



ISSN Print: 2394-7500  
ISSN Online: 2394-5869  
Impact Factor: 8.4  
IJAR 2021; 7(4): 319-325  
[www.allresearchjournal.com](http://www.allresearchjournal.com)  
Received: 14-02-2021  
Accepted: 26-03-2021

**Nikita Bhaskar Thool**  
Intern L.S.F.P.E.F'S College  
of Physiotherapy, Nigdi, Pune,  
Maharashtra, India

**Dr. Pallavi Chicholikar**  
Associate Professor,  
Department of in  
Cardiovascular and  
Respiratory Science,  
L.S.F.P.E.F'S College of  
Physiotherapy, Nigdi, Pune,  
Maharashtra, India.

## Comparison between effects of yoga postures and foam rolling exercises for improving hamstring flexibility among young population

**Nikita Bhaskar Thool and Dr. Pallavi Chicholikar**

### Abstract

**Introduction:** Yoga practices enhance muscular strength and body flexibility. Self Myo-fascial release is a popular intervention used by both rehabilitation and fitness professional to enhance myo-fascial mobility. Common SMR tools include the foam roller.

**Aim:** To compare effects on hamstring flexibility by foam rolling exercises and yoga postures using 90-90 straight leg raising test in young population.

**Procedure:** A study was conducted on 100 students between age group of 18-25 for duration of 4 weeks. Group A and B each consisted of 50 subjects. Group A were given yoga postures and Group B were given foam roller. Results were analysed using 90-90 straight leg raising test and using goniometer at the end of the 4<sup>th</sup> week.

**Results:** Data was analysed by using paired t test and unpaired t test. Within the groups(pre and post) paired t test was used. And in between the Groups unpaired t test was used. There was no dropout of the patients from the study.

**Conclusion:** Yoga postures and foam roller are clinically significant for improving hamstring flexibility after hamstring flexibility has improved in both A and B Groups. We concluded that yoga postures may be more effective as compared to foam roller and can be given without any assistive devices but under observation by professional yoga instructor after proper evaluation of a patient by a physiotherapist.

**Keywords:** Hamstring flexibility, foam roller, goniometer, 90-90 straight leg raising test

### Introduction

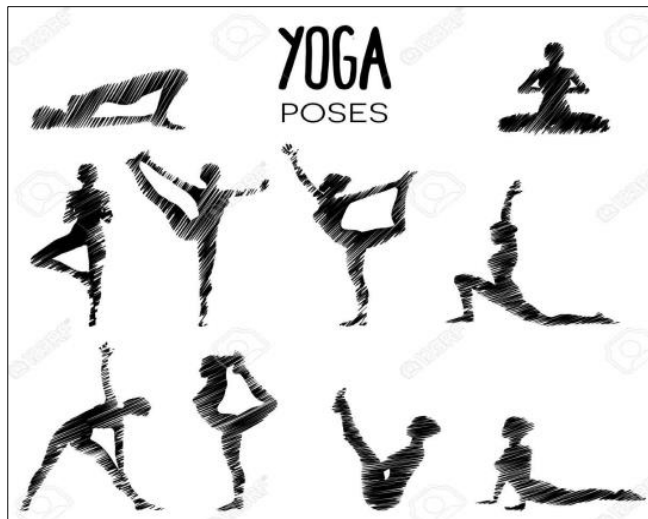
Yoga is an ancient physical and spiritual discipline and branch of philosophy that originated in India reportedly more than 5000 years ago.

Yogic practices enhance muscular strength and body flexibility, promote and improve respiratory and cardiovascular function, promote recovery from and treatment of addiction, reduce stress, anxiety, depression, and chronic pain, improve sleep patterns, and enhance overall Well-being and quality of life <sup>[1]</sup>.

Yoga helps the muscles, tendons and ligaments move through a full range of motion, thus cultivating balance and core strength. Yoga helps you to relax not just tight muscles but also anxious and overstressed minds <sup>[13]</sup>.

Yoga differs from other typical forms of exercise training as it requires multi-structural involvement that gives a difficult task to the body in various way. Proper positioning through yoga enhances movement abilities and reduces movement limitation, thus improves body functioning among athletes. It also helps to maintain continuous and stable breathing through a series of Asanas (static posture) involving required muscle groups under tension. Interacting breathing mechanism to the tensed musculoskeletal system brings comprehensive changes to the whole body while performing those Asanas <sup>[14]</sup>.

