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The Effectiveness of MOVE Rehabilitation Methodology on Rehabilitation Outcome of Movement Dysfunction Among Palestinian Children - A Descriptive Retrospective study

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Dedication

I dedicate this thesis to my late parents and beloved husband and kids who have been incredibly supportive throughout my studies.

Declaration

This thesis is submitted in partial fulfillment of the requirement for the Master's degree in Physiotherapy and Rehabilitation at Al-Quds University, I declare that the content of this thesis (or any part of the same) has not been submitted for a higher degree to any other University or institution.

Name: Siba Khaled Salame Dawani Balian

Signed: ***Siba Dawani Balian***

Date : 16/08/2021

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Abstract

Introduction. Movement dysfunction is referring to more than one specific diagnosis, including cerebral palsy, head injuries, Down syndrome, Spina Bifada and other movement related disorders. **Move (**movement opportunity via education**)** is a rehabilitation method based on motor learning aiming to train movement disorder patients to gain their basic movements and motor abilities , the Aim of this study was to evaluate the effect of MOVE methodology in Rehabilitation on rehabilitation outcome of Movement dysfunction children . **Methods**: Retrospective analytical observational study was used to investigate and review all the rehabilitation files (n=80) from MOVE three centers, Jericho, Yatta and Idna (2012 – 2020) in west Bank. Baseline and follow up assessments were investigated and analyzed, using MOVE assessment form that includes 16 functional items, scores are based on points scale, and 4 functional categories, representing the different functional abilities of the children at baseline and follow up. **Results**: Eighty files were detected. 50 files had pre and post assessments, 36.3% were spastic quadriplegia CP, 27.5% were Psychomotor delay, 17.5% Diplegia, 6.3% were Microcephaly, 5% Downsyndrome,2.5% were Spina bifida and 1.3% had Brain atrophy. 52.5% were males and 47.5 % were females, average age of participants was 11.26, average length of stay in the rehabilitation program was 26.38 months. All domains of the 16 functional tasks showed a statistically significant improvement between baseline and follow up ($p < 0.05$) Most improved domains were sitting to standing and standing to sit and walking forward. Least improvement was standing still, pivoting during walking, and movement in sitting position. Most improved diagnosis was Traumatic brain injuries, Down syndrome, microcephaly, and Diplegia, and least improved diagnosis were Spina Bifida and brain atrophy. Improvement was positively associated with the age and the

length of stay in rehabilitation. Other variables like gender and demography were not a significantly associated variable with improvement (P >0.05). **Conclusion** MOVE is an effective functional rehabilitation approach in movement disorders children, further research is needed to investigate a comprehensive measurement that covers all areas of physical function & ADL's (activities of daily living). and compare MOVE efficacy versus other rehabilitation techniques.

Keywords

Movement disorder, Cerebral palsy,, MOVE, outcome measures, school age, functional activity

فعالية طريقة تأهيل موف على مخرجات تأهيل المشاكل الحركية لدى الأطفال الفلسطينيين – دراسة تحليلية بأثر رجعي

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الملخص

مقدمة. يشير اضطراب الحركة إلى أكثر من تشخيص واحد محدد، بما في ذلك الشلل الدماغي وإصابات الرأس ومتلازمة داون والسنسنة المشقوقة وغيرها من الاضطرابات المرتبطة بالحركة. موف (فرصة الحركة عن طريق التعليم) هي طريقة إعادة تأهيل تعتمد على التعلم الحركي بهدف تدريب مرضى اضطراب الحركة على اكتساب حركاتهم الاساسية وقدراتهم الحركية. **الهدف من هذه الدراسة** هو تقييم تأثير منهجية موف في إعادة التأهيل على نتائج إعادة التأهيل لحركة الأطفال اللذين يعانون من الاضراب الحركي والوظيفي. منهجية البحث: تم استخدام دراسة تحليلية بأثر رجعي للتحقق من ومراجعة جميع ملفات إعادة التأهيل (العدد= 80) من مراكز موف الثلاثة اريحا، يطا وادنا (من تاريخ 2012–2020) في الضفة الغربية، تم فحص وتحليل التقييمات الأساسية والمتابعة، باستخدام استمارة تقييم موف التي تتضمن 16 عنصرًا وظيفيًا، تستند الدرجات إلى مقياس النقاط، و4 فئات وظيفية، تمثل القدرات الوظيفية المختلفة للأطفال في لحظة الدخول وعند عمل الفحص الثاني من المتابعة. **النتائج:** تم مراجعة ثمانين ملفا. 50 ملفًا فقط كان لها تقييمات سابقة وبعدية، 36.3٪ من الاطفال كانوا يعانون من شلل رباعي تشنجي، 27.5٪ تأخر حركي نفسي، 17.5٪ شلل مزدوج، 6.3٪ صغر الرأس، 5٪ متلازمة داون، 2.5٪ شلل نصفي مشقوق و1.3٪ كان لديهم ضمور دماغي وتشخيصات اخرى. 52.5٪ كانوا من الذكور و47.5٪ إناث، متوسط عمر المشاركين كان 11.26 عام، متوسط مدة الإقامة في برنامج إعادة التأهيل كان 26.38 شهرًا. أظهرت جميع مجالات المهام الوظيفية الـ 16 تحسنًا ذا دلالة إحصائية بين الفحص الاساسي وفحص المتابعة ($p<0.05$) كانت اكثر المجالات المتحسّنة هي الجلوس من الوقوف والانتقال من الجلوس الى الوقوف والمشي إلى الأمام. كان التحسن الأقل في الاستدارة أثناء المشي، والحركة في وضع الجلوس. كان التشخيص

الأكثر تحسناً هو إصابات الدماغ الرضحية، ومتلازمة داون، وصغر الرأس، ثم الشلل النصفي، وكان التشخيص الاقل تحسنا هو السنسنة المشقوقة وضمور الدماغ. ارتبط التحسن بشكل إيجابي مع العمر وطول الإقامة في عملية التأهيل. الجنس والمتغيرات الديموغرافية لم تكن مرتبطة مع التحسن($P > 0.05$). **الخلاصة:** موف هي منهجية إعادة تأهيل وظيفي فعالة للأطفال الذين يعانون من اضطرابات الحركة، وهناك حاجة إلى مزيد من البحث للتحقيق في قياس شامل يغطي جميع مجالات الوظيفة البدنية وأنشطة الحياة اليومية و مقارنة فعالية موف بطرق ناهليه اخرى.

الكلمات المفتاحية: أطراب الحركة، الشلل الدماغي، الاضطرابات الحركية، الحركة، مقاييس النتائج ، تقنية موف

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List of abbreviations

CP: Cerebral palsy

MOVE: Movement opportunity via education

ADL's: Activity of daily living

AFO: Ankle foot orthoses

GRF: Ground reaction force

WHO: World health organization

ICF: International classification of function

ICF-CY: International classification of function- child and youth

HAS: Hip shaft angle.

NSA: Neck shaft angle

AP: Anteroposterior

ML: Mediolateral

AFO-FC: Ankle-foot orthoses-footwear combination

TDMMT: Top-Down Motor Milestone Test

Chapter one

1.1 Introduction

1.2 Problem Statement

1.3 Study Objectives

1.4 Study Questions

1.5 Study Rational

1.1 Introduction

Movement disorders points to a neurological dysfunction, a condition with voluntary or involuntary abnormal dexterity, decreased or slow movements, loss of coordination, repetitive involuntary contractions, and ataxic movements (1) Movement disorders points to a neurological dysfunction, a condition with voluntary or involuntary abnormal dexterity, decreased or slow movements, loss of coordination, repetitive involuntary contractions, and ataxic movements. Movement disorders points to a neurological dysfunction, a condition with voluntary or involuntary abnormal dexterity, decreased or slow movements, loss of coordination, repetitive involuntary contractions, and ataxic movements. These complications can affect any part of the body, limbs ,face, neck, trunk due to spasticity or flaccidity in children with movement disorder that are related to basal ganglia or extrapyramidal and pyramidal tract diseases (2). 37.1% of all individuals with a mobility disability in Palestine require physiotherapy, 24.0% require bathing aids, 23.5% need an electric wheelchair, 22.7% require occupational therapy, and 21.0% require walking aids such as a walking stick or walker (PCBS,2011). (3) Movement dysfunction could be found in Down syndrome, traumatic brain injuries, hydrocephaly, and Spina Bifida. Movement disorder is a neurological condition that damages pyramidal and extrapyramidal tracts that controls voluntary and involuntary movements, it may be manifested as Ataxia, dystonia, essential tremors, spasticity tardive dyskinesia, some of these classifications or disorders whether progressive or non-progressive, hinders functional mobility affecting balance, postural stability and movement as a whole.

