International
Journal of Medical and Exercise Science
(Multidisciplinary, Peer Reviewed and Indexed Journal)

ORIGINAL ARTICLE

COMPARATIVE EFFECT OF STATIC AND DYNAMIC STRETCHING EXERCISE TO IMPROVE FLEXIBILITY OF HAMSTRING MUSCLES AMONG MALE ADULTS

Search engine:
www.ijmaes.org

Dr. Jibi Paul[1] ,Pradeep Balakrishnan[2]

Corresponding author: [1]Faculty of Physiotherapy Program, School of Health Sciences, KPJ Healthcare University college, Nilai, Malaysia, E-Mail: jibipaul74@gmail.com
Co-Author: [2]Faculty of Physiotherapy Program, School of Health Sciences, KPJ Healthcare University college, Nilai, Malaysia.

Abstract

Aim and Objective: *Stretching exercises have used in many studies to reduce hamstring tightness and to improve flexibility of the muscle. This study is aimed to find the best method to improve flexibility of hamstring muscle among male adults. Objective of the study was to find out the effect of static and dynamic stretching exercise on flexibility of hamstring muscle and also to compare the effect of static over dynamic stretching exercise on flexibility of hamstring muscle.* ***Methods****: This was a comparative experimental study on seventy four male healthy subjects from KPJ Healthcare University College, Malaysia. Convenient sampling method was used to select the samples. The subjects were selected by inclusion criteria and randomly divided equally in to two with 37 subjects in each group. Static and dynamic stretching exercises were given as intervention program for four weeks respectively for experimental and control group. Pre and post data of restricted range of movement for knee extension was measured using goniometry and documented separately for both group.* ***Result:*** *In experimental and control group, pre-post statistical analysis found significant effect in increase of hamstring flexibility with P<0.0001, for right and left side. Comparative study between experimental and control group found that static stretching exercise have significant effect in increase of hamstring flexibility for right and left side with P<0.04.* ***Conclusion:*** *This study concluded that hamstring flexibility improves by static and dynamic stretching exercise, but static stretching exercise found more effective over dynamic stretching exercise among male adults.*

Key words: *Hamstring muscle, static stretching, dynamic stretching, hamstring flexibility.*

Received on 30th Oct 2015, Revised 10th November 2015, Accepted 19th Nov 2015

INTRODUCTION

Muscle flexibility has defined as the ability of a muscle to lengthen, allowing one joint or more than one joint in a series to movement through a range of motion [ROM]. Hamstring flexibility is important to prevent knee injuries among nonathletes. Several authors have investigated the relationship between hamstring flexibility and hamstring injury, Christensen C, et al (1972).Worrell et al (1991) and Liemohn (1978) reported hamstring-injured subjects were less flexible than non-injured subjects. Hamstring is an important muscle in the lower limb which helps for knee flexion and hip extension. Mann and Sprague (1980) described the function of the hamstrings in walking as active at the end of the swing phase until foot flat has been completed.

The hamstrings contract eccentrically to control knee extension in the swing phase. At heel strike, it provides stability and initiates flexion of the knee. During running, the hamstring muscle become active during the last third of the swing phase, at which time the tibia is being decelerated eccentrically and the hip flexes concentrically. Static stretching has been reported as a therapeutic tool in preventing injuries associated with lack of flexibility as well as in treatment of sports injuries [1, 2, 3].

Research Objective

Objective of the study was to find out the effect of static and dynamic stretching exercise on flexibility of hamstring muscle and also to compare the effect of static and dynamic stretching exercise on flexibility of hamstring muscle.

MATERIALS AND METHODS

This was an experimental study with Random Control Trial (RCT). The population for this study were selected from students of School of Health Sciences, KPJ Healthcare University College, Malaysia for the year 2014. This study conducted in Physiotherapy skill lab of KPJ University College, Malaysia. Sample size were calculated and confirmed by n=74 with 37 subjects each group (experimental and control). Male subjects with hamstring tightness (above 20 degree) and aged between 18 to 25years were selected for the study. Subjects with diagnosed musculoskeletal disorders/ injured lower limbs, traumatic and neurological conditions, multiple chronic disorders and who doesn't sign the informed consent were excluded from the study. Selected subjects were randomly divided in to two groups equally by lottery method. Study materials used for this study were couch and informed consent. Clinical goniometer was used as study tool for this study.

