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# EFFECTIVENESS OF STRETCHING AND WEIGHT BEARING EXERCISES IN THE MANAGEMENT OF SPASTIC PARAPLEGIA IN PATIENT WITH HSP

**Rajnee Yadav,**

**Student of Master of Physiotherapy (NEUROLOGY) from SANSKIRITY UNIVERSITY,MATHURA**

**Background-**People with hereditary spastic paraplegia (HSP) experience difficulties adapting their gait to meet environmental demands, a skill required for safe and independent ambulation. Gait adaptability training with stretching and weight bearing exercises to improve performance of patients with HSP. It is unknown whether gait adaptability can be trained in people with HSP.

**Aim-**The aim of Move-HSP is to study the effects of stretching and weight bearing training alone, compared with combination of stretching with weight bearing training, on gait adaptability in people with pure HSP.

**Method-** stretching was applied for 30 sec with 30 sec rest 3-5 times for each muscle group of lower limb within pain limit followed by strengthening exercise for weak muscles which was performed by all three groups; each group contained ten repetitions for each weak muscle group. Weight bearing exercise was performed by patients for 60 sec with 30 sec rest 3times for hip, knee, ankle for stability of lower limb and improvement of gait.

**Result-** Among the 30 participants in our study 13 were females and 17 were males. the SD for MAS [0.50] and for MTUGT [1.34]. The study shows that, there is significant difference in MAS and MTUGT after the treatment .the P value of MAS is 0.024 and MTUGT is 0.40 which is strongly significant for the protocol.

**Key word-** HSP, stretching, weight bearing, gait adaptability

## INTRODUCTION

Combining inherited single-gene neuronal degenerative and developmental illnesses, hereditary spastic paraplegia (HSP) primarily affects the lower extremities and presents with severe clinical symptoms as fragility and stiffness [1]. Degenerating descending fibers in the corticospinal and posterior columnar regions in either autosomal dominant, autosomal recessive, mitochondrial, or X-linked inheritance patterns are additional clinical symptoms [2]. The disorders associated with HSP are called spastic paraplegia genes (SPG); so far, 80 SPGs have been found, with an uncommon incidence ranging from 1 to 5 per 100,000 people worldwide. The global prevalence of SPG is 1.8/100,000, according to a meta-analysis, with the SPG3A, SPG4, and SPG11 subtypes accounting for the majority of registered cases and representing the rare diagnoses in consanguineous settings [3, 4]. A meta-analysis involving 13570 people revealed the often occurring genetic

**Spasticity**: Pandyan 2005 proposed that spasticity could be defined as "disordered sensory-motor control, resulting from an upper motor neuron lesion, presenting as intermittent or sustained involuntary activation of muscles" .McCrea 2008 recently suggested that 'spasticity' may be interpreted as an umbrella term for all the positive, active symptoms of the upper motor neuron syndrome that one might encounter in routine clinical practice. In this review the term 'spasticity' will be used according to this umbrella term. Resistance of muscle to passive stretch/movement, which is velocity dependent (increases with the rate of stretch), has traditionally been attributed to hyperexcitable tonic stretch reflex responses (spasticity) (Lance 1980). Some evidence exists that velocity dependent resistance also arises from passive muscle components (Lee 2002; Singer 2003). According to Satkunam 2003, spasticity results from interruption of the neural circuitry regulating the muscles and is a common complication of stroke

## Method-

stretching was applied for 30 sec with 30 sec rest 3-5 times for each muscle group of lower limbs within pain limit followed by strengthening exercise for weak muscles which was performed by all three groups; each group contained ten repetitions for each weak muscle group. Weight bearing exercise was performed by patients for 60 sec with 30 sec rest 3times for hip, knee, ankle for stability of lower limb and improvement of gait.

**INCLUSION CRITERIA** – □ Age 50-60 years □ Both gender (male and female) □ Patients had grades I and II according to gross motor function classification systems. □ spasticity of grade 1 or grade 1+ according to modified Ashworth scale.

**EXCLUSION CRETERIA**-

□ Auditory and visual disorder

□ Hip dislocation

□ Fixed contracture deformity

□ Heart disease

## Results-

Among the 30 participants in our study 13 were females and 17 were males. Mean age of participants of both groups was [25.15] Data were collected based on inclusion criteria and spasticity level scored by using Modified Ashworth Scale (MAS) scoring (pre and post treatment for 6 weeks) and Modified Time Up & Go Test (MTUGT) scoring (pre and post treatment for 6 weeks) with respect to GMFCS levels improvements in each subject. The two sample T- test revealed that there were significant difference in spasticity, balance and gait with the mean of MAS after treatment [2.33] and of MTUGT after treatment [16.86]. with the SD for MAS [0.50] and for MTUGT [1.34]. The study shows that, there is significant difference in MAS and MTUGT after the treatment. The P value of MAS is 0.024 and MTUGT is 0.40 which is strongly significant for the protocol.