Cerebral palsy (CP), is a one-time irreparable damage to the brain lesion that affects the movement ,developmental milestone, balance and posture causing disability of an on-going development of secondary complications that influences the function which

allows independence (4)(5).The different clinical types of CP are Hemiplegia, bilateral hemiplegia, Diplegia, dyskinesia, ataxia and mixed type, all ranges from mild to severe(6). Prevalence in Israel was 0.8 per 1000 live births. two to one in 1000 between Arabs and Jews and was highest in the south (Bedouins)(7). Most children with CP have further conditions, diseases along, such as epilepsy cognitive delay(8)(9), secondary musculoskeletal complications ,sensory ,and communication problems (10). Usually, the most prevalent motor disability is Spastic CP affecting 80% of children with neurological deficit. It can also result in marginal problems and complications (11). Mean while in Palestine, Palestinian central bureau of statistics has declared in 2019, that in Palestine 21% of the population are suffering from different types of disabilities, in which around 20% of them are under the age of 20 years old (65).

Physiotherapy is one of the major rehabilitation professions in the holistic rehabilitation approach to improve functional abilities and support health in different aspects of life, physically, emotionally, and cognitively with social relations and independence (50) .Optimal outcomes are seen if early and intensive interventions are given through teamwork that involves entire aspects of management programs tailored to the child's goals. It includes assistive aids, different therapy approaches, surgeries, and management of related status. Progression of care for adult patients becomes hard as they age and it gets difficult to carry out activities of daily living (ADL's) due to the lessening of social services and caregivers (12)(13).

Context therapy approach means adapting the task to the child's ability rather than improving the functional ability to the specific task(14). It is a top-down approach identifying the problem and accordingly designing a goal and treatment protocol, focused

on activity and function. The therapist adapts the features of the task and/or the surroundings which enables the child to practice the act that was difficult to perform earlier (15).

Management of cerebral palsy is a Multidisciplinary approach, regarded nowadays in health systems. Additionally, essential for CP rehabilitation perspective. CP rehabilitation is an intricate procedure pointing at guaranteeing better quality of life for the family and child. It is a holistic approach considering all aspects whether physical, social, or environmental as well as a unification of restoration, pedagogy, and awareness. This holistic approach is recognized by the World Health Organization (WHO) under the International classification of function (ICF) International classification of function-child-youth (ICF-CY) to have a common language internationally among the health profession (16).

Multi-interdisciplinary is family involvement with the therapists, to join forces for the benefit of the child, and the enrollment in the program based on the child's requirements. Transdisciplinary is a new method combining multi and inter disciplinary for a better outcome and self-fulfillment for the utmost long term active ongoing rehabilitation for CP. It is an integration which breaks down the partitions between the standard disciplines and sorts out learning and teaching around the establishment of meaning in the circumstances of real-world difficulties or issues (17).

Occupational therapy is a part of rehabilitation team and its role is mainly to enhance ADL's through core stability exercises that improve sitting balance to meet the function of dressing for example (51).

Whereas the PT work is more physical ability in enhancing the mobility and capability to walk and performing different levels of functional tasks. Both professions are important collaborators in the treatment and rehabilitation of CP patients to address the patient's needs around the lifetime (18).

MOVE was introduced or established in Palestine around 2009 within the municipality facilities in Halhool & Beit Fajjar, Jericho ,Yata and Idna. Even though the neurological pathology isn't progressive, the orthopedic complication itself is progressive and affects the ability of the CP children to progress, and in so many cases they lose their functional achievements when their functional status can't meet their growth requirements anymore. Due to the neurological dysfunction and progressive secondary complications, it makes walking less efficient (19). MOVE is one of many approaches used to improve the functional abilities for children with neurological disorders that has caused mobility restriction due to the ongoing progression of complications as they age (18).

1.2 Problem statement

Rehabilitation approaches are well documented and investigated in terms of outcome, and effectiveness, MOVE rehabilitation approach, is relatively new, taking into consideration that it has started in 2009 in Palestine.

MOVE rehabilitation outcome, and effectiveness had not been thoroughly investigated, which leaves a gap of information about its outcome in rehabilitation of movement disorders.

Evaluating the MOVE approach in this study will allow us to highlight the effectiveness of this approach and the factors associated with children's functional

improvement. Since MOVE approach is away from developmental approach more toward functional model with special education and pediatric therapy. Movement opportunities via education (MOVE) approach, suggested therapy protocols in sitting, standing, walking, and transferring.

1.3 Study Objectives

- To investigate MOVE approach rehabilitation outcome to consider as an alternative approach
- To investigate the factors associated with rehabilitation outcome among children treated by MOVE approach.

1.4. Study questions

By the end of this study, it is expected to answer the following questions

- what is the MOVE approach rehabilitation outcome?
- what are the factors associated with rehabilitation outcome among children treated by MOVE approach?

1.5 Study Rationale

This study will explain MOVE in all its domains and categories with the different levels that describes the development of the disabled children treated by this rehabilitation approach. that may promote therapists to consider this approach if it proves its effectiveness, and it will help families to continue rehabilitation of their children whom they care for them reaching their maximum functional level potential. Since MOVE approach is away from developmental approach more toward functional model with special education and pediatric therapy and it is for children with learning and physical difficulties attending a school for special needs. It's a holistic approach that combines

Bobath approach, Context therapy, Motor learning and the assistive devices with orthotics needed for prompts.

To date, the analyses of MOVE approach in Palestine has not been done to justify the effectiveness of this approach on children with movement dysfunction nor has it been used as an outcome measurement to study the outcomes of the functional abilities to those treated with MOVE approach.

Chapter Two

Review and related literatures

2.1 Theoretical Back Ground

2.2 Similar Studies

2.1 Theoretical Background

2.1.1 Introduction

MOVE is a lifestyle methodology that helps children and adults with severe physical disabilities to gain their basic movements by being taught motor functional activities to enable them to sit, stand, walk, and transfer, to integrate in normal daily living within family and community. (MOVE manual, 2008) It is a Trans disciplinary approach, top-down shaped plan to evaluate and estimate total motor ability. It teaches skills to implant habits for practical movement.(5) MOVE is an approach of an ongoing process, designed to serve throughout the rehabilitation, from planning to implementing, analyzing, and tracking. It is an approach to transfer the individual into a dignified and independent individual in the family and society (6).

The idea of such methodology became evident when non-ambulant students' skills were less at graduation than when entered at age 3. Studies were made to learn throughout the day the defaults or the areas that brought the regression of the students (19).

The reasonable outcome was to merge education with care that needed so much attention. After interviewing caretakers /parents to check out the expectation and involvement of their disabled throughout the day within the home and community environment. MOVE has 6-step process that involves a functional mobility assessment, a family interview to determine priorities, and a framework for preparing and implementing intervention, as well as a collaborative team approach (parents, infant, and professional staff). The 6 steps of MOVE are, 1) Assessing the team tests the functional ability of the child using the Top-Down Motor Milestone Test (TDMMT) 2)Tailoring goals conducted with the family priorities 3) Task analysis, depends on family needs to establish functional activity accordingly 4) measure physical support needed in order to facilitate participation

in the activity (which body part, type and amount of support and position of support) 5) reducing physical support when the child's activity and ability to participate increases. 6) teaching the skill which means practice the activity as a function in daily life (20) .

2.1.2 Common movement dysfunctions managed by MOVE

Cerebral palsy (CP) is one of the major movement dysfunctions managed by MOVE, it is a result of brain injury during development before birth, during delivery or (52). It causes physical impairment and is a major disabling movement disorder, affecting the muscles and can be in one or more parts of the body. It also may disturb balance, posture, coordination depending on the area of damage in the brain (53) is non-progressive permanent long-term damage for life, it can be managed with therapy, assistive device technology, surgeries, and medication to provide an independent and quality of life to the patient. The cause may not be obvious but risk factors of CP include pregnancy infections, preterm birth, difficult delivery, and 2% can be genetic cause (Sankar and Mundkur 2005)

Down syndrome is another major movement dysfunction targeted by MOVE, it is genetic disorder of chromosome 21 that causes physical developmental changes and intellectual abilities that is most common as well as specific facial features. They can also develop heart problems hearing and pulmonary disorders. Weight gain is another common feature that down syndrome patients develop (18) .

Psychomotor delay it is also addressed as global developmental delay for more than two domains, such as motor, ADL's language, and speech, social/personal and cognition. It affects communication skills social interaction cognitive and or behavioral skills. Intellectual function, learning difficulties which will be more obvious in school

years. Psychomotor delay can be a result of attack to the brain from infection meningitis and as viral attacks (18) .

Microcephaly is an inborn defect where the head circumference is small and the brain is underdeveloped. It can be a result of a mutation, toxins, radiation and or viral infection (18) .And **Macrocephaly which is a** term for enlarged head circumference, can be benign or a cause of underlying neurological problem either genetic or injury to brain like tumor ,bleeding ,hematoma again depending on the area of damage (18). and both dysfunctions are managed by MOVE approach.

