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# Assessing Pronated Foot Correction: A Comparative Analysis of Structured Exercise Programs and Conventional Barefoot Orthotic Support

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**Abstract**.

**Introduction:** The ankle joint, which connects the lower leg and foot and permits dorsiflexion and plantarflexion, is an important synovial hinge joint. The 26-foot bones that make up the ankle joint complex include 33 joints: talocalcaneal, tibiotalar, and transverse tarsal. Significant forces can be applied on the foot's ability to adapt to various surfaces during walking and running. This study looks at the effects of a structured exercise programme and a modified barefoot orthotic support on lower limb injuries, foot deformities, and biomechanics in individuals with pronated foot issues. The relationship between low back pain, knee adduction moments, pelvic motion, and foot mechanics is investigated in this study. Plantar pressure distribution and the effectiveness of bespoke foot orthoses for pronated feet symptoms are impacted by extrinsic rearfoot posts. To enhance pronation-related therapies, the study looks into foot type responses and dose-response effects.

**Material and Methods:** The study conducted at Krishna College of Physiotherapy in KIMSDU, Karad, "The Effectiveness of Structured Exercise Programme and Modified Barefoot Orthotic Support on Pronated Foot in Collegiates," uses a strict experimental design. A prevalence study of flexible flat foot was used to estimate the sample size of 100. SPSS-25 is used for statistical analysis, including paired and unpaired t-tests, in this study. Strict inclusion criteria centre on marked pronation, and measuring tools and materials are carefully selected for biomechanical evaluation. A thorough assessment is provided by outcome measures such as the Rearfoot Angle, Foot Posture Index, and Navicular Drop Test. A comprehensive investigation of long-term consequences can be conducted within the one-year timeframe, and the academic context lends legitimacy. The methodology makes a substantial contribution to the field of musculoskeletal health research by guaranteeing accuracy, validity, and relevance when examining therapies for pronated foot.

**Result:** The Structured Exercise Programme and Modified Barefoot Orthotic Support were implemented, and the results showed a considerable improvement in navicular drop, foot posture index, and rarefoot angle scores. These results provide strong proof of the usefulness of these therapies in reducing the negative consequences of pronated feet. The study supports the alternate theory while also validating the main hypothesis and offering insightful information to researchers and healthcare professionals.

**Conclusion:** In summary, this study advances our knowledge of successful treatments for disorders involving the pronated foot by highlighting the advantages of a structured exercise regimen and modified barefoot orthotic support. Improved management of pronated foot issues in a variety of populations is made possible by the thorough statistical analyses and thorough interpretation of the results, which highlight the effectiveness and dependability of these therapies.

**Keywords:** structured exercise programme, pronated foot, navicular drop test, foot posture index, barefoot angle, musculoskeletal disorders, biomechanics, intervention, patient comfort, neoprene, statistical significance, prevention, risk reduction, treatment protocol, orthotic materials, multifaceted interventions, proactive healthcare, ankle instability, plantar pain, knee pain.

