

Efficacy of Cold Therapy on Spasticity and Hand Function in Children with Cerebral Palsy

Thesis

Submitted For Partial Fulfillment of the Requirements
for Doctorate Degree in Pediatric Nursing

By

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2016

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2016**



*First and foremost, I feel always indebted to **Allah**, the most kind and the most Merciful for all countless gifts I have been offered. One of these gifts is accomplishing this research work.*

*I wish to express my deepest gratitude and sincere appreciation toward **Prof. Dr. Iman Ibrahim Abd Elmoniem**, Professor of Pediatric Nursing & Vice Dean of Community Services and Environment Development Affairs, Faculty of Nursing, Ain Shams University, who devoted much of her time, effort generous advice for the completion of this work. Words can never express my hearty thanks and indebtedness to her valuable advice experienced guidance and encouragement.*

*I am so grateful to **Assist. Prof,Dr. Madiha Amin Morsy Aboukhalla**, Assistant Professor. of Pediatric Nursing, Faculty of Nursing, Ain Shams University, for her supervision, understanding, constructive criticism, and friendly encouragement.*

I could never forget to offer my special thanks to the children and supervisions of the hostel as their cooperation was of great value to accomplish this study

Hagar Abd El-hameid Ali

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List of Abbreviations

AACPDM.....	American Academy for Cerebral Palsy Developmental Medicine
ADL.....	Activities Daily Living
APA.....	American Psychiatric Association
CCT	Controlled Cold Therapy
CIVD.....	Cold-Induced Vasodilatation
CP	Cerebral Palsy
EEG.....	Electro-Encephalo-Grams
EMG	Electro-Myo-Graphic
GA.....	Gestational Age
GI.....	Gastro-Intestinal
Gr.....	Grasping
MAS	Modified Ashworth Scale
NDT.....	Neuro-Developmental Therapy
NNDS	National Institute of Neurological Disorders and Stroke
PDMS	Peabody Developmental Motor Scale
ROM	Range of Motion
SCPE.....	Surveillance of Cerebral Palsy in Europe
TAC.....	The American College
UCP.....	United Cerebral Palsy
VMI.....	Visual Motor Integration

Abstract

The aim of the study was to investigate the efficacy of cold therapy on spasticity and hand function in children with cerebral palsy. **Research design** a Quasi-experimental design was utilized in conducting this study. **Reasearch setting** study was carried out in both physiotherapy centers for pediatric at Ain Shams University Hospitals and Cairo University Hospitals. **Subject:** A purposive sample consisted of children had cerebral palsy undergoing physiotherapy from the previously mentioned settings total sixty with their mothers. The subjects were divided into two identical groups the study group who received physiotherapy plus the cold therapy on spasticity and the control who received the routine hospital physiotherapy. **Tools of data collection** were an interviewing questionnaire, Modified Ashworth Scale, Rang of Motion and Peabody Developmental Motor Scale. **Results:** The study revealed that the highest percent of the studied children was a highly statistical significant difference in reducing spasticity and improve hand function in children with spastic compared with the control group **Conclusion:** The study concluded that cold therapy reduce spasticity and improve hand function in children with spastic cerebral palsy compared with the control group . **Recommendation:** it could be recommended to implant the cold therapy management/procedure for decrease spasticity in children to enhance hand function activities.

Keywords: Cerebral Palsy, Cold Therapy, physical therapy, Children.

INTRODUCTION

Cerebral Palsy (CP) isn't one condition, rather, the term describes a wide range of disorders and developmental disabilities that can arise from damage to a child's developing brain before, during or shortly after birth (*Evans & Alberman, 2014*). The motor disorders of CP are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior, and secondary musculoskeletal problems (*Rosenbaum et al., 2012*). Spasticity remains a major cause of disability among children with CP (*Stromberg et al., 2012*).

Spasticity is a widespread problem in CP as it affects function and can lead to musculoskeletal complications. It occurs as a result of pathologically increased muscle tone and hyperactive reflexes mediated by a loss of upper motor neuron inhibitory control (*Flett, 2008, Schecker, et al., 2009*). The spastic types of CP have neuro-motor findings that are consistent and persistent; neurologic abnormalities remain during quiet periods and sleep, and do not vary much during the active state or when degrees of emotional stress or irritability are present (*The Surveillance of Cerebral Palsy in Europe (SCPE) (2007)*).

The worldwide incidence of CP is approximately 2 to 2.5/1000 live births. The incidence is strongly associated with Gestational Age (GA), occurring in 1 of 20 surviving preterm

infants. Preterm infants are at the highest risk for developing CP. It occurs in approximately 1.2:2.5 in live birth annually and incidence rate is high in very low birth weight infant and those who are small for GA (**Brown et al., 2007; King et al., 2008**). In Egypt, had CP, giving a prevalence of 2.04 (95% confidence interval 1.48-2.59) per 1, 000 live births (**El-Tallawy et al., 2011**).

Cold therapy is a widely used treatment technique in the management of acute and chronic conditions of various types. There are many tissue-based effects which are promoted by the application of cold therapy and these include post-injury reduction of swelling and edema, an increase in the local circulation, lowering of the acute inflammation that follows tissue damage, muscle spasm reduction, and pain inhibition (**Semenova et al., 2014**).

Muscle contraction can be facilitated by using cold therapy and this can be used to improve muscle contraction to increase joint ranges of motion after injury. Another effect of cold is a time-related reduction in spasticity once the cold has been applied for some time. Cold can be applied to the body in three different ways: immersing in cold water, rubbing with ice cubes or ice packs or using evaporative sprays such as ethyl chloride (**Eldred et al., 2010**).

Significance of the study

Cerebral palsy is a serious health problem that threatens the children and their families during their life and interferes with activities that normally achieved in infancy, childhood, and adolescence. Prevalence of CP at Egypt is 2.04 per 1,000 live births (*El-Tallawy et al., 2007 & Stromberg et al., 2012*).

Spasticity remains a major cause of disability among children with CP. Management of spasticity is a major challenge to treatment team. Various forms of therapy are available to children living with CP as well as caregivers and parents caring for someone with this disability. They can all be useful at all stages of this disability and are vital in a CP child's ability to function and live more effectively (*Stromberg et al., 2012; Tilton, 2014*).

AIM OF THE STUDY

This study aims to investigate the efficacy of cold therapy on spasticity and hand function in children with CP.

Research Hypothesis

Cold therapy will reduce spasticity and improve hand function in children with spastic CP.

REVIEW OF LITERATURE

Part I: Overview about Cerebral Palsy

Cerebral palsy (CP) was first described by the English physician Sir Francis William Little in 1861 and was known as Little's disease for a long time. Little thought that this condition was caused by neonatal asphyxia. Later, Sigmund Freud and other scientists challenged Little's idea and proposed that a variety of insults during pregnancy could damage the developing brain (*Nadire & Selim, 2010*).

Cerebral palsy (CP) describes a group of permanent disorders of the development of movement and posture, causing activity limitations that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of CP are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior, and secondary musculoskeletal problems (*Rosenbaum et al., 2007; Stoknes et al., 2012*).

Children with CP may experience uncontrolled or unpredictable movements, muscles can be stiff, weak or tight and in some cases child have shaky movements or tremors. Children with severe CP may also have difficulties with