

# EFFECT OF SOMATIC EXERCISE IN IMPROVING MUSCLE INDUCED OUT TOEING

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## Abstract

**Aim:** The aim of the study is to determine effect of the somatic exercise in improving out toeing that is caused due to various muscular imbalances.

**Methodology:** An experimental study was conducted by recruiting 50 healthy participants in the study both Male and Female were included and excluded on basis of neurological issues and previous history of surgery in lower limb.

**Tools:** Inch tape & Goniometer.

**Results:** The result showed that Inch Tape Measurement and Out-toe angle in Experimental Group improved in post-test comparatively. Significance of Inch Tape Measurement was  $P=0.0061$ , Out-toe angle - right leg is  $P=0.0144$  and Out-toe angle - Left leg is  $P=0.0023$ .

**Conclusions:** Our findings showed that out toeing are corrected by selective somatic exercise.

**Key Words:** out toeing, somatic exercise, Diaphragm, Hamstring,

## INTRODUCTION

Out toeing is a rotational deformity which is caused by femoral retroversion and external tibial torsion of the leg and is due to the tightness of the hip muscles which causes the toe to rotate outward. Out-toeing also paves way for increased risk of back, hip, and knee pain muscle tightness & poor posture<sup>(1)</sup>. External tibial torsion is the primary source for out toeing. The prevalence for out toeing among teenagers is around 7.4%<sup>(2)</sup>.

Foot loading patterns may be cautiously altered during out-toeing gait during barefoot walking because of the close relationship of the hamstring muscle to the major muscles of the body including the Diaphragm however out-toeing exaggerates the load on the medial aspect<sup>(3)</sup>. Out toeing is a compensatory movement, this Compensatory movement may occur for anatomical reasons, such as a tibia vara of 10 degrees or more, ligamentous laxity forefoot varus, leg length discrepancy because of muscular weakness or tightness in the gastrocnemius and soleus muscles<sup>(4)</sup>.

A femoral detorsion with a lateral tibial torsion can be seen from birth through the end of growth. Rotational anomalies of the lower limbs are caused by the severity of this condition, which prefer to as in-toeing or out-toeing<sup>(5)</sup>. Out toeing's (external rotation of the foot) early and

late stances are reduced by Knee adduction and achieved by changing the body's Center of Pressure mediolaterally.<sup>(8)</sup>

According to certain studies, weakening of the hip external rotator and weakness of diaphragm following hamstring tightness can also make the hip joint to internally spin leading to outtoeing<sup>(9)</sup>.

Out-toeing can be caused by both overuse and underuse of the hip and leg muscles. When the lower body muscles become stiff or weak, they impair the posture and leg position, causing the feet to turn outwards. External tibial torsion and external femoral torsion muscles are contracted muscles that cause the hip tibia to twist outwards. Femoral retroversion is a deformity induced by contractures in the hip's external rotators and external tibial torsion caused by hamstring muscle tightness.

Somatic exercises are set of exercises that help the clients to have a realization of their own way of movements, where they understand the movements and help the central nervous system to re program and heal any type of muscular programs at ease. This exercises utilizes a part of Intra personal intelligence a small part of the multiple intelligence that is used in day to day activities. Henceforth the purpose of this study is to use selective somatic exercises to correct and improve muscle-induced out toeing.

## METHODOLOGY

Healthy participants (N=50) were recruited into this study after briefing and signing informed consent. The inclusion criteria for the subjects were normal healthy participants & this study included 14 males and 36 females. The participants were excluded if they had any neurological issues and previous history of pain and surgery in lower limbs, other deformities, post fracture, language difficulties that may hinder the understanding of the informed consent and the subjects those who are unwilling or uncooperative.