## I. Introduction:

The ankle joint, which is a synovial hinge joint, creates the kinetic connection between the foot and lower leg, which is essential for gait patterns. The ankle joint complex, which consists of 33 joints made up of 26-foot bones and long limb bones, comprises the talocalcaneal, tibiotalar, and transverse tarsal joints [1]. The biggest foot bone, the calcaneus, engages with the talus and serves as an anchor for the Achilles tendon. Plantar- and dorsiflexion are mainly made possible by the tibiotalar joint, which joins the talus, fibula, and distal tibia. The transverse tarsal joint, which is a component of the subtalar joint functional unit, affects foot inversion-eversion, while the inferior tibiofibular joint provides stability. Foot and ankle mobility is propelled by compartmentalised extrinsic muscles. Because of its oblique axis, the tibiotalar joint—which is frequently thought of as uniaxial—experiences complicated motion [2]. Various movements are attributed to the axes of ankle complex rotation in the sagittal, coronal, and transverse planes. The ankle experiences stress up to five times body weight when walking and thirteen times when sprinting. The foot adjusts to various surfaces through inversion and eversion through pronation and supination. Ankle ligament sprains and other trendy disorders can result from the tension that high heels place on the lower limbs and spine. Function may be hampered by inherent or acquired deformities. Lower extremity kinematics are influenced by pronation, and musculoskeletal problems are associated with excessive pronation. The purpose of customised foot orthoses is to treat pronated foot problems [3]. Biomechanics is impacted by design elements such extrinsic rearfoot posts. FOs affect the distribution of plantar pressure, and exercises focusing on the intrinsic foot muscles can help reduce hyperpronation. This study investigates how well a planned workout regimen and customised barefoot orthotic support might shorten recovery times and enhance pronated foot outcomes. The ankle joint, categorized as a synovial hinge joint, is essential for enabling the lower leg and foot to interact, especially during tasks like walking. The ankle joint complex includes the talocalcaneal, tibiotalar, and transverse tarsal joints. It is made up of 26 foot bones and extra-long limb bone[4]s. The Achilles tendon is anchored by the calcaneus, the largest and most posterior bone in the foot, which also interacts with the talus. Conversely, the tibiotalar joint, which joins the talus, fibula, and distal tibia, is primarily responsible for plantar- and dorsiflexion movements. The transverse tarsal joint, which is regarded as a component of the subtalar joint functional unit, affects foot inversion and eversion, while the inferior tibiofibular joint concentrates on providing stability. Within the foot and ankle, motion is propelled by compartment-organized extrinsic muscles. The tibiotalar joint is commonly described as uniaxial, however its oblique axis affects its complex motion [5]. The varied movements of the ankle complex are further facilitated by rotation axes located in the sagittal, coronal, and transverse planes. Walking applies forces to the ankle that are five times the human weight; when running, these forces increase to thirteen times. The foot can adjust to various surfaces and situations through the processes of pronation and supination, which involve inversion and eversion. Wearing heels higher than five centimetres can put strain on the lower back and limbs, leading to what are known as "fashionable diseases," such as sprains of the ankle ligaments. Congenital or acquired deformities can affect how a body functions and can show up as changes to the normal structure of any portion of the body, from the head to the toe[6]. When excessive, pronation—which is acknowledged as a major determinant of lower extremity kinematics—has been connected to a few musculoskeletal conditions. For symptomatic pronated foot types, customised foot orthoses (FOs) are often given to treat problems such limited calcaneal eversion and muscle tuning. Extrinsic rearfoot posts, which can be slanted medially or laterally to regulate rearfoot movement during the stance phase of gait, are one of the design elements that affects how successful FOs are. FO use also affects the distribution of plantar pressure, and changes in material selection and application can change pressures [7]. Quantifying the dose-response effects of FOs on these parameters and comprehending the reaction of various foot types to interventions are, however, fairly limited in the research. This study explores the effectiveness of a modified barefoot orthotic support and organised exercise programme in shortening the duration of rehabilitation, improving outcomes, and improving outcomes for people with pronated feet [8]. The study also investigates the complex connection between the likelihood of lower limb injuries and aberrant foot mechanics. Elevated plantar pronation may cause biomechanical alterations in the lower limbs, which may result in proximal joint musculoskeletal problems. According to earlier studies, pronation torques can be significantly increased by misaligning the forefoot at ground contact, which increases the amount and duration of pronation while walking. Remarkably, disparities in the pronation of the foot have been identified in both young and old people. The study also looks into how foot pronation affects pelvic motion, and it finds that foot pronation causes an increase in pelvic ipsilateral descent when quiet standing. Walking with unilateral foot pronation may exacerbate pelvic drop and, as a result, increase the contralateral knee adduction moment [9]—a factor linked to the advancement of knee osteoarthritis—if this coupling mechanism continues. Furthermore, there is evidence connecting unilateral foot pronation to low back discomfort, highlighting the importance of understanding the biomechanical consequences of this pronation. Customised foot orthoses (FOs) are frequently given in the field of treatments to treat pronated foot types that present with symptoms. Reducing calcaneal eversion and adjusting muscle function are suggested modalities of intervention [10]. The scientific community is divided on the ideal degree of customisation needed for different foot problems and how to accomplish this. The extrinsic rearfoot post, which is intended to regulate rearfoot movement during the stance phase of gait, is the specific variable in FO prescription that is the subject of this study. It is claimed that a variety of biomechanical effects can be achieved by adjusting the angle of this post, however these effects have not yet been thoroughly characterised. The study also explores how plantar pressure distribution changes in response to FO consumption. There have been effects on pressures shown by material selection and modification (medial heel skives, for example). To measure the dose-response effects of FOs on these parameters and comprehend how various foot types react to such interventions, more research is necessary. To tackle the intrinsic causes that lead to foot pronation, the research looks at activities that target the intrinsic muscles of the foot. It is thought that concomitant hyperpronation might be lessened or controlled by strengthening this musculature. This strategy is in line with the study's overarching goal, which is to ascertain if a modified barefoot orthotic support and/or structured exercise programme can help people with pronated feet recover more quickly from their injuries and achieve better outcomes [11].

