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Effect of neuro-developmental therapy (NDT) on disability level of subjects with cerebral palsy receiving physiotherapy at the University of Nigeria Teaching Hospital, Enugu, Nigeria

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Abstract: *Aim and Objective:* Cerebral palsy (CP) describes a group of disorders causing activity limitation which is attributed to non-progressive disturbances that occur in the developing fetal or infant brain. The rehabilitation of children with CP has focused on increasing functionality in their daily activities. The objective of this study was to assess the disability levels of cerebral palsy patients receiving physiotherapy treatment at Physiotherapy department, University of Nigeria Teaching Hospital, Enugu, Nigeria.
Methods: The study is a retrospective-repeated measures design, involving the use of Gross Motor Function Classification System (GMFCS) and the medical records of the patients. The duration and frequency of treatment were obtained from the patients' folders. They were initially assessed on the first visit and re-assessed after 3, 6 and ≥ 12 months of physiotherapy (Neuro-developmental therapy [NDT]) exercises using GMFCS. Simple percentage (%), Kruskal Wallis and Mann-Whitney tests were used in data analyses.
Results: The highest number of disability recovery cases are in the treatment frequency group of > 2 treatment per week 17(56.68%) and the first 3-6 months of treatment duration15 (50%) of NDT-Physiotherapy. However, Disability level reduces with longer (>12 months) treatment duration. Results also showed significant frequency and duration treatment effects on disability level following NDT-Physiotherapy at $p< 0.05$.
Conclusion: It was concluded that both duration and frequent of treatment were important factors in the management of CP using NDT-Physiotherapy.

Key words: Cerebral palsy, Disability, Gross Motor Function, Neuro-developmental therapy,

Introduction

Cerebral palsy (CP) refers to a group of non-progressive, but often changing motor impairment syndromes secondary to lesions or anomalies of the brain arising in the early stages of development [1, 2]. Cerebral palsy is a major cause of childhood disability and has been described as one of the three most common life-long developmental disabilities in childhood. The other two being autism and mental retardation. CP is more prevalent in the more socio-economically deprived populations of the world [1]. A reasonable estimate of the prevalence of CP at school age is two per 1000 live births in industrialised nations [3]. Causes of CP include prematurity, asphyxia, trauma, severe jaundice, hypoglycaemia, intrauterine virus infection, neonatal meningitis, genetic factors, malformations and vascular complications [4, 5]. The above aetiological factors are classified as prenatal, perinatal and postnatal [6, 7].

Cerebral palsy cannot be cured, but treatment will often improve a child's capabilities. Early treatment of children with CP will often improve a child's capabilities, functions and many children go on to enjoy near normal adult lives if their disabilities are properly managed [3, 5]. The treatment approaches in the management of CP include: counselling, drug therapy, education, surgery, physiotherapy, orthotics and assistive technology. In physiotherapy treatment of CP, various approaches are based on different theories of motor learning. Commonly used physiotherapeutic approaches in treatment of children with CP are neuro-developmental treatment

(NDT) or Bobath therapy, conductive education (CE) by Petö, reflex locomotion therapy by Vojta, and functional task-oriented training. Other methods used are the patterning method by doman & delacato, and sensory integration by Ayres. In the last decade, especially, the use of NDT in treatment of children with CP has been controversial, with the most common concern that NDT insufficiently targets functional activities and participation by using only neuro-maturational strategies in learning [7]. However, literature seems silent on CP subjects' responses to NDT in this part of the world. The purpose of this study was therefore to investigate the disability level in CP subjects receiving NDT-Physiotherapy at the University of Nigeria Teaching Hospital, Enugu, Nigeria.