Materials used were inch tape, goniometer and skin marker. The study focuses on the effect of muscle induced out toeing. The participants were asked to walk in their normal manner and was intimated to stand still without prior instruction. Then their out-toe angle was analysed without allowing them to change the position. The space between the great toes of both the feet were measured using inch tape and the degree was measured using goniometer. Naturally all participants were unknowingly standing with out toe making a V-shape with their feet's participants foot deviates than normal

## METHOD OF ANALYSING



**FIG.1** measuring the angle



**FIG.2 Measuring the distance between both legs**

**SELECTIVE SOMATIC EXERCISES- Fundamental pattern of Bartenieff**



**FIG 3. KNEE DROP**



**FIG 4. CROSS LATERAL**



**FIG 5(a). SPINAL SOMATIC**



FIG 5(b). SPINAL SOMATIC



FIG 6. SOMATIC BREATHING

Following the Pre measurement of the Out toing angle the subjects were given somatic exercises that included the whole body that relaxed various kinematic chain muscle and relaxed diaphragm which has a strong interrelationship with the lower muscle muscles and this training lasted for four weeks and the handouts were given to follow up exercises at home.

Following the completion of the exercises the subjects were asked to walk without knowing that they have been watched and they were asked to suddenly stop walking and look down for the improvement in out toeing. The post values of the improved angle was measured and statistically analysed.

#### STATISTICAL ANALYSIS:

The collected data was tabulated and analysed using descriptive and inferential statistics. To all parameters mean, median and standard deviation (SD) was used.

Out-toe angle and Inch tape measurement data are statistically measure in parametric statistics. Paired t-test was used to analyse the significant changes between pre-test and post-test measurements. Significance level of ( $p < 0.05$ ) was considered statistically significant

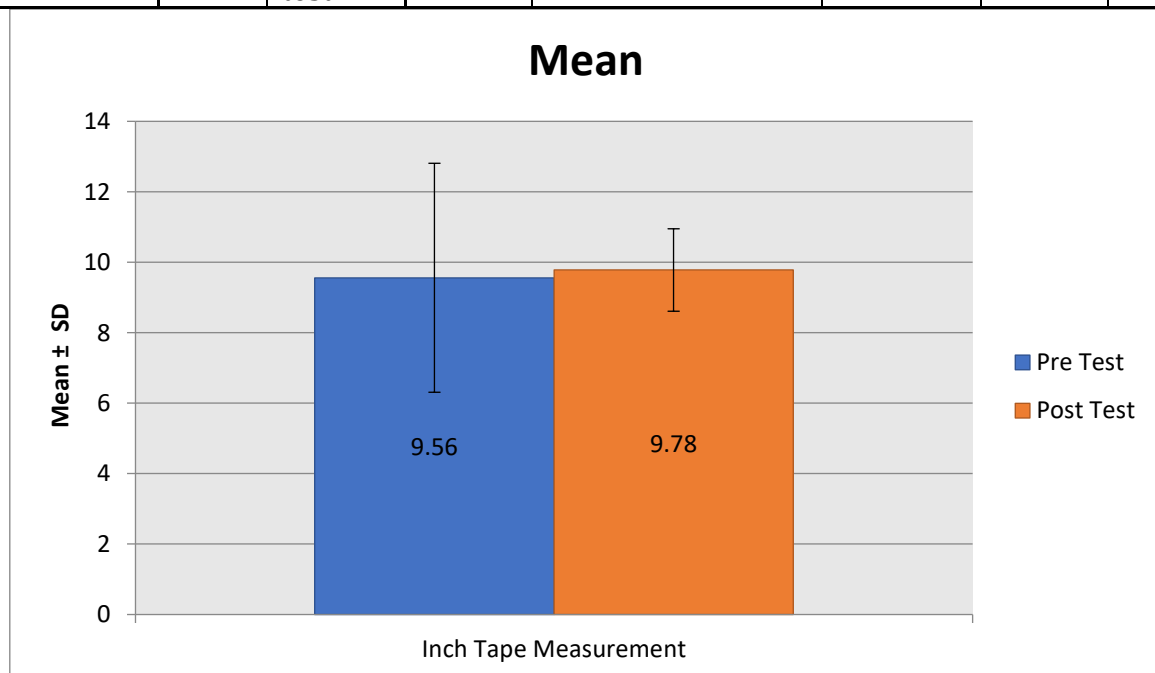
|        |           | Mean | Standard deviation | Std Err. | t value | p value |
|--------|-----------|------|--------------------|----------|---------|---------|
| Inches | Pre test  | 9.56 | 3.25               |          | 2.8664  | 0.0061  |
|        | Post test | 9.78 | 3.28               | 0.08     |         |         |