## II. Background Study

An inward rolling of the foot arch during weight-bearing activities is the hallmark of pronated feet, a common biomechanical problem that can have an impact on the health of the musculoskeletal system. Pronated feet are common in the general population, according to studies, and their effects on posture, locomotion, and general foot function are frequently highlighted. Pronated feet frequently result in abnormal biomechanics during gait and running, which can cause musculoskeletal problems like overpronation, increased ligament stress, and a susceptibility to diseases like plantar fasciitis. Pronated feet are common and have negative effects [12], which emphasizes the need for efficient interventions to address these biomechanical issues. The mainstays of current pronated foot therapies are exercise regimens, physical therapy, and orthotic devices. Although the goal of these methods is to improve foot function and lessen related issues, there are certain drawbacks, such as the difficulty in attaining long-term efficacy and individual variations in response. Novel techniques are being explored because there is a known gap in the literature for tailored and focused therapies for people with pronated foot. The biomechanics of pronated feet provide the scientific foundation for training regimens and orthotic assistance. Studies have examined how structured exercise regimens can strengthen the intrinsic muscles of the feet to reduce hyperpronation and enhance overall foot function. Furthermore, the possibility of foot orthoses, specifically modified barefoot orthotic support, to offer stability, align the foot correctly, and lessen hype pronation has been investigated [13]. These therapies make sense since they can affect foot mechanics and target the underlying causes of pronation-related problems. Important factors, such as extrinsic rearfoot posts, are critical to the construction of foot orthoses. By regulating rearfoot movement during the stance phase of gait, these design elements hope to affect the overall biomechanics of the foot [14], Nonetheless, disagreements continue to exist in the scientific community over the ideal degree of customization needed for various foot problems, which illustrates how difficult it is to meet the various demands of people who have pronated feet. Studies examining the connection between pronation, lower limb kinematics, and the likelihood of musculoskeletal injuries are also included in the literature. Affected lower limb biomechanics have been linked to pronated feet, which may exacerbate diseases including iliotibial band syndrome and patellofemoral discomfort. But there are still gaps and contradictions in the corpus of information that need to be filled to fully understand the complex relationship between pronation and musculoskeletal health. Given this backdrop, the investigation into the efficacy of structured exercise regimens and modified barefoot orthotic support for pronated feet stands out as a crucial one, especially considering the gaps in current knowledge and the demand for more individualised therapies. In closing these gaps, the research hopes to advance the fields of biomechanics and musculoskeletal health by offering insightful information about how to best serve people with pronated feet[15].