Table 1: Data collected of subjects according to MAS & MTUGT (pre and post treatment).

| | **Gender** | **MAS** | | **MTUGT (in seconds** | |
|---|---|---|---|---|---|
| | Male: female<br>17:13<br>N= 30 | **Pre treatment scoring** | **Post treatment scoring** | **Pre test scoring** | **Post test scoring** |
| **mean** | | **3.33** | **2.33** | **23.07** | **16.86** |

Table 4: MAS, MTUGT mean & SD value with respect to GMFCS levels.

| **scales** | **MAS** | | **MTUGT** | | **GMFCS** | |
|---|---|---|---|---|---|---|
| | **Pre treatment** | **Post treatment** | **Pre treatment** | **Post treatment** | **Pre treatment** | **Post treatment** |
| **Mean +_SD** | **3.33+_0.49** | **2.33+_0.50** | **23.07+_1.34** | **23.07+_1.34** | Level 3 (difficult walking leading maximum support but only for short distance, a more no. of falls is seen) | Level 2 (walking with mild assistance for a variable distance, a smaller number of falls are seen) |
| t-value | **1.325** | | **2.236** | | | |
| p- value | **0.024** | | **0.040** | | | |

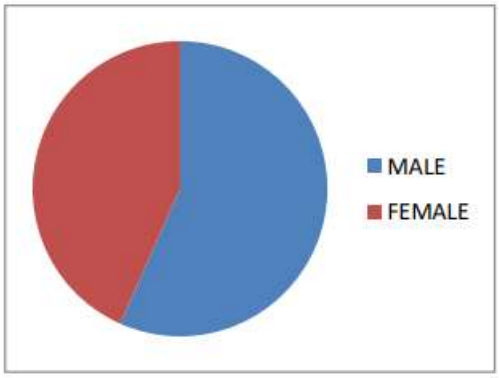


**Figure 2:** pie chart showing the Age and gender wise distribution of subjects.

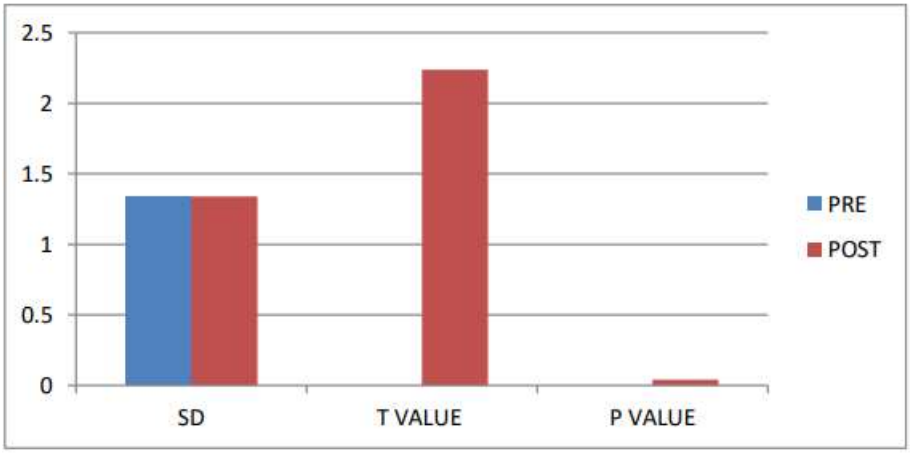


**Figure 4:** Graph showing the MAS, MTUGT mean & SD value with respect to GMFCS levels.

## Discussion

This study was done to understand the effect of weight bearing exercises on spasticity in patients due to spastic diplegia, and to appreciate the outcomes we received from the data analysis. This experimental study was conducted in Reborn Physiotherapy and Neuro Rehabilitation Centre, Mathura, UP. As spasticity is very common problem faced by patient with spastic paraplegia, therefore assessment should always be correct, and treatment should start at day 0 to give a good rehab in future. In this study, spasticity changes were seen from pretreatment to post-treatment scoring done by MAS with respect to change in gross motor functions are also observed. 15 subjects were involved in the study aged from 50 to 60 years , Level III and trained for weight bearing exercises, balance exercises, core exercises, positional exercises, walking exercises, modalities were also given to enhance the functioning of the muscle and worked to re-educate the muscles shows an increased result in the level of GMFCS from III to II.7 Participants were having spasticity in their lower limbs which was scored as MAS 3 or 4, [Mean (SD)=3.33±0.49] as their baseline assessment; there was increased muscle tone, and some passive movements were difficulty while some show rigidity while performing flexion & extension.9 The scoring has been reduced to 1 or 2, [Mean (SD)= 2.33±0.50] after the rehab protocol which was followed for 6 weeks (refer to Table 4). There was reduced spasticity in their limbs which was leading to decreased level of gross motor function of the individual, making passive movement less rigid.3 Modified Time Up & Go Test is a tool used to check the mobility, balance, walking and standing. Scoring was done in pre-treatment and post-treatment to record the data for data analysis. Participants were having spasticity and increased number of falls while walking for few meters ranges from 20-27s, [Mean (SD)= 23.06±1.34] as their baseline assessment; there was decreased number of falls and improved balance after the protocol followed 15- 20s, [Mean (SD)= 16.87±1.50] for 6 weeks (refer to Table 4). The passive stretches analysed in the selected articles (static and dynamic) produced an improvement in at least some of the variables assessed. However, not all of them returned significant results demonstrating their effectiveness. The efficiency achieved with passive static stretching may result from the few limits initially presented, or its efficiency with respect to others. However, studies involving passive static stretching used a protocol in which stretching is kept relatively short. One factor that can influence the results is the mode of application of stretching. -term orthoses, as an isolated intervention compared to non-intervention. Another related review is that of Bovend'Eerdt et al., in which no clear conclusions on stretching were drawn because of the study's limitations.

## Conclusion

We conclude that when we provide the positional exercises, weight bearing exercises, and walking exercises in the treatment to the patients. It helps them to improve their spasticity level. Modalities were also used to initiate the muscles contraction and relaxation to re-educate the muscles to strengthen the muscles. Functional stretching exercises are effective methods used in rehabilitation of spastic diplegic children; it reduced H\M ratio, increased popliteal angle, and improved gait. Limitation- This study presents some limitations. Firstly, the subjective method of measurements uses in data collection. Second one is small sample size with narrow age range covered only university students

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