**Corresponding Author:**  
**Nikita Bhaskar Thool**  
Intern L.S.F.P.E.F'S College  
of Physiotherapy, Nigdi, Pune,  
Maharashtra, India



In physiotherapy field there are many techniques for improving flexibility such as proprioceptive neuromuscular facilitation (PNF) stretching, dynamic ballistic stretching, self myofascial release technique.

Self- myofascial release (SMR) is a popular intervention used by both rehabilitation and fitness professionals to enhance myofascial mobility. Common SMR tools include the foam roll and various types of roller massagers. Evidence exists that suggests these tools can enhance joint range of motion (ROM) and the recovery process by decreasing the effects of acute muscle soreness, delayed onset muscle soreness (DOMS), and post exercise muscle performance. Foam rollers and roller massage bars come in several sizes and foam densities.

Fascia is connective tissue that surrounds muscles, nerves, blood vessels and connects structures of the body. Fascia can become restricted due to injury, disease, inactivity, or inflammation. These restrictions can decrease flexibility, strength<sup>[2]</sup>.

The purpose is to stretch the fascia and facilitate histological length changes to relieve some of the symptoms of fascial restriction such as pain and restricted ROM. Devices are currently being created and tested to be used to replicate myofascial release techniques so that individuals can do their own assisted fascial releases at home without the aid of a therapist.

One such device that has been shown to increase flexibility prior to physical activity is a foam roller. The foam roller is

a dense foam cylinder that a person rolls their bodyweight over to increase ROM for a specific body region, as a type of self- massage<sup>[2]</sup>.

This essentially means that by applying pressure to certain areas of soft tissue surrounding muscles in the body, they help reduce localized muscles tightness.

Using foam roller correctly and regularly provides numerous health benefits and effects for the user. Using foam roller helps to restore our muscles to their normal function after strenuous activity, thus helping to improve their flexibility.

Yoga is an ancient form which requires dedication, sincerity, self-control. Also, it does not require any cost. But it requires training but once you are trained you can perform without any supervision. On the other hand, foam rolling is one of the newest techniques which require assistive devices to improve flexibility. Both techniques are individually proved for improving flexibility.

### Need of Study

- Both the techniques are individually proved for improving flexibility, but few Researches has done on comparison between these two studies.
- Hence need of study is to see which is more effective for improving flexibility with less use of assistive devices.

### Aim

- To compare effect of yoga posture and foam rolling on hamstring flexibility in young population.

### Objective

- To study the effect of yoga on flexibility in hamstring muscles by using 90-90 straight leg raising test.
- To study the effect of foam roller exercises on hamstring muscles by using 90-90 straight leg raising test.
- To compare the effect of both techniques by using 90-90 straight leg raising test.

### Research Question

Which method between Yoga postures and Foam rolling exercises is more effective in improving hamstring flexibility in young population.

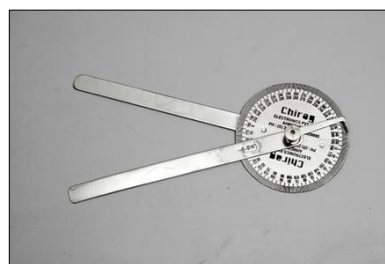
### Material Used



Foam Roller



Yoga Mat



Goniometer

## Methodology

- **Types of study:** Interventional study
- **Sampling Method:** Purposive sampling
- **Study population:** Young students (18-25 age)
- **Sample size:** 100
- **Study area:** PCMC Pune

## Outcome measure

Range of motion by Goniometry (90-90 Straight leg raising test).

## Inclusion criteria

- Young Population
- People having Hamstring tightness
- Age (18-25)
- Both male and female

## Exclusion criteria

- Recent injuries to knee
- Hypermobility
- Recent injuries of hip
- Any hip knee musculoskeletal disorder

## Hypothesis

- **NULL Hypothesis** – There is no difference between the effect of foam rolling and yoga on flexibility in hamstring.
- **Alternative hypothesis** – Yoga is more effective in improving flexibility of hamstrings as compared to foam roller.
- **Foam roller** is more effective in improving flexibility of hamstrings as compared to yoga.