## III. Material and Methods

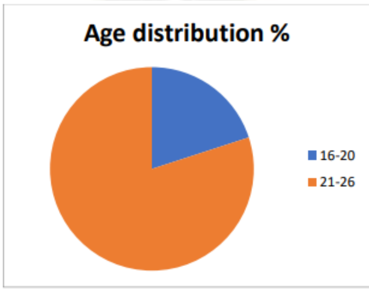
The study project "The Effectiveness of Structured Exercise Programme and Modified Barefoot Orthotic Support on Pronated Foot in Collegiates" uses an experimental design across a year in a comparative setting. The research is conducted at the prestigious Krishna College of Physiotherapy, which is located on the campus of KIMSDU in Karad. Using a straightforward sampling strategy, the study seeks to enlist 100 people in its sample, which is calculated using the formula n = 4pq / L^2, which is based on a previous study on the frequency of flexible flat foot. The study depends on the capabilities of the SPSS-25 software to handle the complex task of data analysis. It makes use of statistical tools such the unpaired t-test for inter-group comparisons and the paired t-test for pre- and post-results scrutiny. In addition to specialized instruments like the universal goniometer, barefoot orthotic support, and therapeutic bands, measuring instruments including scales, markers, protractors, and measuring tape are among the materials gathered for this scientific investigation. thorough inclusion and exclusion framework has been ensured by outlining the exacting criteria for participant selection. People who have a navicular drop greater than 10 mm, a positive foot posture index score, and a rearfoot angle greater than 5 degrees meet the inclusion requirements. Conversely, participants with recent fractures to the spine or lower extremities, post-traumatic ankle joint stiffness, or postoperative lower limb problems will not be allowed to participate in the study. The Navicular Drop Test is one of the outcome measures designed to assess the effectiveness of the organised exercise programme and modified barefoot orthotic support. It offers information about midfoot mobility and how it affects the kinetic chain. A clinical instrument called the Foot Posture Index assigns scores based on palpations and observations, which helps to provide a more comprehensive understanding of static foot posture. Finally, the degree of foot pronation is revealed by the Rearfoot Angle, which is assessed by palpating and marking at different points. The study methodology that was selected creates a well composed symphony of thorough planning, scientific rigour, and extensive assessment instruments. A comprehensive investigation of the possible long-term effects of the modified barefoot orthotic support and structured exercise programme is made possible by the one-year time frame. The research findings are given more credibility by the academic setting of Krishna College of Physiotherapy, which is housed inside KIMSDU, Karad. This academic setting fosters scholarly inquiry. With a strong statistical base, the study uses a straightforward random selection method to choose a sample size of 100 participants. This ensures a contextualised and pertinent approach, as the sample size formulation is in line with the main findings of a previous study on the prevalence of flexible flat foot. This careful selection of participants strengthens the study's defences against bias and improves the applicability of its conclusions to a larger population. The study's dedication to using state-of-the-art analytical methods is exemplified by its dependence on SPSS-25 software for data analysis. Sophisticated statistical methods that deepen the understanding of the data include the paired t-test for before and post-results and the unpaired t-test for inter-group comparisons. This methodological decision improves the validity and dependability of the study's findings in addition to serving as an excellent example of precision. The study's meticulous attention to detail is demonstrated by the array of measuring tools and instruments, which range from conventional measuring scales to specialised apparatus like the universal goniometer and barefoot orthotic support. In order to ensure that the study obtains a comprehensive understanding of the influence of the interventions on pronated feet, each tool selected has a specific function in the complex dance of biomechanical evaluation. Carefully designed inclusion and exclusion criteria serve as gatekeepers for participant eligibility, directing the study towards a specific cohort of feet that are clearly pronated. This accuracy protects the study's internal validity and permits a detailed investigation of the interventions' efficacy in a particular target population. Excluding participants with recent fractures or postoperative conditions reduces confounding variables and improves the findings' internal validity. The study is guided towards its aim by the three outcome measures, namely the Rearfoot Angle, the Foot Posture Index, and the Navicular Drop Test. Every metric contributes a distinct viewpoint to the assessment of foot biomechanics and posture, which when combined creates a thorough picture of the effectiveness of the organised workout regimen and customized barefoot orthotic support. To summaries', the study's methodology embodies a well-balanced combination of scientific accuracy, practical applicability, and a dedication to revealing the nuances of biomechanical corrections for feet that pronate. The study is set to make a significant contribution to the field of musculoskeletal health as it progresses within the revered halls of Krishna College of Physiotherapy. This methodological framework highlights the dedication to a strong and careful methodology, guaranteeing that the research successfully negotiates the difficulties of biomechanical assessment in people with deviated feet. Through the integration of random sampling, statistical analysis, and a meticulous selection procedure, the research aims to provide insight into the possible efficacy of the interventions being examined.

## IV. Observation & Result

### 1. Age Distribution

| Age Distribution | | |
|---|---|---|
| Range | No. | % |
| 16-20 | 20 | 20% |
| 21-26 | 80 | 80% |

**Table No. 1.**



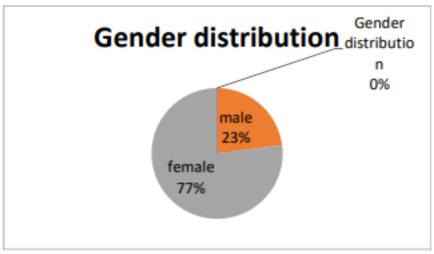

**Graph No. 1.**

Analysis: The distribution of ages is shown in the table and graph that are provided. In particular, 20 participants were between the ages of 16 and 20, while 80 participants were between the ages of 21 and 26.

### 2. Distribution of Gender

| Gender Distribution | | |
|---|---|---|
| | No. | % |
| Male | 77 | 77 |
| female | 23 | 23 |

**Table No. 2.**




**Graph No. 2**

Analysis: In accordance with the data presented in the table and graph that was presented before, the participants in the study consisted of 77 females and 23 males.

### Examination of Data

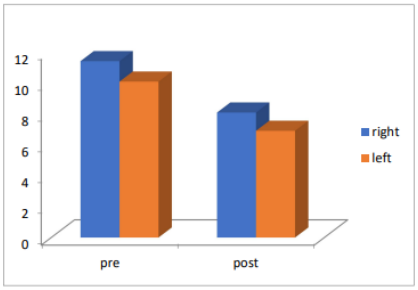
A. Test of Navicular Drop

1. within the group

| Navicular drop test | mean ± SD | p value | t value | significance |
|---|---|---|---|---|
| right pre | 11.4± 2.3 | <0.0001 | 12.34 | ES |
| right post | 8.08± 2.4 | | | |
| left pre | 10.8± 1.7 | <0.0001 | 13.12 | ES |
| left post | 6.9± 2.1 | | | |

**Table No.3.**

ES- Extremely Significant.




