

# PARENTAL REVIEWS ON OUTCOME OF NIGHT SPLINTS IN CHILDREN WITH SPASTIC DIPLEGIA - A REGIONAL SURVEY IN KERALA, INDIA

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## ABSTRACT

Orthotic supports play a very vital role in preventing limb deformities and supporting it in its functions. The aims and objectives of prescribing an orthotic splint for children with cerebral palsy varies widely. Basically there are two types of splints - Supportive & Positional splints. Positional splints aims to improve and maintain muscle lengths and joint positions. These are usually prescribed as night splints. However, how far these splinting meet its expectations are not known. In this survey, we studied the parents' satisfaction range of 68 cases with spastic cerebral palsy and presented along with our inference.

**KEY WORDS:** Night Splints, Cerebral Palsy, Spastic Diplegia.

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## INTRODUCTION

Cerebral palsy (CP) describes damage to the immature brain resulting in problems with balance, coordination, and movement. Although CP is by definition a static neurological lesion, the associated impact of skeletal growth can compound problems, if the spastic weak muscles fail to lengthen in proportion to their adjacent bones [1].

Children with cerebral palsy are usually grouped under Gross Motor Functional Classification System (GMFCS) levels as ambulatory and non-ambulatory children [2]. Children with Cerebral Palsy categorised between GMFCS I & III often present with numerous gait deviations that primarily result from the loss of selective motor control, decreased muscle strength and

abnormal muscle tone. Children with GMFCS levels IV and V will spend a large amount of their time in seated positions, meaning they are more likely to develop contractures.

With time, these impairments lead to deformities and disabilities in the children resulting in limitations in functional participation. This has to be prevented. Sustained muscle stretch is an effective method of preventing a decrease in muscle shortening and deformities [3]. It is known that prolonged muscle stretch increases the muscle length by addition of sarcomeres in series [4]. It is studied that maintaining a spastic muscle in maximum stretch up to 8 hours can reduce the possibilities of developing muscle shortening or contractures [5].

With reference to these facts, application of orthoses continue to play a vital role in the management of children with spastic CP. Orthoses are designed with one of two primary aims - to support the functions or to position the joints in the extremities. "Night-splints" used during night and/or during rest periods during the day are part of the general management of children with CP [6].

## METHODOLOGY

This study was carried out as a structured survey among 68 parents of children with spastic cerebral palsy residing in the Malabar region of Kerala. The mean age of the subjects was 12.4 years. (SD - +/- 4.3). The survey was inclusive of both objective and descriptive questions. Selected number of objective questions and its responses availed are described here in this manuscript.

**Inclusion Criteria:** Parents of children with spastic diplegia who use night splints (orthosis), both male and female, children aged from 6 years to 18 years who attended Physiotherapy or Occupational therapy.

**Exclusion Criteria:** Children with severe fixed orthopaedic physical disabilities, severe intellectual disabilities, status epilepsy, osteochondral diseases, tropical issues like ulcer, soreness etc, Children with Grade 2 & above PEM, Children with non spastic cerebral palsy, Children below 6 years.

**Materials:** Personal interview using a validated structured questionnaire in Malayalam (regional language) inclusive of both objective and descriptive parts. The participants were informed about the study and they were told that the general data from this questionnaire will be used for publication.

**Settings:** Duly filled questionnaires from various Physiotherapy, Occupational therapy clinics were compiled and data from the objective questions were processed accordingly. The original values (data) were tabulated in MS Excel sheet and graphs were obtained. The data inferred from descriptive data are not presented in this manuscript.

**Duration of the study:** 18 Months, September 2018 - February 2020

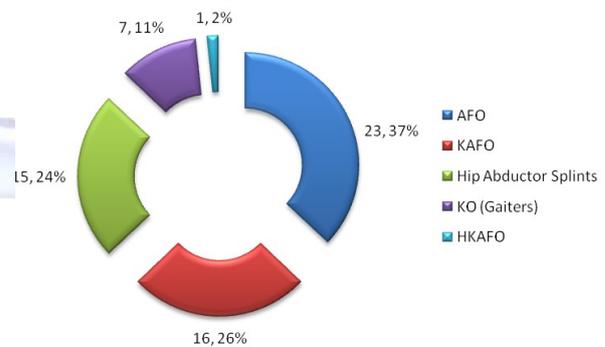
## OBSERVATIONS

Among the 68 subjects who returned the duly filled questionnaires, 6 subjects were excluded due to inadequate information provided. The objective data availed from 62 subjects are presented here as graphs. These include data from 35 male and 27 female children with spastic diplegic cerebral palsy.