## Procedure

Ethical approval was taken and written consent was taken from the ethical committee. Subject were selected by purposive sampling. Total 100 students were screened for hamstring muscle tightness. Hamstring muscle tightness was assessed using 90-90 straight leg Raising test. Dividing them into group- A(50) & B (50) using simple random sampling. Pre-assessment to check flexibility was done using 90-90 Straight Leg raising test.

## Group A –was given 4 yoga postures

1. Standing forward bend –uttanasana
2. Downward facing dog pose – adho mukha
3. Triangle pose - trikonsana
4. Side lunges-skandasana

Hamstring stretching poses (every yoga pose mentioned above should hold for 30 sec.).

Group B- was given foam rolling exercise for hamstring stretching. (The first step begin in a seated position with your hands on the floor. Place your foam roller under your knees. And slowly begin moving the roller up toward the hips. Be sure to rock your weight back and forth). The protocol was given for 30-60 sec., 2-5 repetition for 3 days (continuously) every week for 4 weeks. Relaxation time was given 5-10 sec. in between the sessions. Post –assessment reading to check hamstring tightness was taken by 90-90 hip knee extension test using goniometer.

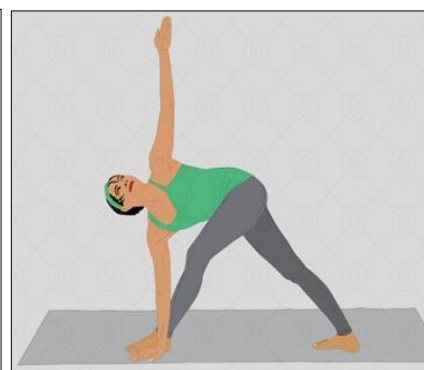
Readings were taken after the 4th week of session. Then data was analyzed and results were obtained.



1. Uttanasana



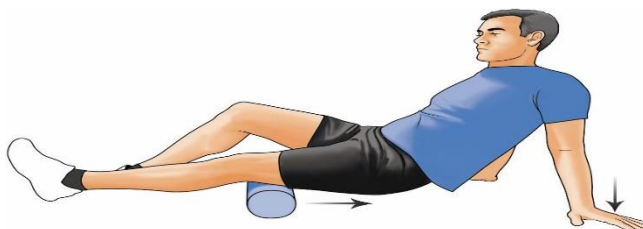
2. Adho Mukha Svanasana



3. Trikonasana



4. Skandasana



Foam Roller for Hamstring

## Data analysis and statistical analysis

Paired t test was done for comparing the values within the groups i.e. to measure the pre and post values of hamstring tightness in Group A (Yoga) and Group B (Foam Roller)

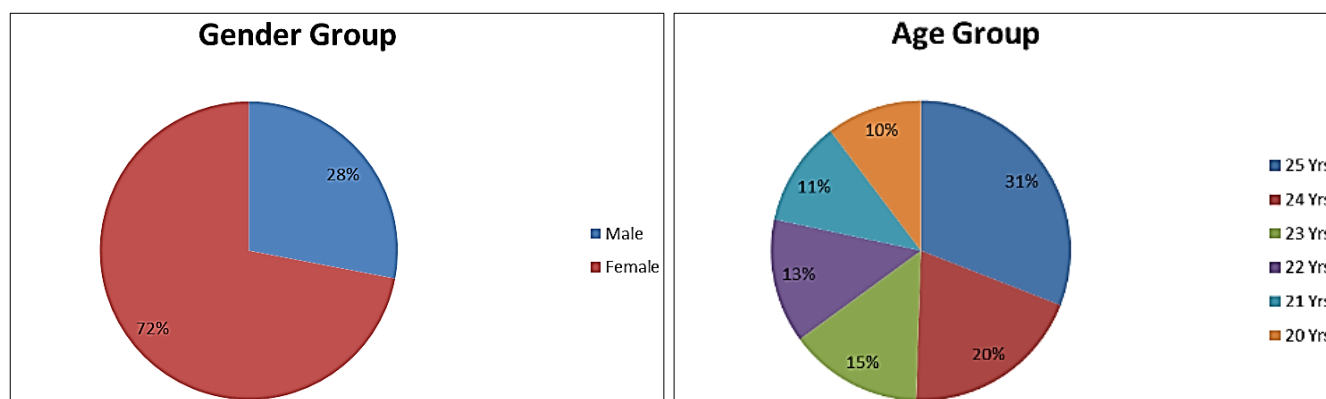
Unpaired t test was done to compare the values between two different groups i.e. between GROUP A (Yoga) and Group B (Foam Roller).