**Graph no. 3**

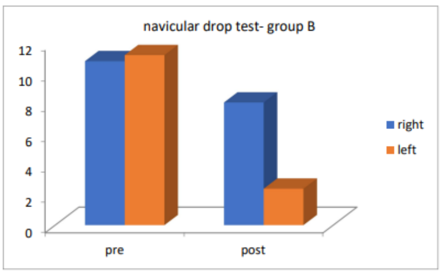
**Interpretation:** A closer look at the table and graph above shows that group A's pre- and post-navicular drop test results differ noticeably. The observed p-values demonstrate a statistically significant difference in the post-treatment outcomes between the participants.

### 2. In between B group

| navicular drop test | mean ± SD | p value | t value | significance |
|---|---|---|---|---|
| right pre | 10.9 ± 2.2 | <0.0001 | 12.13 | ES |
| right post | 7.2± 2.0 | | | |
| left pre | 11. 2± 1.7 | <0.0001 | 12.18 | ES |
| left post | 7.3± 2.4 | | | |

**Table no. 4.**

ES- Extremely Significant.




**Graph no. 4.**

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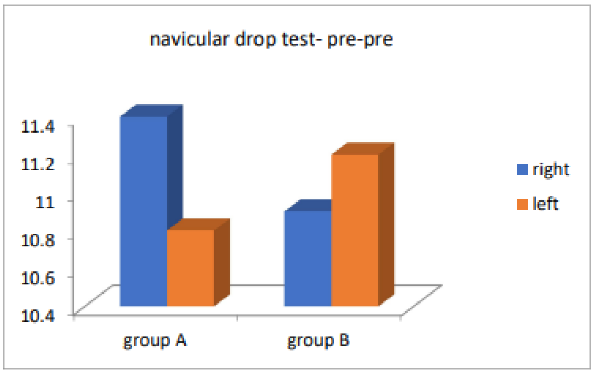
**Interpretation:** The pre- and post-test comparisons for Group B's Navicular Drop Test are shown in the table and graph above. P values showed that there was a statistically significant change in the post-treatment findings.

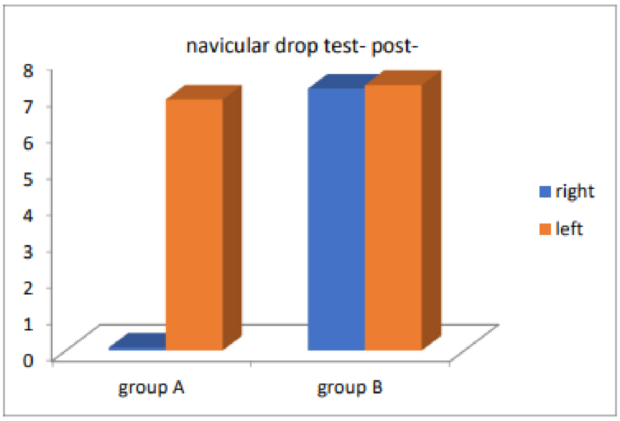
### 3. Between Both the Groups

| pre and post | group A- mean ± SD | group B- mean ± SD | p value | t value | significance |
|---|---|---|---|---|---|
| pre- right foot | 11.4 ± 2.3 | 10.9 ± 2.2 | 0. 31 | 1.003 | NS |
| pre- left foot | 10.8 ± 1.76 | 11.2 ± 1.72 | 0.20 | 1.2 | NS |
| post- rightfoot | o.08 ± 2.4 | 7.2 ± 2.0 | 0.01 | 1.89 | NS |
| post- left foot | 6.9 ± 2.1 | 7.3 ± 2.4 | 0.21 | 0.96 | NS |

**Table no.5**




**Graph no.5**




**Graph no.6**

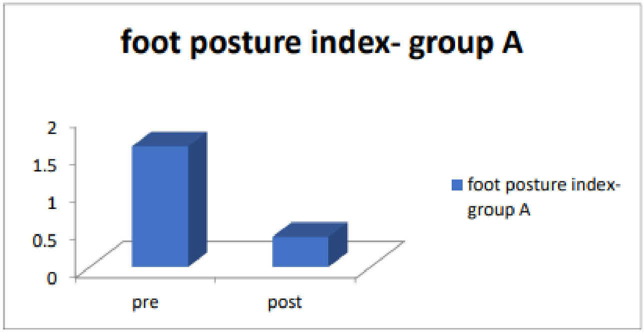
**Analysis:** The comparison of the Navicular Drop Test pre- and post-treatment outcomes is shown in the table and graph above. Notably, the obtained P values indicated a substantial difference in the post-treatment results.