Methods and Materials

Population and Subjects: Population for the study was 40 male and female CP patients attending the Physiotherapy Department of the University of Nigeria Teaching Hospital (UNTH), Enugu. Sample size was determined using the sample size calculator by Creative Research System Survey Software (CRSSS) (Petaluma, CA, USA). Thirty (17 males and 13 females) CP patients (with Gross Motor Function Classification System [GMFCS] Levels II to IV) served as subjects. The patients' age ranged between one and six years. Subjects' parents/carers were fully informed about the experimental procedures, risk and protocol, after which they gave their signed informed consent. Ethical approval was granted by the research and ethics committee of the UNTH, Enugu.

Research design: A retrospective repeated measures design was used to assess the disability level of CP subjects' receiving NDT-Physiotherapy at the UNTH, Enugu, Nigeria.

Procedure: The demographic data of the patients, time of commencement of treatment, duration of treatment and frequency of treatment were obtained from the case folders. The patients' mobility status was assessed at the time of contact and reassessed after 3, 6 and ≥12 months of physiotherapy treatment and treatment frequency of > 2 session per week and ≤ 2 (a session is 1 to 2hrs). Subjects' parents/carers also provided information on the mobility status of the patients.

The materials used for outcome variable assessment include Gross Motor Function Classification System (GMFCS). The scale is one of the scales popularly used for assessment of disability/functional status of patients with cerebral palsy. The GMFCS for cerebral palsy is a motor assessment scale, based on self-initiated movement, with emphasis on sitting, transfers, and mobility. The scale is classified as follows: level I - walks without limitations; level II - walks with limitations; level III - walks using a hand-held mobility device; level IV - self-mobility with limitations; may use powered mobility; level V - transported in a manual wheelchair [4, 8].

Data Analysis: The results were presented with the use of numbers (n) and simple percentage (%). Mann Whitney U and Kruskal Wallis tests were used to determine the association between variables. All statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) (Windows Version 16.0 Chicago IL, USA). A probability level of 0.05 or less was used to indicate statistical significance.

Results

In the study, 17(56.67%) male and 13 (43.33%) females participated. Age group > 2 years reported the highest number cases of CP; reported cases for age group < 2years for male and females are 11 (36.67%) and 8 (26.67%) respectively. Detailed age group demographic data are depicted on table 1. In all, about 15(50%) of the subjects reported improvement in disability level.

Table 1: Age demographic data of the subjects with CP (N=30)

Age group	Male n (%)	Females n (%)	Total n(%)
< 2years	11(36.67)	8(26.67)	19(63.33)
2-3 years	4(13.33)	3(10.00)	7(23.33)
> 3years	2(6.67)	2(6.67)	4(13.33)
Total	17(56.67)	13(43.33)	30(100)

Table 2 shows the duration of treatment by gender; treatment duration group of 3-6 months reported the highest cases. In this treatment group male and female reported 8 (26.33%) and 7 (23.33) respectively. Detailed treatment duration by gender cases are on table 2.

Table 2: Duration of treatment and gender responses to treatment (N=30)

Duration of treatment	Male n (%)	Females n (%)	Total N (%)
3 - 6 months	8 (26.67)	7 (23.33)	15 (50.00)
6 - 12 months	5 (16.87)	4(13.33)	9 (30.00)
>12month	4 (13.33)	2(6.67)	6 (20.00)
Total	17 (56.67)	13(43.33)	30 (100)

The highest number of disability recovery cases 17 (56.67%) are in the treatment frequency group of > 2 treatment per week. The highest number of disability recovery cases 15 (50%) are in the first 3-6 months of NDT treatment duration. Number of number of disability recovery cases reported for male and females are 9 (30.0%) and 8 (26.67) respectively. The treatment frequency group by gender are shown on table 3.

Table 3: Frequency of treatment and gender responses to treatment (N=30)

Treatment sessions	Male n (%)	Female n (%)	Total n (%)
≤ 2 times per weekly	8(26.67)	5(16.67)	13(43.33)
> 2times per week	9(30.00)	8(26.67)	17(56.67)
Total	17(56.67)	13(43.33)	30 (100)

Krukal Wallis and Mann U Whitneny's tests (table 4) indicated significant treatment duration effect (X^2= 9.174, p= .010) and treatment frequency (U= 55.000, p= .011) respectively. Mann U Whitney's test (table 4) also indicated no significant (U= 389.000, P= .404) groups' effect between treatment duration and treatment frequency at p, 0.05.