For statistical analysis instat graphpad was used.

## Results and Interpretation

Data was analysed by using paired t test and unpaired t test. Within the groups (pre and post of both groups) paired t test

was used. And in between the groups (YOGA and FOAM ROLLER) unpaired t test was used. There was no dropout of the patients from the study.



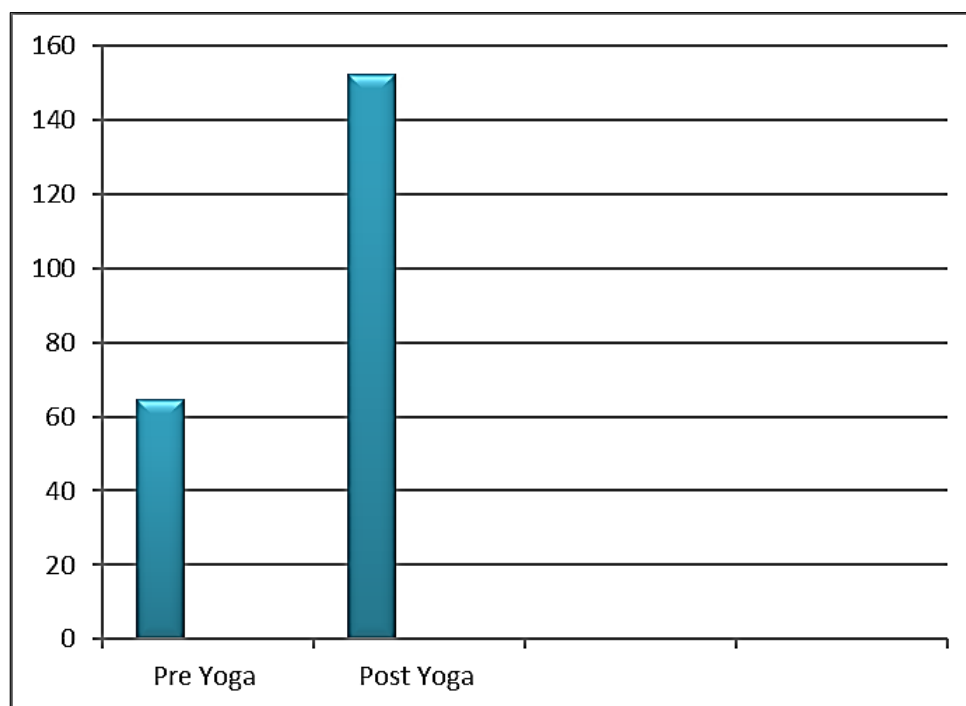
**Fig 1:** Demographic Data

**Table 1:** Paired t test used for pre and post values to check hamstring tightness of group A and group B

Outcome Measure	Groups	Training Mean + SD	P Value	Mean Difference	Paired T Value
90-90 Straight Leg Raising Test	Group A-Yoga Postures	Pre - 64.4 ±12.10666876	<0.0001	87.9	41.381
		POST- 152.3 ±			
		15.88254079			

This data had passed the normality test. The paired T test was done in pre and post groups of group A and group B. Its P value is <0.0001, i.e. it is statistically extremely

significant. The Paired T test is done in pre and post groups of group A and group B. its P value is <0.0001 i.e. it is statistically extremely significant. It is clinically significant.