### B. Index of Foot Posture

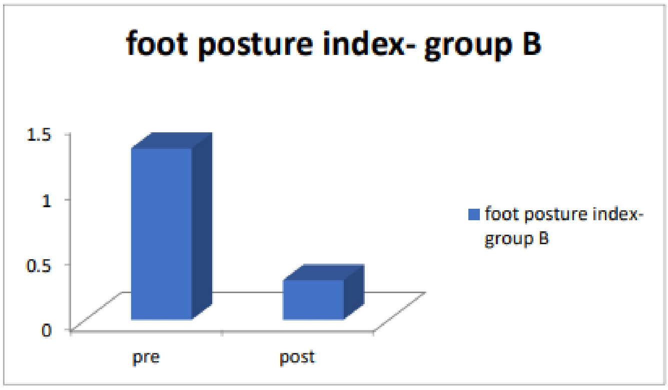
**Evaluations conducted before and after for Groups A and B**

| groups | mean ± SD | p value | t value | significance |
|---|---|---|---|---|
| group A- pre | 1.6 ± 0.4903 | <0.0001 | 11.7 | ES |
| group A- post | 0.4 ±0.4949 | | | |
| group B- pre | 1.3 ± 0.47 | <0.0001 | 10.9 | ES |
| group B- post | 0.3 ± 0.46 | | | |

**Table no.6**




**Graph no. 7**



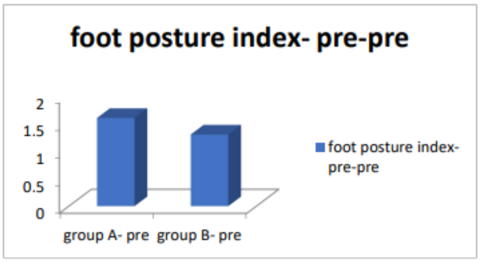

**Graph No.8**

**Interpretation:** The comparison of the pre and post foot posture indexes is shown in the table and graph above. The P values show that there is a highly significant difference in the post-treatment findings.

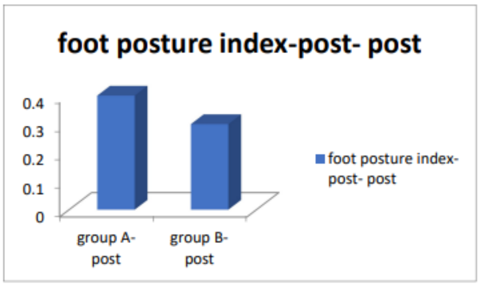
### 2. Between Both the Groups

| pre and post | mean ± SD | p value | t value | significance |
|---|---|---|---|---|
| pre-A | 1.6 ± 0.4903 | 0.0047 | 2.8 | ES |
| pre-B | 1.3 ± 0.47 | | | |
| post A | o.4 ± 0.4949 | 0.29 | 1.04 | NS |
| post B | 0.3 ± 0.46 | | | |

**table no. 7**




**Graph No.9**




**Graph No.10**

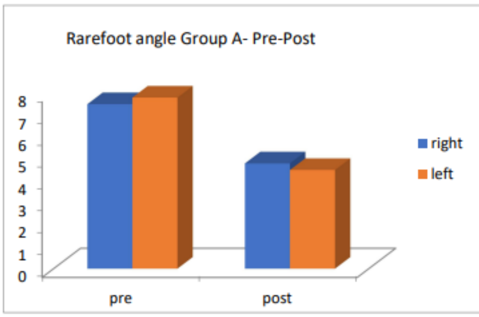
**Analysis:** The comparisons of the Foot Posture Index before and after therapy are shown in the table and graph above. The pre-treatment phase shows a highly significant difference, as indicated by the P values. Nevertheless, there was no statistically significant difference between groups A and B's post-treatment outcomes.