|        |       |           |        |       |       |        |        |
|--------|-------|-----------|--------|-------|-------|--------|--------|
| Degree | Right | Pre test  | 101.58 | 11.96 | 0.331 | 2.5364 | 0.0144 |
|        |       | Post test | 102.42 | 12.15 |       |        |        |
|        | Left  | Pre test  | 106.4  | 17.35 | 0.335 | 3.2151 | 0.0023 |
|        |       | Post test | 107.54 | 17.71 |       |        |        |

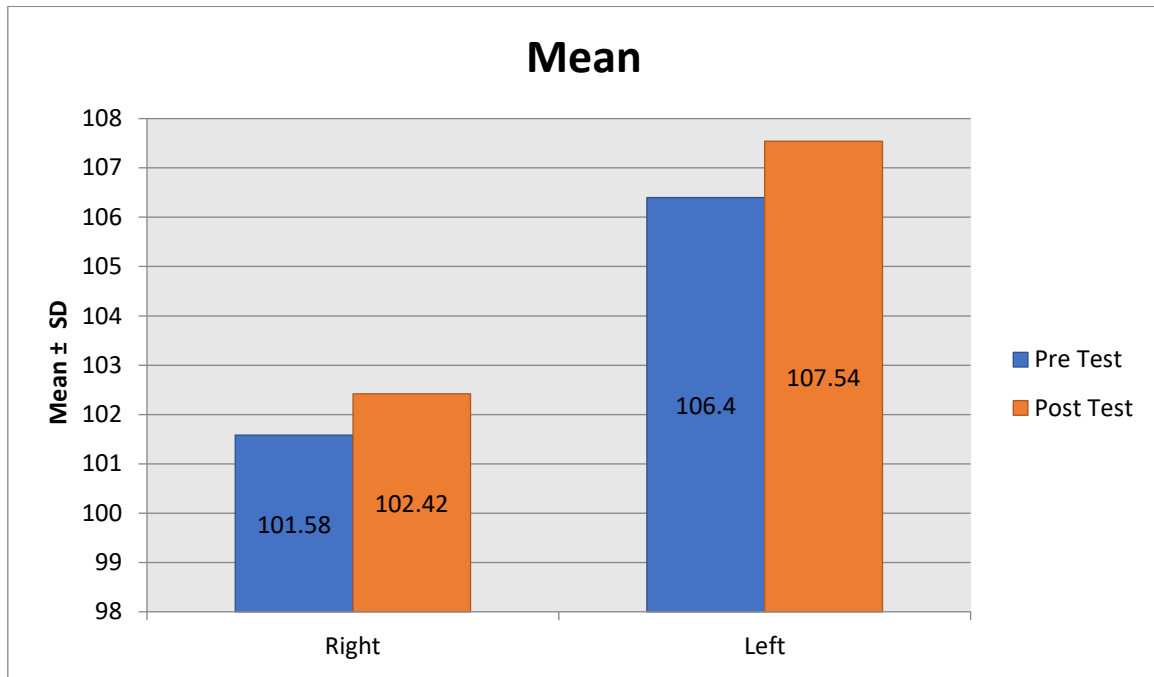
| Parameter | Post Test Values |       |        |       | Std Err. | t value | Significance |
|-----------|------------------|-------|--------|-------|----------|---------|--------------|
|           | Right            |       | Left   |       |          |         |              |
|           | Mean             | SD    | Mean   | SD    |          |         |              |
| Degree    | 102.42           | 12.15 | 107.54 | 17.71 | 3.037    | 1.6856  | 0.0951       |