The mean age of the subjects was 12.4 with a standard deviation of 4.3 years. The mean height of the subject was 128 cm with a standard deviation of 11 cm. As reported by the parents, 11 children with spastic diplegic cerebral palsy had minimal weakness in the upper limbs and 2 had moderate weakness in one of the upper limbs. Among the total subjects, 3 children were taking medication for seizure disorders for more than 2 years. Five children underwent muscle release (alike) surgeries, and 3 had at least one dose botulinum toxin injection within the recent two years.

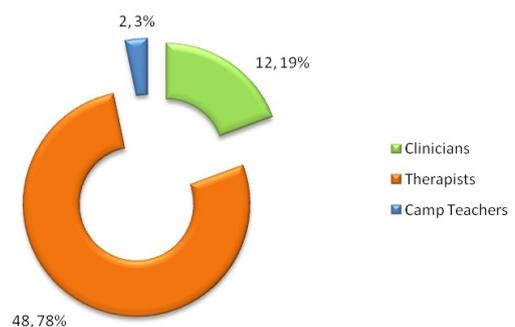
**Question 1.** What type of Splint was prescribed for your child?

(Graph 1)



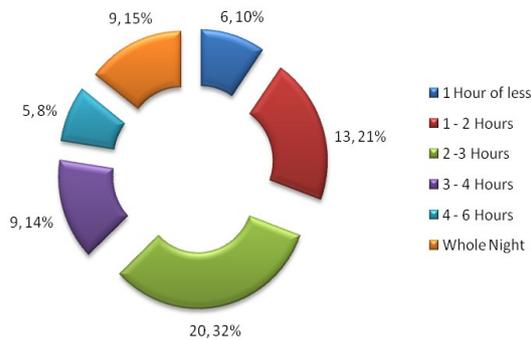
**Question 2.** Who prescribed splints for your child?

(Graph 2)



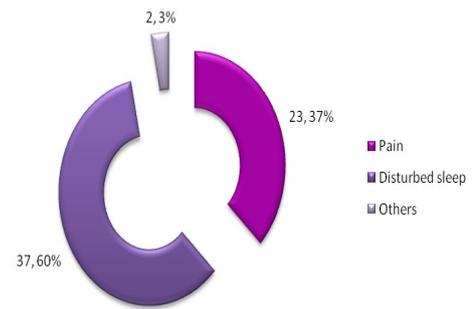
**Question 3.** What is the duration of night splinting advised per day?

(Graph 3)



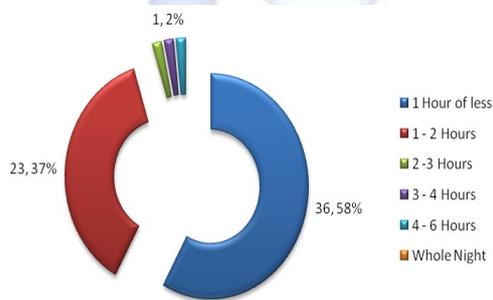
**Question 7.** What were the major discomforts while using night splints?

(Graph 7)



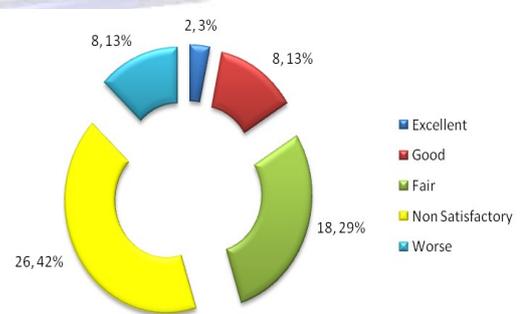
**Question 4.** What is the duration of night splinting you actually practiced?