Data collection

Subjects were evaluated hamstring tightness in supine lying. Hip in flexed position at 90 degree followed by passive extension of knee joint. [4, 5, 6] Goniometric measurement was taken and recorded at knee joint at the level of tissue resistance (fig.1). Data collected before and after the prescribed exercise program by qualified physiotherapist from KPJUC, Malaysia.

Fig.1 Goniometric measurement taken for tissue resistance at knee level

Exercise intervention

Exercise performed once in a day for five days in a week and continued for four weeks. Each team performed static and dynamic stretching actively for 04 minutes in a day.

In static stretching, subjects were in standing position with one hip flexed for 90 degree and knee extended with supported in a couch. Hamstring muscle stretched to the maximum by reaching both hands towards big toe and

hold for 30 seconds followed by 10 seconds rest; this exercise repeated 6 times for 04 minutes in a day (Fig.2).

Fig.2 Static stretching exercise in standing

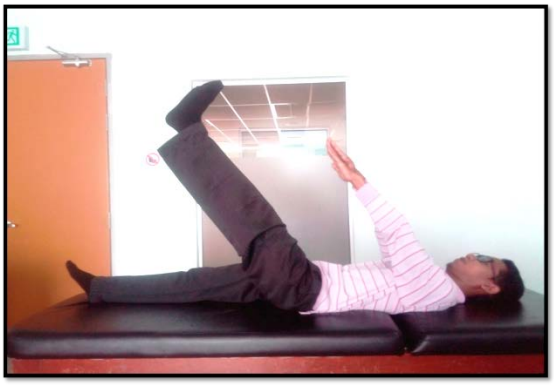


Fig.3 Dynamic stretching exercise in lying

In dynamic stretching subjects were in lying position; knee maintained in full extension followed by maximum flexion of hip joint. Each movement followed by 5 second rest; this exercise repeated for 04 minutes in a day. Both exercises performed for right and left side (Fig.3).

Experimental Group static stretching	Hamstring tightness in degree at knee Joint Pre Intervention (Mean ± SEM)	Hamstring tightness in degree at knee Joint Post Intervention (Mean ± SEM)	T value	P-Value
Right	30.54 ± 1.18	20.32 ± 1.09	t=11.18, df=36	< 0.0001
Left	32.05 ± 1.40	22.38 ± 1.20	t=10.00, df=36	< 0.0001

Table 1: Experimental group hamstring tightness in degree at knee joint; significant difference in effect found in both sides within the group.

Control group Dynamic stretching	Hamstring tightness in degree at knee Joint Pre Intervention (Mean ± SEM)	Hamstring tightness in degree at knee Joint Post Intervention (Mean ± SEM)	T value	P-Value
Right	29.89 ± 0.89	23.30 ± 0.94	t=6.69, df=36	< 0.0001
Left	32.19 ± 0.82	26.30 ± 1.40	t=4.34, df=36	< 0.0001

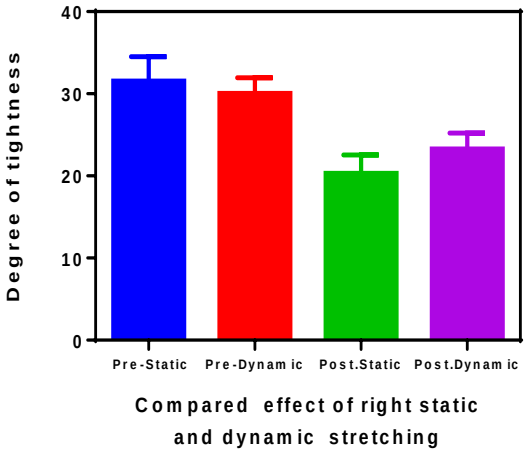
Table: 2 Control group hamstring tightness in degree at knee joint; significant difference in effect found in both sides within the group.

Statistics

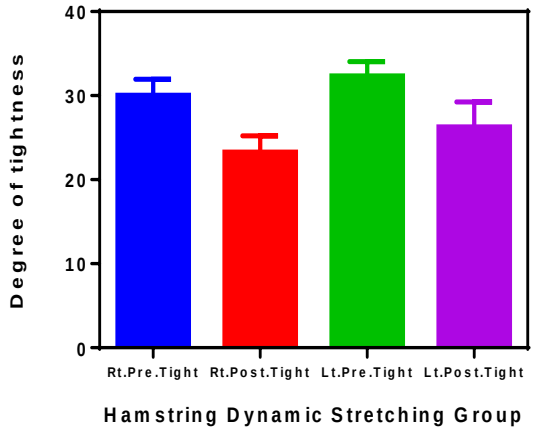
Dependent t' test used to compare the effect within the group. Independent t' used to compare the difference between the independent variables of two groups and to find the significance. P< 0.05 was considered as significant effect on the study.