**Table: Comparison of Pre-test and Post-test**

| Parameters       |       | Mean      | Standard deviation | Std. Error | t value | p value |        |
|------------------|-------|-----------|--------------------|------------|---------|---------|--------|
| Inch Measurement | Tape  | Pre test  | 9.56               | 3.25       | 0.08    | 2.8664  | 0.0061 |
|                  |       | Post test | 9.78               | 3.28       |         |         |        |
| Out-toe angle    | Right | Pre test  | 101.58             | 11.96      | 0.331   | 2.5364  | 0.0144 |
|                  |       | Post test | 102.42             | 12.15      |         |         |        |
|                  | Left  | Pre test  | 106.4              | 17.35      | 0.335   | 3.2151  | 0.0023 |
|                  |       | Post test | 107.54             | 17.71      |         |         |        |



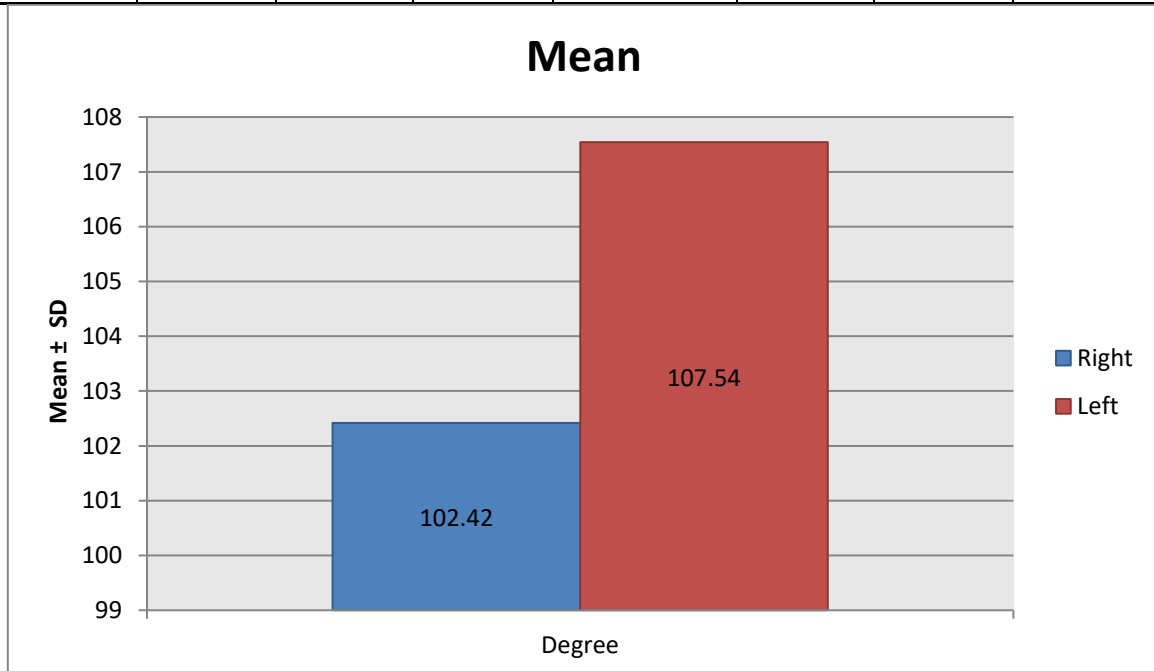
**Graph 1: Comparison of pre-test & post-test values in Inch Tape Measurement**



**Graph 2: Comparison of pre-test & post-test values in Out-toe angle**

**Table 2: Comparison of Post-test value of Right and Left Degree**

| Parameter | Post Test Values |       |        |       | Std Err. | t value | Significance |
|-----------|------------------|-------|--------|-------|----------|---------|--------------|
|           | Right            |       | Left   |       |          |         |              |
|           | Mean             | SD    | Mean   | SD    |          |         |              |
| Degree    | 102.42           | 12.15 | 107.54 | 17.71 | 3.037    | 1.6856  | 0.0951       |