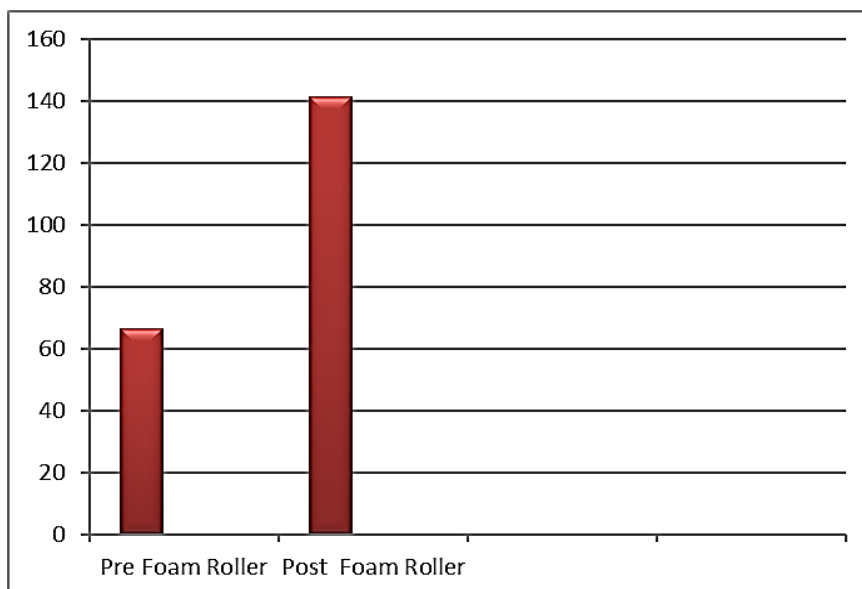
**Fig 2:** Show the pre yoga

**Table 2:** Paired t test used for pre and post values to check hamstring flexibility.

Outcome Measure	Groups	Training Mean + SD	P Value	Mean Difference	Paired T Value
90-90 Straight Leg Raising Test	Group B-Foam Roller	Pre- 66.36 ± 12.97683965	<0.0001	75.04	29.677
		Post- 141.4 ± 19.24705119			

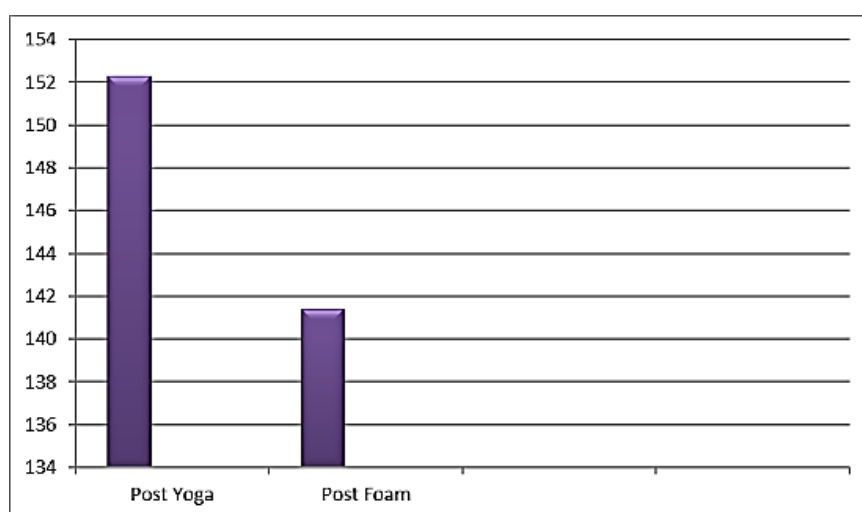
This data had passed the normality test. The paired T test was done in pre and post groups of group B. Its P value is <0.0001, i.e. it is statistically extremely significant. The

Paired T test is done in pre and post group B. its P value is <0.0001 i.e. it is statistically extremely significant. It is clinically significant.

**Fig 3:** Pre foam roller**Table 3:** Un Paired t test used for post values to check hamstring tightness of group A and group B.

Outcome Measure	Groups	Training Mean + SD	P Value	Mean Difference	Paired T Value
90-90 Straight Leg Raising Test	Group A-Yoga Postures	POST- 152.3 ± 15.88254079	0.0026	10.900	3.089
	Group B-Foam Roller	POST- 141.4 ± 19.24705119			

The Unpaired t test was carried out between post values of Group A and B. its P value was 0.0026 making it statistically significant.