Muscular dystrophy is a common movement dysfunction that MOVE includes in its approach, it is a lack of dystrophin which affects the myofibers of the skeletal muscles and Muscular dystrophy is a mutation of gene that is inherited and diagnosed between ages 3-6, all 30 types are classified into nine categories (55). It is considered a progressive disease-causing weakness and deterioration of muscle mass. It makes functional activities difficult such as walking and transferring leading to regular falls. The most difficult and deadly type of muscular dystrophy is Duchenne (56).It is essential like any other motor dysfunction disabilities to provide the patient with the appropriate assistive devices and orthotics with specialized rehabilitation program to prevent and lessen the complications that arises (21).

Spina bifida which is a neural tube defect that happens in any part along the spinal cord. It is believed to be genetic hereditary and or environmental(57) Most can live a normal life and do well in school even participate in sport. There are more than one type of spina bifida occulta, (hidden) closed neural tube defects, meningocele. (protrusion of the meninges through a gap in the spine due to congenital defect, myelomeningocele also

known as(neural tube defect) last two can be grouped under spina bifida cystica.in the literature 8 week progressive resistive exercise improved functional outcome such as walking and endurance in terms of contracture improvement there was a moderate response to sustained stretching ,the literature also is emphasizing the improvement of the children with spina bifida who are provided with rehabilitation to a better outcomes of functional abilities (58).

Traumatic brain injury Is a hit to the head that can cause mild concussion to severe permanent brain damage. Relative to the area of damage is the physical movement dysfunction .Early intervention post injury and early rehabilitation in the facilities advance functional improvement in moderate to severe contrast to normal care (2).

2.1.3 Common secondary complications

Movement disorders are a group of neurological conditions that cause motor flaws which may result in complications. such as Spasticity which is a manifestation of an upper motor neuron that damages pyramidal and extrapyramidal pathways. It is believed to hinder voluntary motor control and raise energy work. Moreover, it inhibits muscle elongation throughout development that causes secondary complications which develop skeletal malformation leading to deformity of posture. As well as club foot deformity varus/valgus may develop due to spasticity or flaccidity, contracture and weakness .The contractures and joint abnormalities in return affect many functions such as gait (22).In addition hip displacement is the second most prevalent problem developing in neurological disorders (23). Balance is another familiar problem in traumatic brain injuries CP (24).

2.1.4 Common treatment approaches in management of movement disorders

2.1.4.1Bobath

It is named after Berta and Karel Bobath, Berta was a physiotherapist, and her husband was a psychiatrist/neuropsychiatrist. The Bobath concept is made up of three main parts: i) Clinical reasoning, ii) functional movement analysis, iii) facilitation. Before Bobath approach was developed therapist used to do stretching, splinting and surgery which was the typical way of interventions. Their approach gave a new concept that considered children with CP struggle with upright position against gravity and motor control (25) .

Atypical tone and reflexes observed in CP impede with the maturing of equilibrium and righting responses, which are basic for the development of motor abilities and normal postural reflexes.It underlines two aspects crucial for enhancing motor regain post brain damage. Postural control and functional performance ,dexterity of movement coordination as well as sensory input for motor learning (26).

2.1.4.2 Functional Motor Learning

Motor learning is a complicated process that includes gaining a new permanent skill through repeated exercises of a certain task or movement until it reaches into automatic action. There are three stages in which a movement becomes a gained skill. Cognitive(planning, how to do the task)Associative (practice, tuning consistency, how well the task is done)Autonomous (automatic, the task is mastered no need to think about executing it) (59). Physiotherapist have a major role in motivating motor learning whether

through repetitive exercises or merging technology, like Nintendo Wii, gait trainer ,supported gait trainer ,virtual reality, Walk Aide(27) .

Considering children with movement disorders/CP reach 90% of their gross motor capacity steadily by age 5 with peak capacity around age two (5). Assuming that the first two years are crucial stage for development of the corticospinal tract , therefore it's an important period for enhancing end results (28). Well-functioning CP children benefited better in gaining from motor learning approach in executing functional mobility (29) .

2.1.4.3 Stretching exercises.

CP which is an anomaly to the brain lesion that is stagnant results in muscle fibrosis, atrophy and an ongoing, shortening. Moreover ,there is an absence of muscle development .the active shortening of the muscle is usually treated with different approaches ,like passive elongation, orthotics ,fixation and medication for spasticity. In time, contractures are developed if the conservative treatments failed to help preserve the muscle length, ending up to surgery solutions (60).

Varied aims of these types of therapies is to keep up and improve range of motion(ROM)at the joint to better the gait pattern and to enhance functionality .Stretching exercise or elongation can be hectic painful and time-wasting to the children, the families and the therapist .In order for an alteration of muscle length to take place there are many factors involved ,like the contractile tissue the connective fibers in the muscle the tendon and their mechanical properties .rather shows productive results in ROM but not in gait pattern nor speed not even in gross motor function. The alteration(adaptation)of the muscle and tendon is not noticeable nor present after stretching. Besides there is little verification to aid functional development. Regardless stretching is abundantly used (30).

2.1.4.4 Strengthening

According to research strengthening exercises for CP becomes more effective when performed three times a week for long session periods (40-50 minutes). Significant progress was seen in specific muscles related to strength in children compare to adults, better gait performance not endurance. More research is in need to find out the benefit of strengthening exercise on total motor activity (31).

Recent studies show that functional power training improves walking abilities and strength. It is a targeted, progressive and high velocity, walking and sprinting exercises that made the difference, with extra weight added to the training program consequently guaranteeing sufficient power to the strengthening exercises. (61,62) younger the children, the better muscular and neural plasticity, therefore higher sensitivity to motor coordination which consequently improves their sprint ability, strength and endurance. It is also suggested to aim at the plantar flexors in the training program which might enhance gait and sprinting abilities (32).

2.1.4.5 MOVE Approach

MOVE program is multidisciplinary approach that integrates parent/and or carers in the involvement of treatment protocol and this incorporation shows effectiveness of MOVE in improving function (33). MOVE was developed to target children with physical and learning disabilities. It is a multi-disciplinary top-down approach. It is designed to teach motor functional skills to enable them to integrate in home and community and improve their independence in sitting, standing, walking, and transferring. The MOVE philosophy was well aware that carers and the person with disability is the one who

knows best for contouring a program that fits their needs based on motor learning “the acquisition of new skills with practice.”(34) It is a lasting change in the competence of movement. Motor learning is an acquired skill that has autonomy rather than reflexes or neuronal modification.” Practice makes perfect” (27) (35).

Choosing the proper activities was the essential part to reach to independence. The activities were task oriented that initiated 16 categories (A-P)

A. Maintain a sitting position

B. Move while sitting

C. Standing

D. Transition from sitting to standing Transition from standing to sitting Pivot while standing, G Walk forward Transition from standing to walking, I Transition from walking to standing Walk backward Turn while walking, L Walk up steps Walk down steps,**N** Walk on uneven ground, 0 Walk up slopes,P Walk down slopes. with four levels of success.

- **Level** I: Minimal care without hoisting, the child will be able to walk 100 meters with either gait-trainer or both hands held. Wheelchair for distances outdoor.
- **Level** II: Minimal care without hoisting with minimal assistance in maintaining his/her balance & walking 3 meters. Wheelchair is needed for distances above 3 meters.
- **Level III: Skills** decrease pain and joint distortion. healthier bones and better function of internal organs .

- **Graduate level:** Independent mobility indoor minimal assistance outdoor in society. Reaching this level enables them to develop motor skills in other programs and will never need a wheelchair (19) .

MOVE also has 6-step process that involves a functional mobility assessment, A family interview to determine priorities, and a framework for preparing and implementing intervention, **The 6 steps of MOVE are**

1. **Testing** The team tests the functional ability of the child using the Top-Down Motor Milestone Test (TDMMT) .
2. **Setting goals** Tailoring goals conducted with the family priorities
3. **Task analysis**, depends on family needs to establish functional activity Accordingly.
4. **Measuring prompts** measure physical support needed in order to Facilitate participation in the activity.
1. **Reducing prompts** physical support when the child's activity and ability to participate increases.
5. **Teaching the skills** which means practice the activity as a function in daily life (19).

2.1.4.6 Splinting and orthotic in CP

Earlier studies have reported that normal kinetic and kinematic characteristics during typical gait. They agree that the symmetry of the ground reaction force (GRF) comparative to the joint is lead in generating controlled, energy-saving gait. Although, in pathological gait it is seldom attainable. Ankle-foot-orthosis (AFOs) in CP and movement disorder children are widely advised to lessen energy use. Studies show progress in definite gait specifications, but not all in unison as to which specifications due to dissimilarity in research designs. It is not a similar dysfunction therefore differentiating gait patterns with AFO's naturally will result in different variables. It might as well be the absence of ankle-foot orthoses-footwear combination (AFO-FC) adjusting, that can affect the biomechanics of the lower limb and consequently the gait pattern and performance (36) .Heel height has an important impact in the alignment and biomechanics of the foot as a result to ensure the

calculating, adjusting, and aligning the AFO-FC. It enhances the gait cycle to influence the GRF and have better management in extension and flexion of the knee joint. lack of adequate research in this area makes it difficult to apply it clinically. Therefore, it is advised to mention all details of the AFO and the footwear used in any research to rule out apparent results which can be referred to therapy practice (37) .