Table 4: Kruskal Wallis and Mann U Whitneny's summary for groups' disability level (N= 30)

Variables	X^2-values	p-values
Groups treatment duration	9.174	.010*
Groups treatment frequency	55.000	.011*
Groups duration and frequency treatment	398.000	.404

significant* P<0.05

Figure 1 and 2 depicted disability level responses to treatment duration and frequency groups. Disability level decreases in the treatment duration and frequency groups of > 12months and > 2 session per week respectively.

Fig 1: Disability level responses to treatment duration

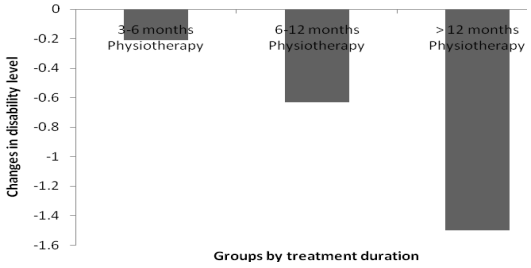
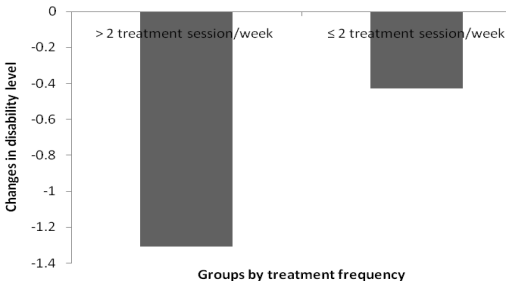


Fig 2: Disability level responses to treatment frequency



Discussion

Results of the present study indicated that 50% of the subjects reported improvement in disability status. The result of this study was closely related to the work of Gagliardi et al [9] who studied the feasibility and effectiveness of a year-long integrated rehabilitation program for young children (less than 6 years old) with cerebral palsy in Italy. A sample of 40 children took part. Gross Motor Function Measure Classification System at baseline and after one year of treatment was taken. They reported an improvement in gross motor function, with 37% of children improving and no children showing lowered function. In their study a larger percentage of the patients attended up to one year period.

Results of the present study also indicated significant improvement in disability level following NDT in both treatment and frequency of treatment. This above finding is in agreement with the findings of Tsorlakis et al. [10] who studied the effect of NDT and differences in intensity on gross motor function of children with cerebral palsy (CP) in Greece. Their results showed that the gross motor function of the children improved significantly after intervention. The present study indicated that frequent and long term NDT management (>12months & >1 times/weekly respectively) of CP gives better improvement in disability level than short and few frequency (<12months & <1 weekly respectively). This finding agreed with the study by Lilly and Powell [11] who looked at the effects of short-term therapy (1 to 2 hours/week for 12 weeks) using a crossover design in which two children acted as their own controls producing level II evidence suggesting there was no difference between physiological motor function following NDT versus play. Other similar studies [12-14] have showed significant effect of NDT on GMFM among subjects with CP.

Conclusion and Recommendation

The study supports the notion and findings that NDT-Physiotherapy (Bobath exercise) is effective therapeutic modalities for in the rehabilitation of CP. It was recommended that NDT-Physiotherapy treatment frequency and duration for CP be immediate and increased for better recovery.

Limitations

A major limitation of the study was its restriction to Enugu South-East Nigeria. However, the findings cannot be generalized automatically to the whole Nigeria and other countries. Another limitation was non randomization of subjects, and randomized controlled trials (RCTs) are generally accepted as the most valid method for determining the efficacy of a therapeutic intervention, because the biases associated with other experimental designs can be avoided [15].

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