**Fig:** Show the post of yoga and foam

## Discussion

The purpose of present study was designed to compare effect of yoga posture with foam rolling exercises for improving hamstring flexibility among young population. The improvement in values of hamstring flexibility were seen in both groups (Yoga and Foam Roller). But Group A (Yoga) showed better results with increase in hamstring flexibility. Pre assessment value -  $64.4 \pm 12.10$  and post assessment ROM value of group A (Yoga) -  $152.3 \pm 15.88$ . Proper positioning through yoga enhances movement abilities and reduces movement limitation, thus improves body functioning among athletes. It also helps to maintain continuous and stable breathing through a series of Asanas

(static posture) involving required muscle groups under tension. Interacting breathing mechanism to the tensed musculoskeletal system brings comprehensive changes to the whole body while performing those Asanas<sup>[14]</sup>. Flexibility is an important element of physical fitness. yoga difference can be described with three As: alignment, attention, and awareness. Yoga allows your body to move through every range of motion, and though it may be sometimes uncomfortable to remain in a pose, stretching the muscles and joints allows you to move deeper into the pose. Yogic *asanas* is a type of controlled physical activity which is a unique combination of isometric muscular contraction and stretching exercises might improve the muscular



strength. Stretching can increase muscular flexibility and could cause changes in the development of maximum strength. Muscle stretching could also promote the rate of increment of protein synthesis in muscle. The combined action of isometric muscular contraction and stretching help in the muscle fibre hypertrophy and thereby improve muscular flexibility, strength<sup>[15]</sup>.

Group A was given 4 yoga postures 1. Uttanasana, 2. Adho mukha svanasana, 3. Trikonasana, 4. Skandasana. Hold the poses for 30 sec.

The hamstring tightness were checked by 90-90 straight leg raising test. Our study is in accordance with the research conducted by M Jay Polsgrove, Brandon M Eggleston,<sup>1</sup> and Roch J Lockyer on impact of 10 weeks of yoga practice on flexibility and balance of college athletes. it was seen regular yoga practice may increase the flexibility and balance. Results suggest that a regular yoga practice may increase the flexibility and balance as well as whole body measures of male college athletes and therefore may enhance athletic performances that require these characteristics<sup>[4]</sup>.

Another study has done by. Daniel James Amin<sup>1</sup>, Maureen Goodman on Effect of selected asanas in Iyenger yoga on flexibility. The results shows a significant increase in flexibility, indicating 6 weeks of single session yoga training may be effective in increasing hamstring flexibility<sup>[6]</sup>.

Also in current study, when hamstring flexibility values using 90-90 straight leg raising test were compared in between the GROUP B – (Foam roller), it was found that there was statistical improvement ( $P < 0.0001$ ) in the hamstring flexibility in pre interventional values ( $66.36 \pm 12.97$ ) and post interventional values ( $141.4 \pm 19.24$ ). Fascia is connective tissue that surrounds muscles, nerves, blood vessels and connects structures of the body. Fascia can become restricted due to injury, disease, inactivity, or inflammation. These restrictions can decrease flexibility, strength<sup>[2]</sup>.

Another study has done by Junker, DH and Stöggl, The foam roller as a tool to improve hamstring flexibility in this study. The aim of this study was to determine the effect of a 4-week training period of the foam roll method on hamstring flexibility. Furthermore, the study was designed to compare the effectiveness of the foam roll myofascial release with a conventional contract-relax proprioceptive neuromuscular facilitation (PNF) stretching method and a control group.. Statistical analysis revealed a main effect for time ( $p < 0.001$ ) with no main effect for group ( $p = 0.123$ ). The foam roller can be seen as an effective tool to increase hamstring flexibility within 4 weeks. The effects are comparable with the scientifically proven contract-relax PNF stretching method<sup>[5]</sup>.

Another study has done by sullivan km, silvey db, behm Roller-massager application to hamstring flexibility increases sit and reach range of motion within five to ten sec. without performance impairments –Foam rollers are used to mimic myofascial release technique and have been used by therapist, athletes, and the general public alike to increase range of motion and alleviate pressure points. The use of the roller massager results in 4.3% increase in ROM and can be provide statistically significant increases in ROM. Particularly when used for longer duration<sup>[1]</sup>.