2.2 Similar Studies

Barnes and Whinnery (2002) conducted a study on MOVE with 5 preschool-aged children with various disorders. The age range was between 3-9 years old. Four of which improved walking abilities or maintained in the first year of intervention. Two of which developed to walking independently, without support. A 3-year-old girl with cerebral palsy post enrollment to MOVE a period of one year as indicated in the study acquired walking more than 100 steps on a gait-trainer (32)

A quasi-experimental study conducted by Van Der Putten 2005 . Evaluating the "Mobility Opportunities Via Education" curriculum with children with profound intellectual and multiple disabilities .44 children were recruited with multiple disabilities with age ranges from 2 to 16 years old, average age 9.36 in a 12-month program ,32 of which were in the experimental group and 12 in control group. Pre and post tests were used (TDMMT) top-down motor milestone test that 63% of the children in the experimental group who received concentrated (focused) activities showed significant improvement whereas no significant improvement was achieved in the control group (38)(39) .

A yearlong pilot study was done in 2005 in movability program applying MOVE curriculum in a 5 special education classes on 39 children between the ages 3.5 -13 with severe various disabilities. ROM, developmental motor level, and functional mobility were

assessed at baseline and at 12-month post intervention. An individual program was tailored to each child in the classroom by the physiotherapist and the teacher on MOVE curriculum and a 2–4-hour session per week was followed with no additional treatment related to therapy. An increased functional mobility resulted in sitting, standing, and walking in majority of the children, with loss of function in those who had medical problems throughout the year of study. As a clinical importance ,MOVE curriculum is a an effective rehabilitation methodology to apply at school context (40).

The similar studies were all experimental studies where they all applied MOVE approach to children with severe disabilities .Van Der Putten,Whinnery and Barnes and Low S A. agree on MOVE as an alternative approach to be considered . Since to date almost no research has been done not analytical nor experimental in Palestine to consider its holistic approach rehabilitation outcome that involves the environment, focused activities, motivation and opportunities to practice new skills. Up to this point, those were almost the only studies (2002, 2005) found for the application of MOVE approach internationally .This retrospective analytical study showed significant improvement in most of its categories which makes it an approach to consider in Palestine in all schools for special needs.

Chapter Three

Methods and Materials

3.1 Introduction

3.2 Research setting

3.3 Sampling and population

3.4 Methodology

3.5 Ethical consideration

3.1 Introduction

This chapter focuses at introducing the sampling method of the data collection, inclusion exclusion criteria . methodology, tools of data collection and in the statistical analysis.

3.2 Research setting

This research has been conducted in Palestine, In 3 centers applying MOVE approach, located in Idna (south west Hebron). Yatta (south Hebron. and Jericho. those places were chosen because they are the only canters available and still open and apply move till today.

3.3 Sampling and population

3.3.1 Sampling method

All files of MOVE patients were screened, from 2012, up to 2020, where 80 files were screened, 50 files had both baseline and follow up assessment.

3.3.2 Sample size

All available files were screened.

3.3.4 Exclusion criteria

- Patients treated by other approaches such as Bobath, functional motor learning, Vojta……
- Absence of reassessment
- Patients who dropped MOVE approach treatment between 2012-2020

3.3.3 Inclusion criteria

- All Participants with Files treated by MOVE approach.

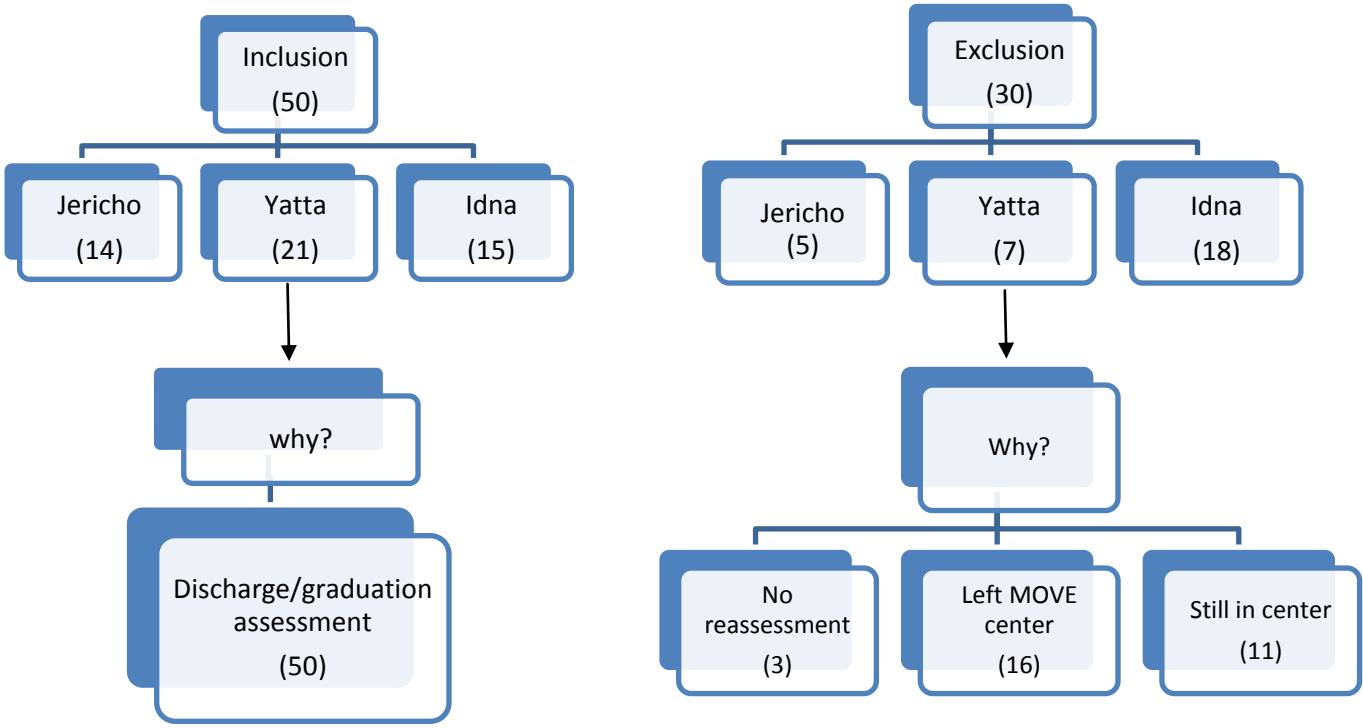

Figure 3.1 Inclusion and exclusion process

3.4 Methodology

3.4.1 Study design

Retrospective analytical observational study was conducted to analyses MOVE assessment sheets, it was adopted as this design allows us to investigate effectiveness, without exposure to patients, in the COVID19 era, where exposure to patients and follow up may be restricted and hindered by social distancing restrictions. Retrospective analytical studies are considered a valuable design of research of outcome of previous interventions using files of patients, it is fast and cheap, with draw back and disadvantage of lack of possibility to track information that was reported in the file, in this type of studies investigators use data collected in the past to inform a current research question (64).

3.4.2 Study tools

A Data collection sheet was developed to match the information and assessment finding provided by the MOVE approach (Appendix 1), which included.

- Level of functional ability (categories)
- score for each one of the 16 functional tasks abilities
- Age
- Diagnosis
- length of stay in between the baseline and the follow up assessment.

3.4.3 Data collections procedure.

After getting the Approval of the physiotherapy department, and the approval of Qader organization (responsible for MOVE centers) a screening process and data extraction and capturing was performed between the periods of February 2021- to end of May 2021. All participants' files were electronically captured later for analysis.

3.4.4 Statistical analysis

Data was statically analyzed using SPSS version 22. Descriptive statistics of mean, median, STD was used to present the characteristics of the sample, mean difference in between nominal variables like gender and areas were analyzed using independent sample t test, improvement in between baseline and follow up was analyzed using paired sample t test , correlation Pearson was used to analyze the association in between total MOVE score and continuous variables like age and length of stay, P value was set as ($p < 0.05$)

3.5 Ethical Consideration

As this is a retrospective descriptive study that was based on medical files only there was no need for ethical clearance certificate. But despite that the researcher is committed to the anonymity of information and data of the participants, and there was no use of names of the children and codes were used in the analysis, and the researcher is committed for the use of data only.