In experimental group the hamstring tightness in degree found significant difference in effect at knee joint in both sides within the group (Graph.1).

In control group the hamstring tightness in degree found significant difference in effect at knee joint in both sides within the group (Graph.2).



Graph.1 Experimental group hamstring tightness in degree at knee joint



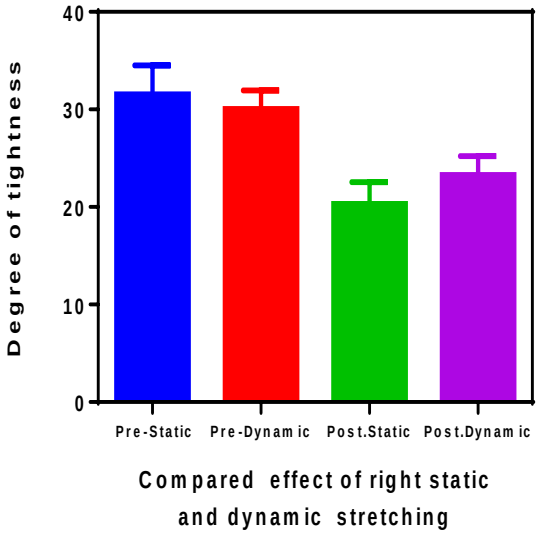
Graph.2 Control group hamstring tightness in degree at knee joint

Right side	Hamstring tightness in degree at knee Joint Experimental group (Mean ± SEM)	Hamstring tightness in degree at knee Joint Control group (Mean ± SEM)	T value	P-Value
Pre Intervention	31.54 ± 1.47	30.05 ± 0.93	t=0.86, df=72	0.40^{NS}
Post Intervention	20.32 ± 1.09	23.30 ± 0.94	t=2.06, df=72	P<0.04

Table 3: Compared experimental and control group for hamstring tightness in degree at knee joint

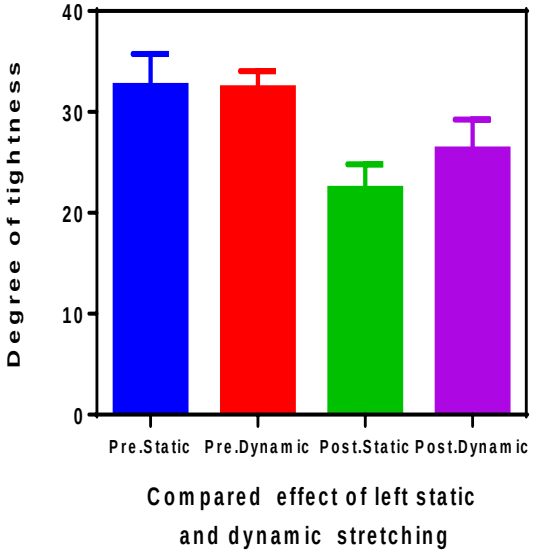
Left side	Hamstring tightness in degree at knee Joint Experimental group (Mean ± SEM)	Hamstring tightness in degree at knee Joint Control group (Mean ± SEM)	T value	P-Value
Pre Intervention	32.05 ± 1.40	32.19 ± 0.82	t=0.44, df=72	0.66^{NS}
Post Intervention	22.38 ± 1.20	26.30 ± 1.40	t=2.06, df=72	P<0.04*

Table 4: Compared experimental and control group for hamstring tightness in degree at knee joint



Graph: 3 Compared experimental and control group for hamstring tightness in degree at knee joint

Compared experimental and control group for hamstring tightness and found significant difference in effect on Post Intervention of right side between the groups (Graph:3).



Graph: 4 Compared experimental and control group for hamstring tightness in degree at knee joint

Compared experimental and control group for hamstring tightness and found significant difference in effect on Post Intervention of left side between the groups (Graph: 4).

RESULT

In experimental and control group hamstring tightness have reduced significantly with P< 0.0001 at right and left side. Between experimental and control group hamstring tightness found significant difference in effect with P<0.04 after post Intervention at right and left side. Hamstring tightness reduced more in experimental group compared to the control group.

DISCUSSION

This study has accepted the alternative hypothesis that there was a difference in knee extension range of movement (ROM) after 4 weeks stretching training within and between the groups of dynamic (controlled group) and static (experimental group) stretching.