## Conclusion

After comparing both the groups i.e. GROUP A and

GROUP B, it was concluded that there was improvement in hamstring flexibility in both groups i.e. Yoga and Foam Roller, Which made it clinically significant and statistically it is also significant. But the improvement was more in Group A as compared to Group B. Yoga may be more effective as compared to foam roller.

## Limitation of study

- Only specific age group was included in the study.

## Recommendation and future scope

- Different outcome measures can be used.
- The study can be done in different population such as athletes.
- Further study can be done with inclusion of equal number of male and female.
- The study can be done on bilateral leg also.

## Clinical implication

As per the study, for improving hamstring tightness, yoga postures can be given without any assistive devices anywhere.

## References

1. Catherine Woodyard, Exploring the therapeutic effects of yoga and its ability to increase quality of life Int J Yoga 2011;4(2):4954.
2. Scott W, Cheatham PT, Morey J, Kolber PT, Matt Cain, Matt Lee, *et al.* the effects of self- myofascial release using a foam roll or roller massager on joint range of motion, muscle recovery, and performance: a systematic Review Int. J Sports Phys Ther 2015;10(6):827-838.
3. Kathleen M Sullivan, Dustin BJ Silvey, Duane C Button, David G Behm. Roller-massager application to the hamstrings increases sit-and-reach range of motion within five to ten seconds without performance impairments Int J Sports Phys Ther 2013;8(3):228-36.
4. Jay Polsgrove M, Brandon M Eggleston, Roch J Lockyer. Impact of 10-weeks of yoga practice on flexibility and balance of college athletes Int J Yoga 2016;9(1):27-34.
5. Daniel H Junker, Thomas L Stöggl. The Foam Roll as a Tool to Improve Hamstring Flexibility, J Strength Cond Res 2015;29(12):3480-5.6.
6. Daniel James Amin, Maureen Goodman. The effects of selected asanas in Iyengar yoga on flexibility: pilot study. J Bodyw Mov Ther 2014;18(3):399-404.
7. Daniel Mayorga-Vega, Rafael Merino-Marban, Jesús Vicianá. Criterion-Related Validity of Sit-and-Reach Tests for Estimating Hamstring and Lumbar Extensibility: a Meta-Analysis J Sports Sci Med 2014;20;13(1):1-14.
8. Scott W Cheatham, Morey J Kolber, Matt Cain, Matt Lee. The Effects of Self-Myofascial Release Using A foam Roll or Roller Massager on Joint Range of Motion, Muscle Recovery, and Performance: A Systematic Review, Int J Sports Physical Therapy 2015;10(6):827-38.
9. Kathleen M Sullivan, Dustin BJ Silvey, Duane C Button, David G Behm. Roller-massager application to the hamstrings increases sit-and-reach range of motion within five to ten seconds without performance

- impairments, Int J Sports Physical Therapy 2013;8(3):228-36.
10. David J Maggie. Book of orthopaedic physical assessment *et al.* edition edition 6
  11. Tiago Neto, Lia Jacobsohn, Ana I. Carita, and Raul Oliveira Reliability of the Active-Knee-Extension and Straight-Leg-Raise Tests in Subjects With Flexibility Deficits Journal of Sport Rehabilitation, 2015.
  12. MohammadBagher Shamsi, Maryam Mirzaei, Seyyed Saeed Khabiri. Universal goniometer and electrogoniometer intra-examiner reliability in measuring the knee range of motion during active knee extension test in patients with chronic low back pain with short hamstring muscle 2019;22;11:4.
  13. Luxmi Sharma Benefits of yoga in sports (Research scholar) Department of physical education, C.d.l.u., Sirsa, Haryana. International Journal of Physical Education, Sports and Health 2015; 1(3): 30-32
  14. Shah Noman Md. Iftekher<sup>1</sup>, Md. Bakhtiar, Kh. Shafiur Rahaman. Effects of yoga on flexibility and balance: a quasi-experimental study Asian J. Med. Biol. Res 2017;3(2):276-281.
  15. Kaushik Halder, Abhirup Chatterjee, Rameshwar Pal, Omveer S Tomer, Mantu Saha. Age related differences of selected Hatha yoga practices on anthropometric characteristics, muscular strength and flexibility of healthy individuals Int J Yoga, 2015, 8.