**Graph 3: Comparison of Post-test value of Right and Left Degree**

## RESULT:

The statistical analysis was done using student paired t test with a confidence interval of 95% based on the degree of freedom the p value seems to be less than 0.005 and the quantitative data revealed a statistically significant difference between Pre-test and Post-test. This shows that Inch Tape Measurement and Out-toe angle in Experimental Group were pre-test and post-test comparatively significant of Inch Tape Measurement is  $P= 0.0061$ , Out-toe angle - right leg is  $P= 0.0144$  and Out-toe angle - Left leg is  $P= 0.0023$ . Statistical Analysis of post-test for Inch Tape Measurement and Out-toe angle revealed that there was very statistically significant difference seen between pre-test and post-test. Thus, Post-test has higher mean difference than Pre-test so we conclude the study is to be statistically significant there by accepting the alternate hypothesis

## DISCUSSION

Mohammad HadiNourai et.al 2011 stated that rotational deformities and especially external forms are highly expected to be corrected by conservative management. It is better to consider surgical procedures as the last therapeutic option for patients and our current study is in line with this finding.

Khan SJ, Khan SS, et.al 2019 Stated that Toe-in and toe-out gait modifications have significant effects on balance at higher levels of platform tilt and functional balance. Further investigations with knee osteoarthritis patients and electromyography may provide insight in balancing strategies adopted by the body in toe-out and toe-in gait; in lieu this study also provided a wider insight of primordial preventions through somatic exercise.

The present study was undertaken to evaluate efficacy of somatic exercise for normal individual's college students (teenager) healthy young age individuals, and also to assess the effectiveness of somatic exercise in improving Out-toe angle. The intervention was given for a period of 6 month. But when compared pre and post treatment it showed that somatic exercise has good improvement in correcting skeleton alignment and body-mind segment among college students. Additionally the improvement was checked comparing the right and left out toeing using independent t-test and we could find the improvement more appreciable in left in comparing with right and this may be because of the dominance.

The duration of 6-month treatment of program can improve correcting skeleton alignment and body-mind segment among college students. When the responses were compared with in the groups, the result showed significant difference in the Post-test than Pre-test. This study was conducted to the effects of somatic exercise in subjects with college students. This study was conducted on 50 individuals was taken from MAHER students set-up based on the inclusion and exclusion criteria. Prior to the study, the will explain and supervise the participants

Subjects were treated with somatic exercise for individuals with college students. Inch tape measurement and Out-toe angle was used as a tool for analysis, outcome measure was taken at the end of 6th month. In pre intervention mean of Inch tape measurement was  $9.56(\pm 3.25)$ , Out-toe angle - right leg was  $101.58(\pm 11.96)$ , and Out-toe angle - left leg was  $106.4(\pm 17.35)$ . After treating the subject with somatic exercise, the mean value of Inch tape measurement was  $9.78(\pm 3.28)$ , Out-toe angle - right leg was  $102.42(\pm 12.15)$ , and Out-toe angle - left leg was  $107.54(\pm 17.71)$ , which shows statistically significant difference within the groups.

Based on statistical analysis, somatic exercise showed improvement in Inch tape measurement and Out-toe angle. However, subjects who received somatic exercise showed better

improvement in Inch tape measurement and Out-toe angle in normal individuals among college students, at the end of 6 month. It should be noted that the variables selected in this study did not show any connection between them.

## CONCLUSION

From the result, it has been concluded that somatic exercise was found to be more effective in improvement correcting skeleton alignment and body-mind segment among college students. Naturally all of the individuals were standing with their toes in A V- shape causing their feet to diverge from the norm. With this study we discovered that somatic workouts aid in achieving optimum strength and correcting skeleton alignment and body-mind segment. Hence it was recommended to implement this treatment in clinical practice.

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