

**A critical appraisal of “Efficacy of Intensive Neurodevelopmental  
Treatment for Children With Developmental Delay, With or  
Without Cerebral Palsy”**

**By**

**Derek Tyler Moczygemba, SPT**

**In partial fulfillment of the  
requirements for the course:**

**PT 7240 Evidence-Based Practice in Physical Therapy**

**Department of Physical Therapy**

**Angelo State University**  
**Member, Texas Tech University System**  
**November, 2019**

## **Abstract**

Cerebral palsy, often diagnosed at childhood, can have a severe impact on the developmental progress of children. Though a variety of treatments exist to help improve motor function in those with cerebral palsy, positive results vary from treatment to treatment.

Neurodevelopmental Treatment (NDT) has a long history as being a possible treatment option, but the application of NDT producing positive results is still in question. The intent of this paper was to find a credible and reliable research article that could produce results showing NDT as a positive treatment option for those afflicted with Cerebral Palsy. The initial search began by finding articles utilizing NDT as an intervention on those diagnosed with Cerebral Palsy.

“Efficacy of Intensive Neurodevelopmental Treatment for Children With Developmental Delay, With or Without Cerebral Palsy” was chosen and then critically analyzed in order to determine the reliability of its results. Each section was evaluated to determine its positive and negative aspects, and ultimately the article presented few areas for improvement. The conclusion of the article showed gross motor function improvement in those diagnosed with cerebral palsy after an intervention of intensive NDT. The article was deemed to be a reliable source, thus presenting NDT as a potential treatment option for those with cerebral palsy in the clinical setting.

## **Key words**

Cerebral Palsy, Neurodevelopmental Treatment, Rehabilitation, Gross Motor Function

## **Introduction**

Cerebral Palsy (CP) is an affliction of the brain that results in a variety of symptoms. Altered coordination, movement and muscle tone are typical areas affected in those diagnosed with CP. This can hinder the progress of motor developmental and, if not addressed early, can severely impact their functional ability. Various treatments exist to address the common issues that result from CP, Neurodevelopmental Treatment (NDT) is one that focuses on improving gross motor function. The effectiveness of this treatment is still being debated, which is the question of interest for this review. For those diagnosed with Cerebral Palsy, does NDT (Neurodevelopmental Treatment) have a positive effect on motor learning? The article under review will help provide some insight on the overall effectiveness of NDT.

## **Methods**

Two databases were used in search of an appropriate article concerning NDT and cerebral palsy. These included PubMed and PubMed Central. The Keywords used to specify the search basis were Cerebral Palsy, NDT, and Neurodevelopmental Training. To further limit the search, NDT had to be the main rehabilitation procedure and a portion of the subjects with the study must be diagnosed with CP. No exclusions were utilized for the search process. Around 25 search results were found before an article review process began.

The article selected was conducted by a group from the Dongguk University College of Medicine in Goyang, Korea. The primary author was Kyoung Hwan Lee, MD and the corresponding author was Bum Sun Kwon, MD. Subjects were selected from the Dongguk

University Hospital from March 2010 to December 2014 and the intervention period lasted for 9 months. Once the study was finished it was accepted by the Annals of Rehabilitation Medicine Journal and published in 2017. This article was selected amongst others due to its conclusion about NDT on those with CP and the intervention schedule implemented.

## **Results**

### Summary of the study

The article begins with a brief description of Cerebral Palsy (CP) and how it is a neurological disorder that affects normal movement and posture. Treatments for CP vary but the treatment this article is testing is neurodevelopmental treatment (NDT), more specifically Conventional vs Intensive. Conventional NDT (C-NDT) consists of training provided once or twice a week and a session of 30 minutes or less. The intensive NDT (I-NDT) consists of training provided 3 to 5 times a week and a duration of 30 to 60 minutes. The main objective of this article was to determine the effectiveness of I-NDT for patients of Developmental Delay (DD) with or without CP, on Gross Motor Functions. The participants were selected from the Dongguk University Hospital in Korea and a total of 42 patients, who had a diagnosis of DD with or without CP and showed little improvement with C-NDT, were selected. The intervention consisted of 3 three-month periods and an assessment of Gross Motor Function (GMF) before and after each period. The timetable was laid out as such; assessment, 3 months of C-NDT, assessment, 3 months of I-NDT, assessment, 3 months of C-NDT, and a final assessment. The results showed that for both CP and non-CP patients who were not improving by C-NDT, had a

significant improvement of GMF after a 3-month period of I-NDT and sustained that improvement after I-NDT ceased, and a conventional regimen resumed.

