of the elderly population requires an increasing urgency of practices and services that address the needs of this age group. Therefore, it is very appropriate to broaden understanding of old age, its specificities, including understanding of physiological, psychological and social aspects. The need for new theoretical instruments and models that can guide practice in relation to elderly health, based on an understanding of its breadth and complexity, as well as aspects of physical, psychological, social culture and historical changes, typical of the human aging process (Barbosa et al., 2020)

The problems that occur in the elderly are usually very visible in the decreased strength of large muscle groups. The muscles in the trunk (trunk) will have less ability to keep the body upright. The response of the postural muscles in maintaining posture also decreases. Postural muscle responses become less synergistic when working to maintain a position due to changes in position, gravity, fulcrum, and body alignment. In the hip (gluteal) muscles and muscles in the legs, such as the quadriceps, hamstring, gastrocnemius and tibialis muscle groups, they experience a decrease in ability in the form of fatigue, decreased ability, and atrophy which results in decreased body support and balance to falter easily (Kesehatan et al., 2009).

Kyphosis deformation of the spine is defined as a curve which shows an increase in the dorsal convex angulation. The basic principles of treatment are analysis of the kyphotic deformity and restoration or maintenance of the alignment. Kyphosis deformity that is clinically significant can cause severe pain, substantial cosmetic changes, spinal cord dysfunction, swallowing problems, gastrointestinal and cardiopulmonary complications. When the kyphotic deformity exceeds a certain point and conservative treatment options are no longer sufficient, surgical intervention is indicated (Rajasekaran, S. (2012).

Most of the elderly experience kyphosis, which is a form of abnormality that occurs in the human spine which becomes bent. The most common changes in the vertebrae include the head leaning forward (cervical kyphosis), increased thoracic kyphosis curve, flattened lumbar curve (lumbar kyphosis), decreased thickness of the intervertebral discs so that height is reduced (Niranjan Banik, Adam Koesoemadinata, Charles Wagner, Charles Inyang, 2013).

As a result of these changes will result in a decrease in the ability to maintain posture in the elderly. Seeing the impact and complications of falls in the elderly, it is necessary to evaluate the factors that influence the incidence of falls in the elderly, one of which is to improve vertebral alignment posture by administering therapy in the form of Thoraco Lumbo Sacral Orthosis (TLSO) which is an orthosis that corrects vertebral alignment which includes the thorax. lumbar sacrum. The use of TLSO is expected to reduce the kyphosis curve so that it can reduce the risk of falling in the elderly (Izzaty et al., 1967).

### Conclusion and Recommendation

Research on the use of the Thoraco lumbo sacral corset (TLSO) for vertebral alignment posture in the elderly showed significant results in improving body posture through improving vertebral alignment in the elderly to close to normal alignment. By improving alignment or posture, it is expected to maintain body posture in accordance with normal alignment. Also, according to the theory in his journal about balance in the elderly, the elderly need a normal body posture to improve good balance in order to achieve independence for the elderly (Cuevas-trisan, 2017).

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