### C. Angle of Rearfoot

#### I. Among those taking part in Group A

| Rarefoot angle | mean ± SD | p value | t value | significa |
|---|---|---|---|---|
| right pre | 7.5 ± 1.9 | <0.0001 | 12.4 | ES |
| right post | 4. 8 ± 1.8 | | | |
| left pre | 7.8 ± 1.8 | <0.0001 | 17.3 | ES |
| left post | 4.5 ± 1.9 | | | |

**Table no. 8**



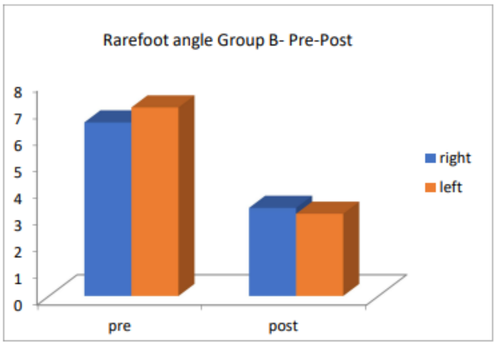

**Graph No.11**

**Analysis:** The rearfoot angle pre- and post-comparison in Group A is shown in the table and graph above. The P values for the post-treatment findings demonstrate an unusually significant change.

#### 2. Between Group B

| Rarefoot angle | mean ± SD | p value | t value | significance |
|---|---|---|---|---|
| right pre | 6.5 ± 1.7 | <0.0001 | 13.4 | ES |
| right post | 3.3 ± 1.2 | | | |
| left pre | 7.8 ± 1.8 | <0.0001 | 14.1 | ES |
| left post | 3.08 ± 1.0 | | | |

Table no. 9



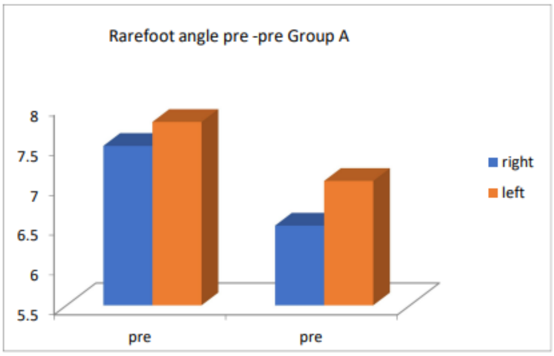

**Graph no.12**

**Analysis:** Pre- and post-rarefoot angles for group B are compared by analysis of the table and graph. The P values show that there is a highly significant difference in the post-treatment findings.

#### 3. Between Both Groups

| | Rarefoot angle | mean ± SD- group A | mean ± SD- group B | p value | t value | significance |
|---|---|---|---|---|---|---|
| pre | right | 7.5 ± 1.9 | 6.5 ± 1.7 | 0.008 | 2.6 | VS |
| | left | 7.8 ± 1.8 | 7.06 ± 1.86 | 0.04 | 1.9 | ES |
| post | right | 4.8 ± 1.8 | 3.3 ± 1.2 | <0.0001 | 4.8 | VS |
| | left | 4.5 ± 1.9 | 3.08 ± 1.0 | <0.001 | 4.5 | ES |

**table no. 10**




**Graph no 13**

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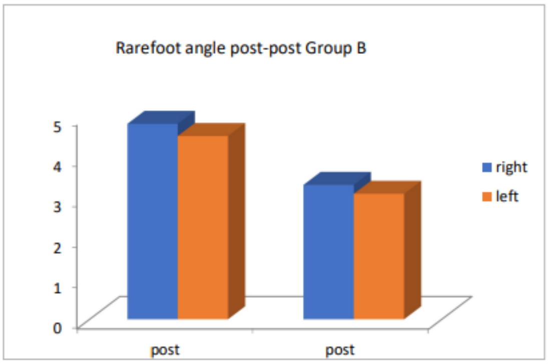
**Analysis:** The rearfoot angle within Group A is compared before and after in the table and graph shown above. The observed P values provide evidence of a significant difference between the pre- and post-treatment measurements in the data.




**Graph No 14**

**Analysis:** The rearfoot angle comparison for Group B after treatment is shown in the table and graph above. The statistical significance shown by the P values indicates a significant difference in the post-treatment outcomes.

## V. Discussion

The current study's main goal was to find out how well a modified barefoot orthotic support and structured exercise programme worked for college students who had pronated feet. The study focused on college students who demonstrated particular traits linked to pronated feet, such as a navicular drop greater than 10 mm, a positive foot posture score, and a rarefoot angle greater than 5 degrees. Numerous musculoskeletal conditions, such as plantar fasciitis, metatarsalgia, low back pain, heel pain, and patellofemoral pain, have been linked to pronated foot position.