### Appraisal of the study introduction

The introduction begins with a very comprehensive section about the utilization of NDT and how previous studies have shown its effectiveness, which is important as it is the primary treatment utilized. The literature used for this article are credible and current. A few articles were dated (1963, and 71'), but these two were used to show that NDT has been studied and accepted in some form for decades.

Though the article does an excellent job at providing background on the intervention topic, NDT, it fails to elaborate on why NDT would be a suitable and effective treatment option for those with CP or DD.

### Appraisal of the study methods

This research article was a quasi-experimental design, that was prospective and longitudinal. The study had 42 participants who each had an individual therapist for treatment and a blinded therapist to assess GMFM, which is proven to be a valid and reliable outcome measure. A GMFM comparison between those with CP and those without CP was performed and analyzed through SPSS-K and ANOVA. In addition, the researchers analyzed absentee rates to assess subject compliance to change in treatment intensity.

The methods were well written and thus presented very few negative points. The major issue with this study is the inability to utilize a control group due to lack of participants and ethical reasons. Therefore, all subjects received the same treatment plan. Each subject was designated a therapist to provide the NDT treatment and even though the training for NDT is standardized, individual application of NDT could allow for some small variability within the treatment. To assess improvement the researchers utilized the Gross Motor Function Measure (GMFM). This assessment was not described in detail and could be a limitation for those unaware on how to perform this assessment.

#### Appraisal of the study results

The results section was well written with very few negative points. The authors answered the research question in a clear and direct manner. The outcome measures presented in the methods section are addressed and sufficiently reported within the results section. All figures and tables are clearly presented and well organized. The authors state that the threshold p-value was  $p < 0.05$  and the confidence interval of 95%. Finally, the article reports all statistically significant results, which was an increase in GMFM after the 3-months of I-NDT.

The authors do present the statistically significant results, but without prior knowledge of the clinical application of GMFM, the average reader may not know if the results are clinically significant.

### Appraisal of the study discussion

Within the discussion the authors further describe the importance of their findings and of this treatment, and to support their conclusion they provide existing literature. In their conclusion they express why I-NDT can be an effective treatment for those with DD and CP, also that I-NDT should be considered if the C-NDT is not providing positive results.

The authors state the limitations and express that future studies should consider these limitations when attempting a study of a similar design. These included no control group, time and frequency of OT and functional training were not controlled during treatment, and the observed long-term effect of I-NDT was only recorded to 3 months. Finally, the authors do not directly state they will perform these follow-studies.

### **Discussion**

Though this article has an inclusion of DD with or without CP, it still provides significance to the PT field and address this review's clinical question. It shows that NDT can improve gross motor function in CP patients and can be effective in other areas where patients are experiencing similar symptoms. This article also may help answer another common issue with NDT, intensity (frequency and duration) of the treatment. The article selected patients that showed no significant improvement through C-NDT, which might help explain that some patients need additional treatment, whether that be frequency or duration, for improvement to be seen.

NDT has been a common treatment for those afflicted by CP and for those experiencing similar symptoms. This article does an excellent job presenting a scenario where conventional



treatment is not effective enough to produce positive results. A more intensive version of NDT is therefore introduced in hopes of obtaining significant results. The benefit of such treatment is a significant improvement in Gross Motor Function (GMF) of the patient; however, this comes at a cost of time, money and increased physical demand on the patient. Generally, a change from C-NDT to I-NDT implies an increased number of sessions and longer sessions, which might be an issue for patients. The effectiveness, and benefits, of I-NDT needs to be evaluated on an individual basis. Each patient needs to be assessed regularly to justify the positive is outweighing the cost, time, and demand needed for I-NDT. If regular GMF assessments provide consistent positive results, then NDT might be a more favorable treatment option for those afflicted by CP.

After review of this article I believe that this study has strong validity and reliability, and as a result I would strongly consider the use of the intervention. The researchers were able to objectively test the positive effects of I-NDT on those that showed no improvement by conventional means. Given my current knowledge I would be unable to implement the use of NDT as it requires special training and a certification. However, this only further increases my confidence of the intervention.

In conclusion, “Efficacy of Intensive Neurodevelopmental Treatment for Children With Developmental Delay, With or Without Cerebral Palsy” was a well written article and ultimately answered the clinical question that began this review. Each section of the article was concise and showed little room for improvement. The intervention design expressed a critical aspect of all rehabilitation treatment plans, that not every patient will respond in a similar manner. It is my opinion that the article under review is reliable source and thus the positive results produced from the study could be applied in a clinical setting.