Chapter Four

Analysis and Discussion

4.1 Results

4.2 Discussion

4.1 Descriptive statistics

4.1.1 Distribution of participants by Diagnosis

As shown in figure 4.1 most frequent diagnosis is cerebral palsy (36.3%), followed by psychomotor delay (27.5%)

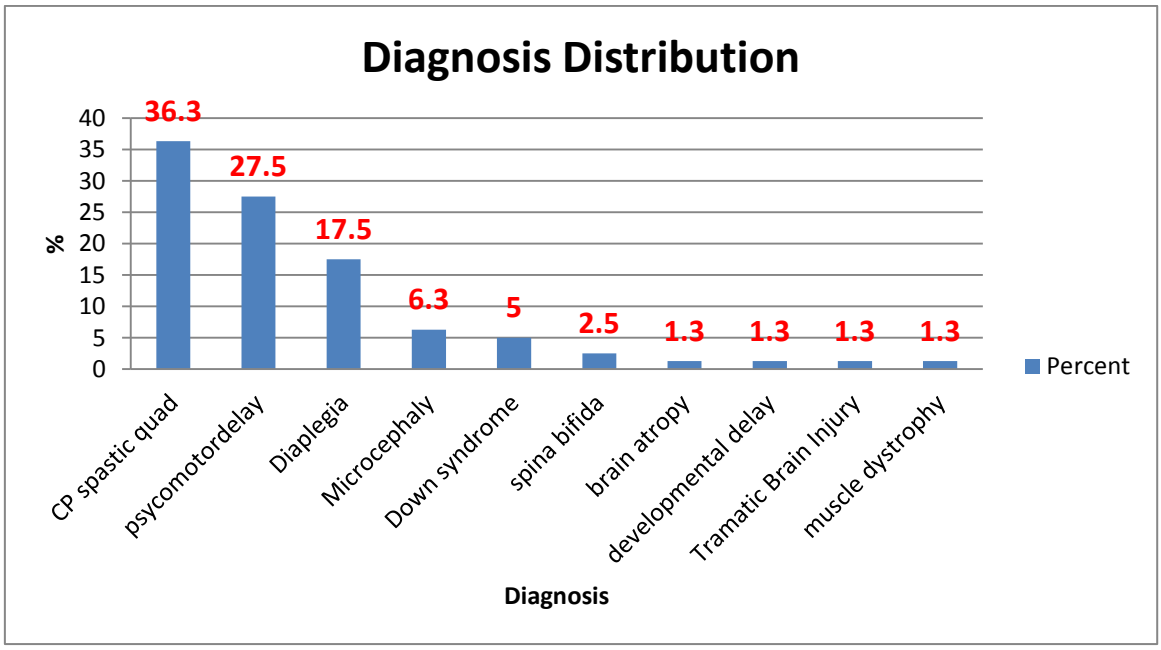

Figure 4.1 Participants by diagnosis

4.1.2 Age of participants

Table 4.1 shows that average age of patients was 11.26 years with STD of 3.469 years. Total number of patients was 80, statistics were run for patients who had both baseline and discharge assessments only (50 participants). Age categories were distributed as following (6-10 years 40.0%, 11-15 years 48.0%, 16-22 years 12.0%).

Table 4. 1 Age of participants

	Minimum	Maximum	Mean	Std. Deviation
Age in years	5	22	11.26	3.469

4.1.3 Inclusion and exclusion of participants

As shown in 4.2 the percentage of the participants included in the study are 62.5% n=50 and the excluded are 37.5 n=30, since the excluded participants had no Discharge assessment data.

Table 4.2 Percentage of participant's inclusion and exclusion

Inclusion / exclusion	Percent
Included	62.5
Excluded	37.5
Total	100

4.1.4 Gender of participants

The percentage of the participants gender related (Table 4.3) is 52.5% (n=42) males and the female is 47.5% (n=38).

Table 4. 3 Gender of participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	42	52.5	52.5	52.5
	Female	38	47.5	47.5	100.0
	Total	80	100.0	100.0	

4.1.5 Type of exclusion

As shown in table 4.4 participants who were excluded from the study analysis were those who had no reassessment at discharge, or who had left the center or still in center with no reassessment files.

Table 4. 4 Type of exclusion

			Frequency	Percent
Excluded	Valid	No Reassessment	2	6.7
		left Move centre	17	56.7
		Still in centre without re assessment	11	36.7
		Total	30	100.0

4.1.6 Improvement in different functional activities

There are 16 functional tasks in MOVE assessment (Figure 4.2), showing the highest improvement in sit to stand function (2.02 points) compared to lowest improvement in standing still function (mean 0.46 points) , in the (16) functional tasks .

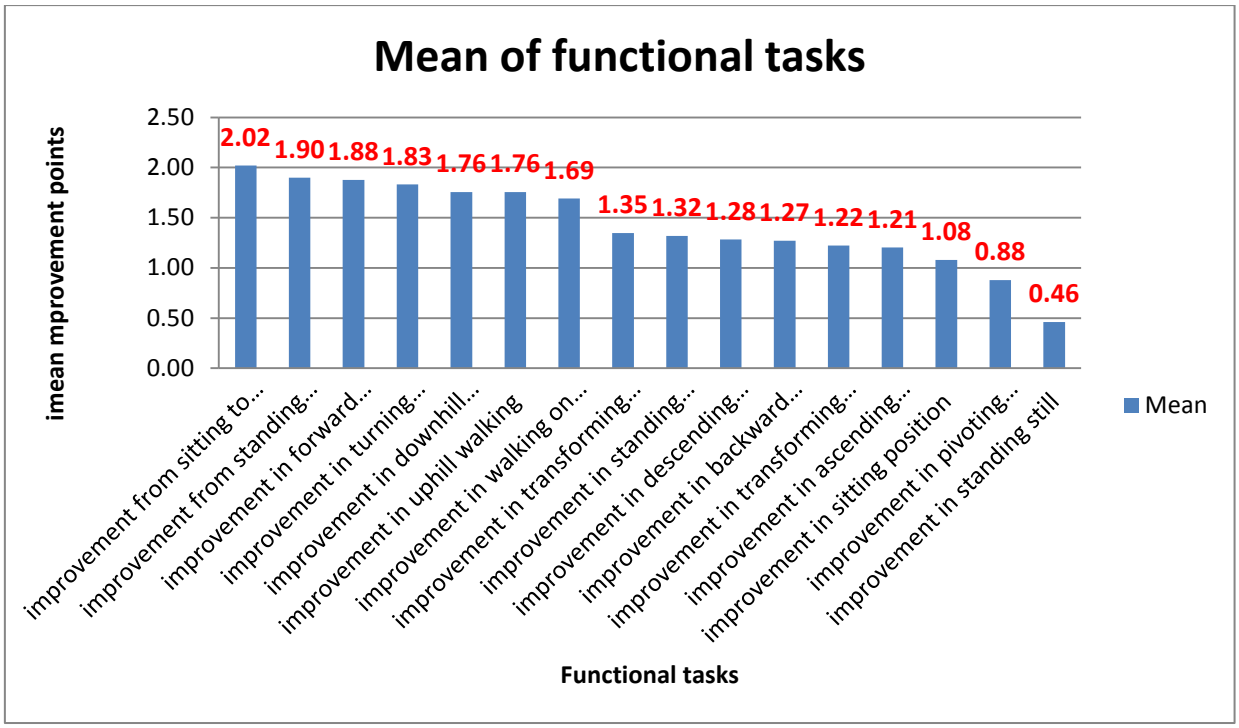

Figure 4. 2 Improvement in different functional activities

4.2.1 Descriptive statistics of baseline and discharge mean and category for each functional task

4.2.1.1 A. maintaining a sitting position

As shown in figure 4.3 (mean change) in item A represented in maintaining a sitting position, mean at baseline was 2.60 and at discharge 2.14, there was a 0.46 mean difference between admission and discharge.