Ground response forces are largely absorbed by foot pronation, a natural movement that is essential to the development of a healthy gait. On the other hand, excessive pronation may cause the medial longitudinal arch to collapse, which would increase the strain on the muscles in the foot and leg. About 21% of adults suffer from pronated foot disorders, which impair lower limb biomechanics and exacerbate conditions like tibia and femur rotation, anterior pelvic tilt, and severe lumbar lordosis. Pronation also affects how muscles activate, which may result in discomfort and other dysfunctions. The purpose of the study was to determine how college students' pronated feet were affected by a modified barefoot orthotic support and a regimented exercise programme. The program's combined effects with traditional barefoot orthotic support and the combined effects of traditional exercises with modified barefoot orthotic support were to be evaluated. 77 females and 23 guys, ages 16 to 26, participated in the study. The recommended duration of the three-month treatment plan was five days a week, with 10–12 hours a day of barefoot orthosis wear. The navicular drop test, foot posture index, and barefoot angle were among the outcome measures used. The goal of Group A's organised exercise programme and traditional barefoot orthosis was to strengthen the hip muscles in order to improve lower limb alignment and reduce the risk of injury. Group B received modified barefoot orthotic support in addition to standard activities. The latter group's much improved pronated foot conditions were likely caused by the intrinsic foot muscles' weariness, which exacerbated the pronated foot condition. Notably, there were notable and noteworthy developments in the usage of modified barefoot orthotic support made of neoprene for comfort and efficacy. Although the navicular drop test and barefoot angle score improved under Group A's structured exercise programme, the discomfort of wearing a traditional orthosis made it difficult for the programme to maintain proper foot posture. With modified barefoot orthotic support and traditional workouts, Group B significantly improved on all evaluated parameters and demonstrated higher levels of comfort than Group A. The navicular drop test, rarefoot angle, and foot posture index were among the evaluation instruments used in the study that were successful in treating pronated foot issues and enhancing posture. The results highlight the efficiency of the therapies in improving pronated foot postures and lowering the risk of related musculoskeletal diseases and injuries. They are further supported by statistically extremely significant p-values. The study's particular focus on pronated foot abnormalities among college students deepens our knowledge of how well therapies work in a group that is more likely to be active and more vulnerable to musculoskeletal problems. The common issue of pronated foot posture was addressed with a well-organized treatment plan that included both orthotic support and training regimens. The use of particular outcome measurements, like the rare foot angle, foot posture index, and navicular drop test, allows for a thorough assessment of the therapies' effects. By using validated evaluation instruments, this methodological approach is in line with recent literature and affirms the study's contribution to the area. Important insights into the relative efficacy of these approaches can be gained from the distinction between Group A and Group B interventions, wherein Group A received structured exercises and traditional barefoot orthosis, and Group B received conventional exercises with modified barefoot orthotic support. The noteworthy enhancements noted in both cohorts highlight the complex character of the therapies, underscoring the possible advantages of customized exercise regimens and orthotic assistance. The difficulties encountered by Group A underscore the significance of taking patient comfort into account while developing treatment strategies, especially in light of the discomfort attributed to traditional orthosis materials. The selection of materials improved user comfort in addition to effectiveness, as demonstrated by the use of neoprene in the modified barefoot orthotic support. Treatment adherence and general patient satisfaction depend on this factor. The study's focus on lowering the risk of injuries and preventing musculoskeletal illnesses is consistent with modern healthcare paradigms, which place an emphasis on proactive therapies to improve general well-being. The ability of the therapies to significantly impact foot biomechanics and minimise the risk of related disorders is validated by the observed improvements in navicular drop scores and foot posture index. The study's findings are strong and the effectiveness of the structured exercise programme and modified barefoot orthotic support is supported by the statistically extremely significant p-values. The fact that the study was able to improve symptoms related to pronated feet, hence reducing knee pain, low back pain, ankle instability, and plantar pain, highlights the usefulness of the findings. As a result, this study adds significantly to our understanding of pronated foot issues and provides college students with useful, nuanced insights on intervention strategies. The research makes a significant contribution to the current discussion on musculoskeletal health and preventive treatment by integrating evidence-based approaches, patient comfort concerns, and a thorough examination of outcomes.

## VI. Conclusion

This study found that the Structured Exercise Programme and Modified Barefoot Orthotic Support improved navicular drop, foot posture index, and barefoot angle scores in pronated foot patients after a thorough statistical analysis, presentation, and interpretation. These important measures show that the Structured Exercise Programme and Modified Barefoot Orthotic Support improve pronated foot postures. The findings support the study's main hypothesis and demonstrate these therapies' efficacy in reducing pronated foot symptoms. Thus, the study supports the alternative theory by showing that the Structured Exercise Programme and Modified Barefoot Orthotic Support significantly improve pronated foot problems. These interventions are reliable and significant, and the full statistical analysis and comprehensive interpretation of the outcomes provide healthcare practitioners and academics with useful insights.

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