(Graph 4)



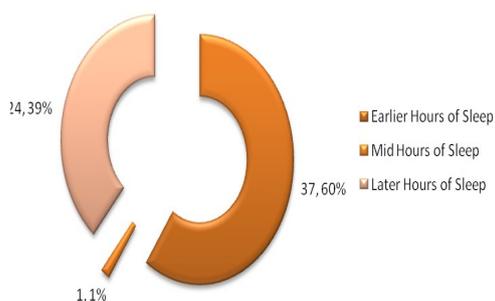
**Question 8.** How do you rate the cost effectiveness of night splints?

(Graph 8)



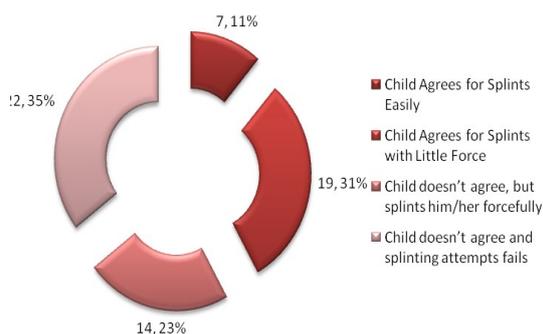
**Question 5.** What is ideal time prescribed for night splints?

(Graph 5)



**Question 6.** How practical was using the night splints?

(Graph 6)



## DISCUSSION

Classical solid ankle foot orthoses with 90° angulation were the most commonly prescribed night orthosis for children with spastic diplegia. Most parents (>65%) report that their children were prescribed with splints / orthosis at the age of 4 or above. Initially, they were advised to use it while sleeping. However, 80% of the parents were unaware of the best method of using it. The average age of splinting for weight bearing was 5.4 years. Most parents (>58%) were unsure if their child had any benefit with splinting.

More than 50% of the subjects used the same splints later on for weight bearing and walking. This is questionable. As per the biomechanical principles, it is known that a weight bearing AFO shall have at least 3 - 4° of plantar flexion to accommodate the line of force rightly [7]. Meanwhile, it is good to have a little amount of dorsi flexion in night splints so that the muscles are stretched well.

An interesting finding noticed during this study was about the duration of night splinting. There

were varied amount of recommendations from the therapists and doctors on the number of hours of night splinting. As per the recommendations of Pin T et al, which states "holding the targeting joint to the available end ROM by mechanical means such as standing tables or position equipment for an extended period, expressed as minutes up to 5-7 hours a day "[8]. However, in this survey, we noticed that the duration of night splints recommended and practiced varied from less than one hour to 8 hours or more.

It was observed that therapists and doctors had different opinion about the timing of night splinting. Around 60% of them advised the parents to splint their children in the earlier hours of sleep, i.e. immediately once the child sleeps. Meanwhile, a few others had difference of opinion in that, they asked the parents to apply splints early in the morning (39%). However, these diverse opinions on splinting time was never justified or explained to the parents. The authors could not find any literature supporting any of those recommended timings. Further reading is required on this regard.

Based on the reports by the parents, the subjects never accepted night splinting easily. There was a lot of resistance shown by the subjects for night splinting. Some of them had pain (37%) and most of them had disturbed sleep (60%). A few had soreness too. According to the reports from parents, around 35% of the subjects never accepted splinting and every attempt for splinting failed. On further discussions with these parents, it was noted that the therapists or doctors only gave verbal instructions instead of demonstrating the application of night splints. These are indeed an unacceptable practice.

Regarding the cost effectiveness of night splints, more than seventy percentage of the parents were not satisfied with their splints. They had higher expectations in the way these were prescribed. This findings are contradictory with many studies of this kind. Many research studies which state that splinting has remarkable benefits and splints are used as one of the a frontline management methods in spastic cerebral palsy.

The authors assume that unscientific practices of night splinting would have caused these remarks from the parents. Also clinical status of some of the subjects we assessed, the authors doubt the genuineness of ethical practices in prescribing a splint. These thoughts have doubled when we understand there are unwritten business understanding between with therapists and orthoses suppliers.

## CONCLUSION

In this study, we noted that,

1. The precriptions for night splints did not follow any universal recommendations or protocols
2. Both clinicians and therapists prescribed it accordingly within their power of wisdom
3. Effectiveness of night splints are questionable
4. Genueness of ethical practices in precribing splints are uncertain

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**Conflicts of interest:** None

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