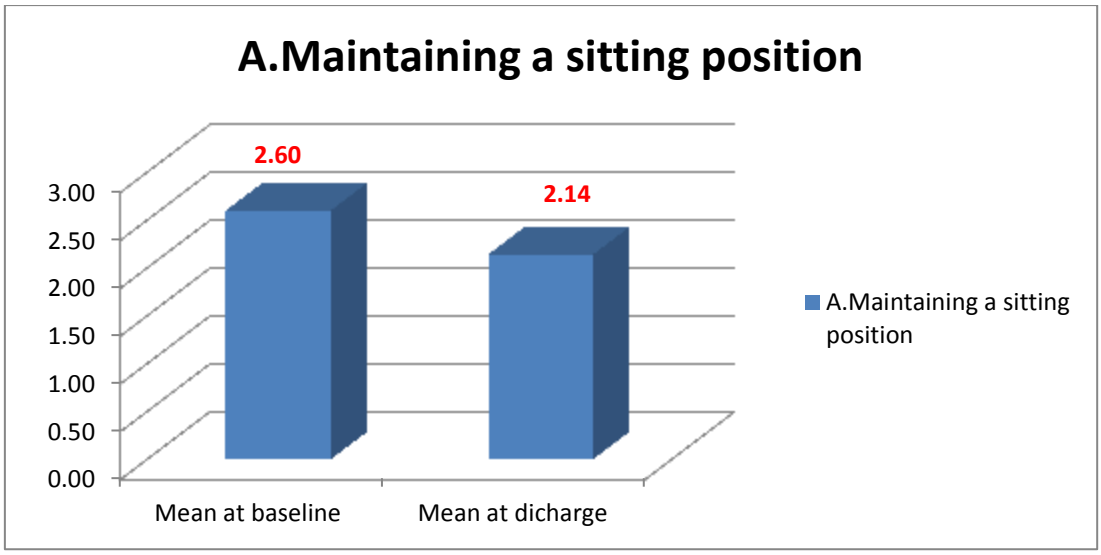

Figure 4. 3 maintaining sitting position

At the same time, below in figure 4.4, category wise there is change in the percentage of people with 3rd and 2nd categories (which is more severe towards discharge and 1st level, which are a better levels of function

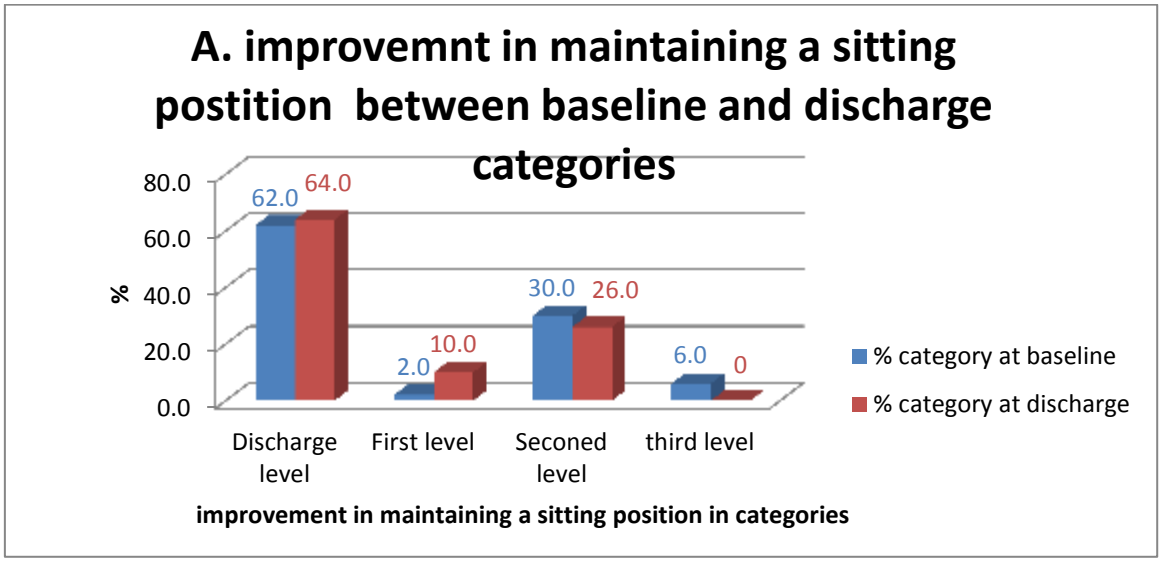

Figure 4. 4 Improvement in maintaining position between baseline and discharge categories

The third category level went down from 6% to 0% whereas at discharge level it went up from 62% to 64% a 2% improvement.

4.2.1.2 Move while sitting

Figure 4.5 presents the improvement in the movement in sitting functional task, where there was a 2.08 mean points of improvement between baseline and discharge.

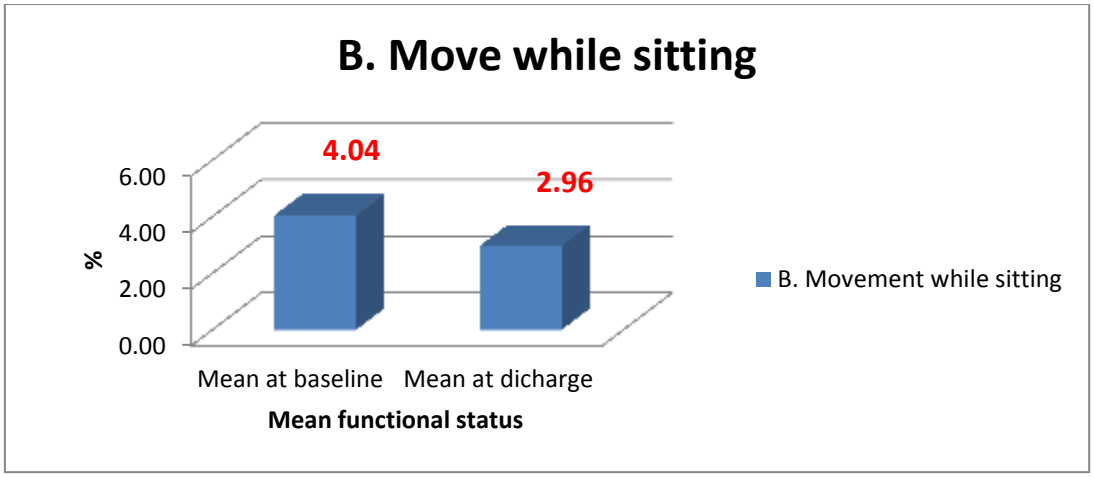

Figure 4. 5 Movement in sitting position

Categories wise more participants moved from the 2nd and 3rd level to the 1st and discharge level (= 12%), which are less severe (Figure 4.6)

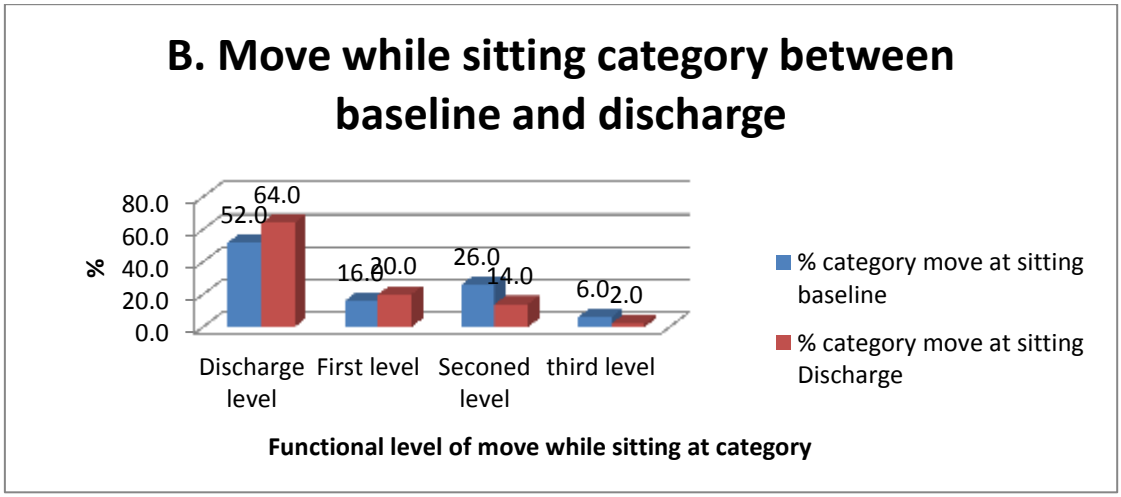

Figure 4. 6 Movement in sitting position category between baseline and discharge

The third category level went down from 6% to 2% whereas at discharge level it went up from 52% to 64% a 12% improvement.