Jibi Paul el al. (2014) found that static and dynamic stretching exercises among female subjects were equally effective in improving the flexibility of hamstring muscles. There was a significant difference in flexibility of hamstring muscle in static stretching group compared to dynamic stretching group after the intervention. This study reported that hamstring stretching exercises among female subjects have reduced the tightness 11.22° and 10.19° but the dynamic stretching exercise could reduce the tightness to 6.75° and 6.05° respectively for right and left side.

In this study, static stretching exercise has reduced the hamstring tightness to 10.22° and 9.67°, but the dynamic stretching could reduce the tightness only 6.59° and 5.89° respectively for right and left side. This reports that hamstring stretching was more effective among female subjects compared to the male adults with the same methods of intervention program.[7]

Russell T. Nelson and William D. Bandy compared the effects of combination of static stretching and eccentric training with controlled group. The groups that performed static hamstring stretching and a combination of eccentric training and hip-flexion range of motion for 6 weeks showed significantly

greater gains in flexibility than the controlled group. Bandy et al compared the effects of 30 seconds of static stretching with dynamic range of motion. Although both methods were effective in increasing range of motion, the gain made with static stretching was 11.42°, but the gain with dynamic stretching was only 4.26°.

The groups that performed static hamstring stretching for 4 weeks showed significantly greater gains in flexibility than the control group. The results support the hypothesis theory that static stretching provides significant increase in the range of motion of knee joint [8, 9, 10, 11, 12.]

CONCLUSION

This study concluded that static and dynamic stretching can significantly reduce the tightness of hamstring muscle at knee joint among male adults. Static stretching exercise found significant effect over dynamic stretching in reduction of hamstring muscle tightness at knee joint.

Acknowledgement

The authors would like to thank the management of KPJ Healthcare University College, the chairman and members of research and development committee KPJUC, Malaysia, for their valuable suggestions and support to complete this study successfully.

REFERENCES

1. Johnagen S, Nemeth C, Griksson F. Hamstring injuries in sprinters: the role of concentric arid eccentric hamstring muscle strength and flexibility. Am J Sports Med. 1994; 22:262-266.
2. Worrell TM, Perrin DH, Gansneder B, Gieck J. Comparison of isokinetic strength and flexibility measures between hamstring injured and non-injured athletes. J .Orthopaedic Sports Phys. Ther.1991; 13:118-125.
3. Hubley CL, Kozey JW. Can stretching prevent athletic injuries? Journal musculoskeletal medicine, 1984; 19: 25-32.
4. Norris CM, M Matthews. Inter-tester reliability of a self-monitored active knee extension test, Journal of Bodywork and Movement Therapie. 2005; 9, 256–259.
5. William D Bandy, Jean M. Irion, Michelle Briggler. Stretching on Flexibility of the Hamstring Muscles Phys .Ther. 1997; 77:1090-1096.
6. Etnyre B R, Lee EJ. Chronic and acute flexibility of men and women using three different stretching techniques Iksenrch Quarterly, 1988; 59: 222-228.
7. Jibi Paul et al, Comparative effect of static and dynamic stretching exercise to improve flexibility of hamstring muscles among non-athletes,ijphy,2014;Vol 1 (4) pp.195-199.
8. Sady SP, Wortman M, Blanke D. Flexibility training: ballistic, static or proprioceptive neuromuscular facilitation? Arch Phys Med. Rehab. 1982; 63:261-263.
9. Odunaiya NA, Hamzat TK., Ajayi OF. The Effects of Static Stretch Duration on the Flexibility of Hamstring Muscles, African Journal of Biomedical Research,2005; Vol. 8 ;79 – 82.
10. Bandy WD., Irion JM and Briggler M. The effect of static stretch and dynamic range of motion training on the flexibility of hamstring muscles. J. Orthop Sports Phys Ther.1998; 29(4), 295-300.
11. Handy WD, lrion J M. The effect of time on static stretch on the flexibility of the hamstring muscle. Phys, Ther. 1994; 74:84i-8.50.
12. Gajdosik RL. Effects of static stretching on the maximal length and resistance to passive stretch of short hamstring muscles J. Orthop. Sports phys. Ther. 1991; 14:250-255.

Citation:
Dr. Jibi Paul et al, Comparative effect of static and dynamic stretching exercise to improve flexibility of hamstring muscles among male adults ,IJMAES, 2015; 1 (2), 53-58.