4.2.1.3 C. standing

Figure 4.7 and figure 4.8 presents the mean difference of the standing function as in baseline to discharge with 1.32 points improvement in mean standing function and a more third of the participants moving towards discharge category of this functional task

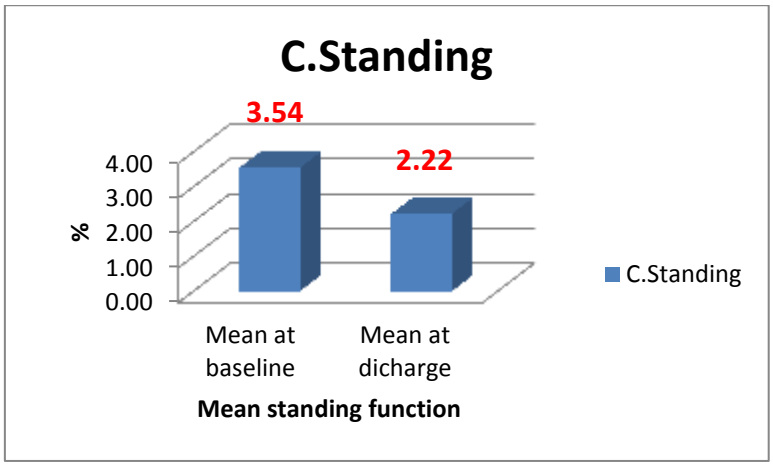

Figure 4. 7 Standing position

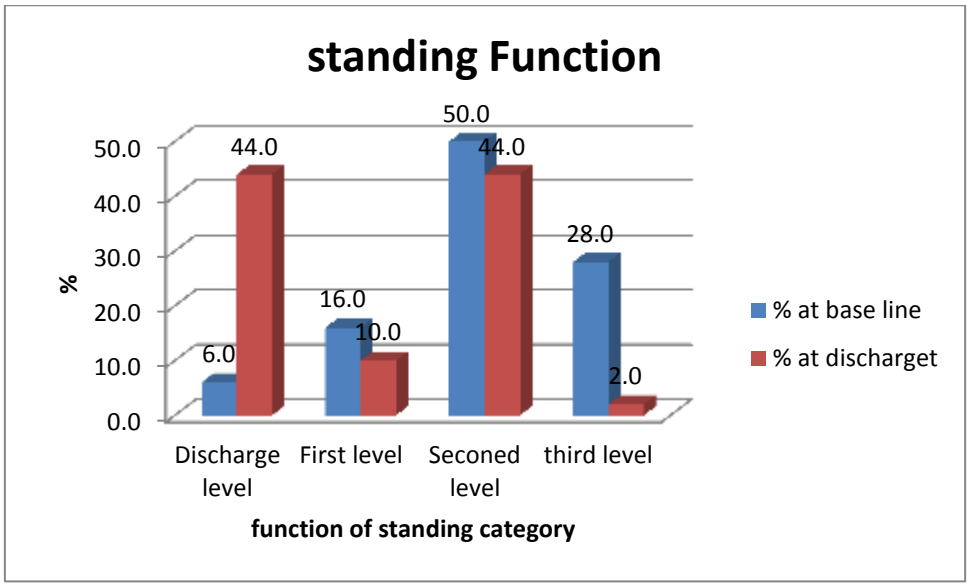

Figure 4. 8 standing function at baseline and discharge

The third category level went down 26% whereas at discharge level it went up from 6% to 44% a 38% excellent improvement.

4.2.1.4 Transition from sitting to standing

Transition from sitting to standing has improved with 2 points (figure 4.9). with nearly third of participants moving from 3rd level category to discharge category (4.10)

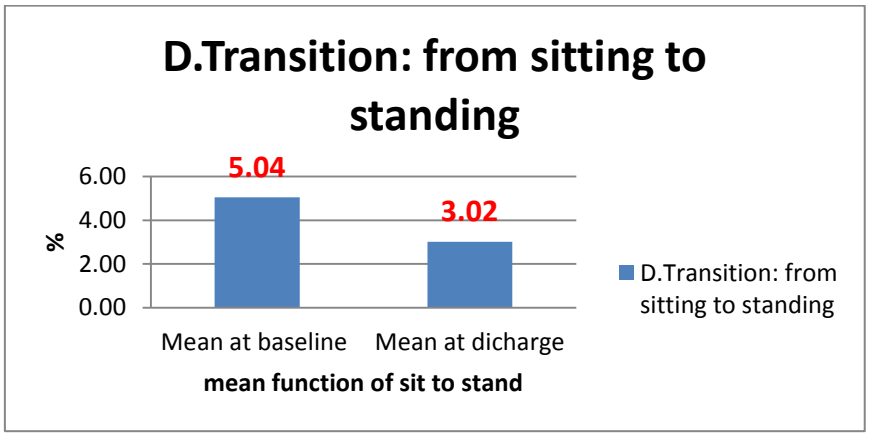

Figure 4. 9 Transition from sitting to standing

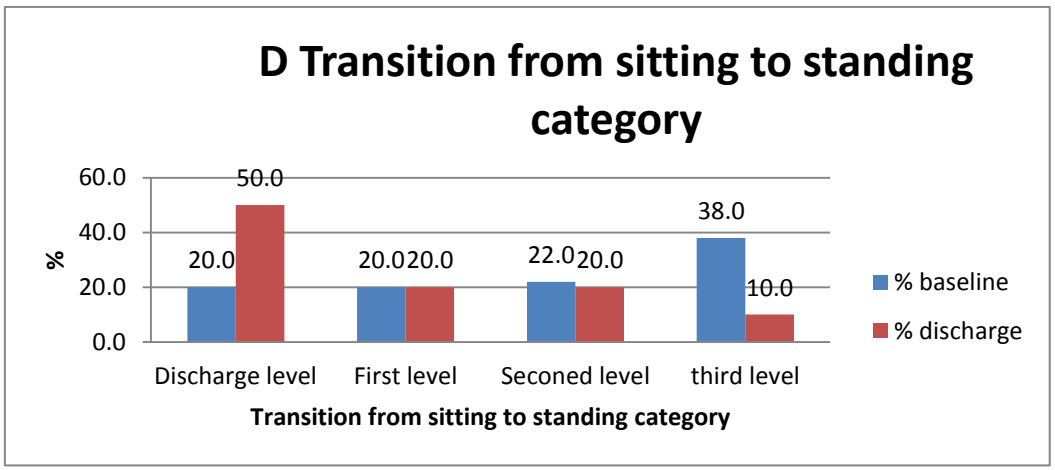

Figure 4. 10 Function of transition from sitting to standing category at baseline and discharge

The third category level it went down from 38% to 10% whereas the discharge level went up to 30% excellent improvement.

4.2.1.5 E. Transition from standing to sitting

No improvement on the category of standing to sitting function was seen after the intervention (figure 4.12). While the mean has improved with points in this functional task (figure 4.11)

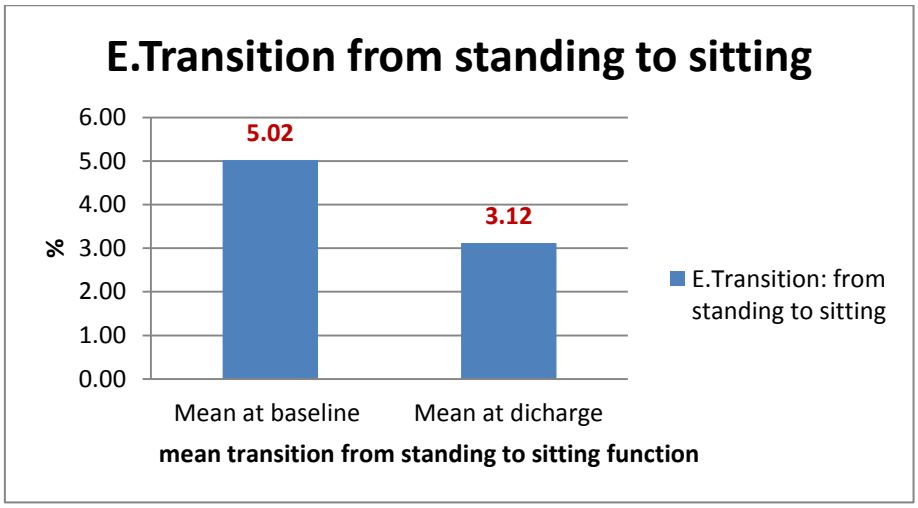

Figure 4. 11 Transition from standing to sitting

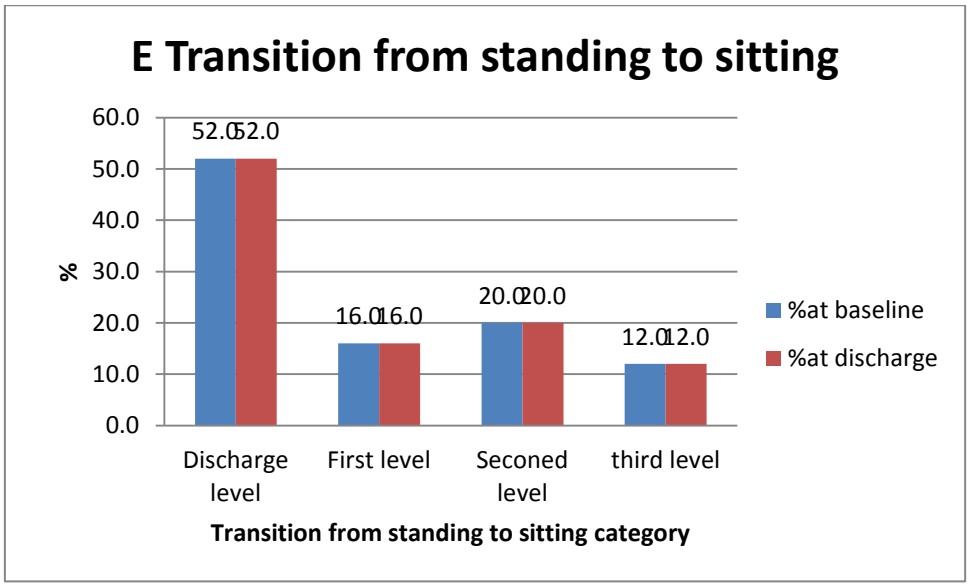

Figure 4. 12 Function of transition from standing to sitting category at baseline and discharge

There has been no change in the categories at this functional task but there was a 1.9% mean difference between baseline and discharge.

4.2.1.6 F. Pivot while standing.

There was more than double percentage of participants at the discharge level category at the end of the intervention, than they were in the baseline (20%) as presented in figure 4.14, and 2 points improvements in the mean points the same functional task between baseline and intervention

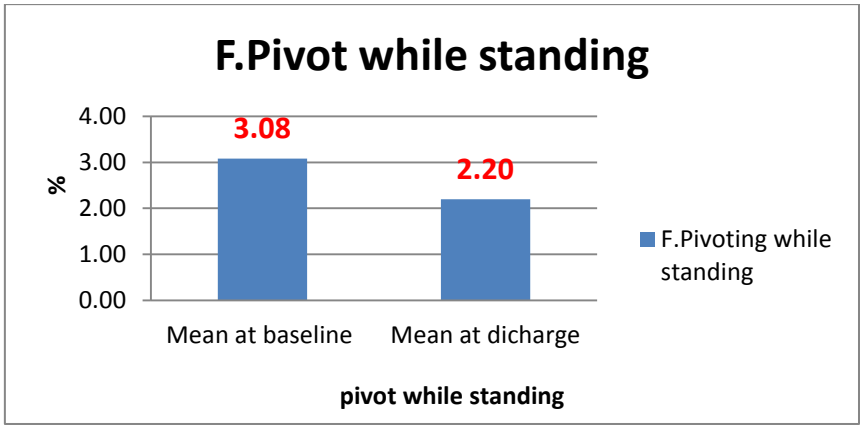

Figure 4. 13 Pivoting While standing

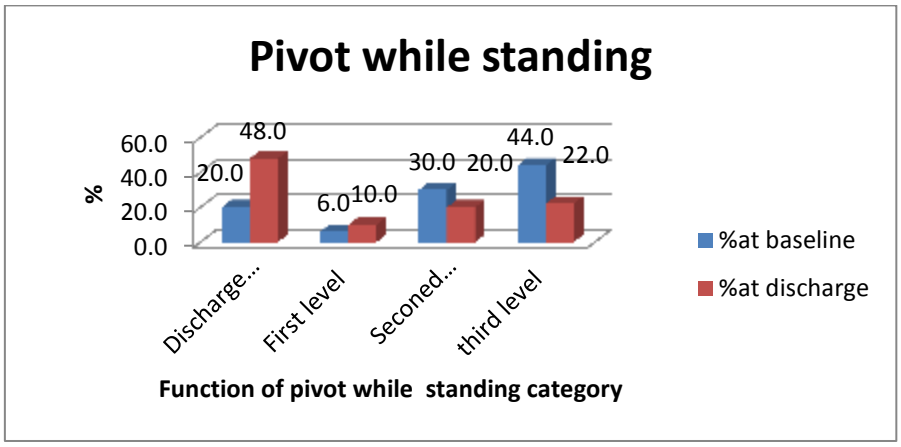

Figure 4. 14 Function of pivot while standing category at bassline and discharge

The third category level went down by 22% whereas the discharge level went up from 20% to 48% an excellent improvement.

4.2.1.7 G forward walking

Forward walking was improved by around 2.38 points (figure 4.15), and more than third of the participants achieved the discharge level category (4.16)

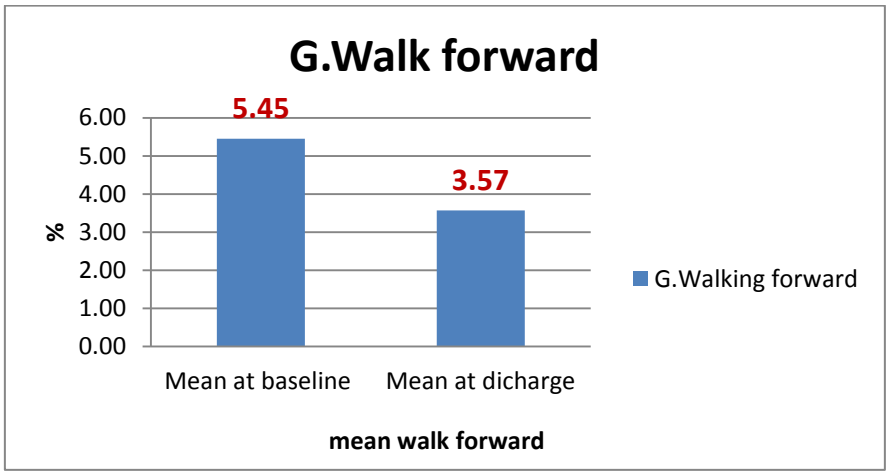

Figure 4. 15 Walk forward

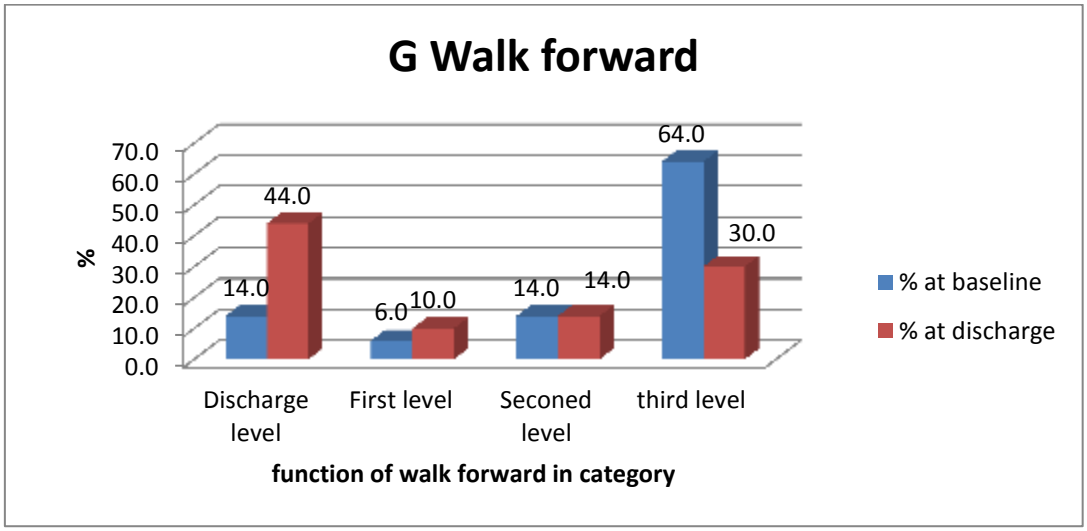

Figure 4. 16 Function of walk forward category at baseline and discharge

The third category level went down from 64% to 30% whereas the discharge level went up 30% .

4.2.1.8 H transition from standing to walking

Transition from standing to walking was improved by 2.38 points (figure 4.17) and around 30% of the participants improved to achieve discharge level at the end of the intervention (figure 4.18)

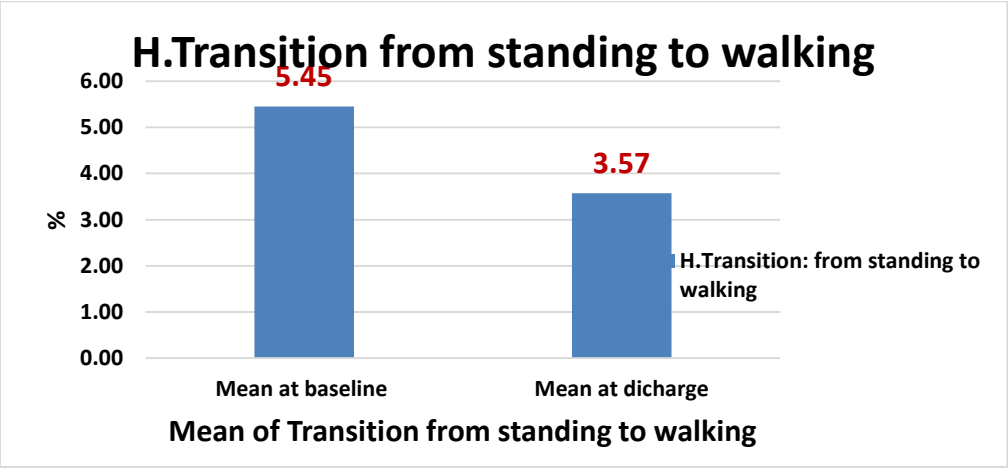

Figure 4. 17 Transition from standing to walking

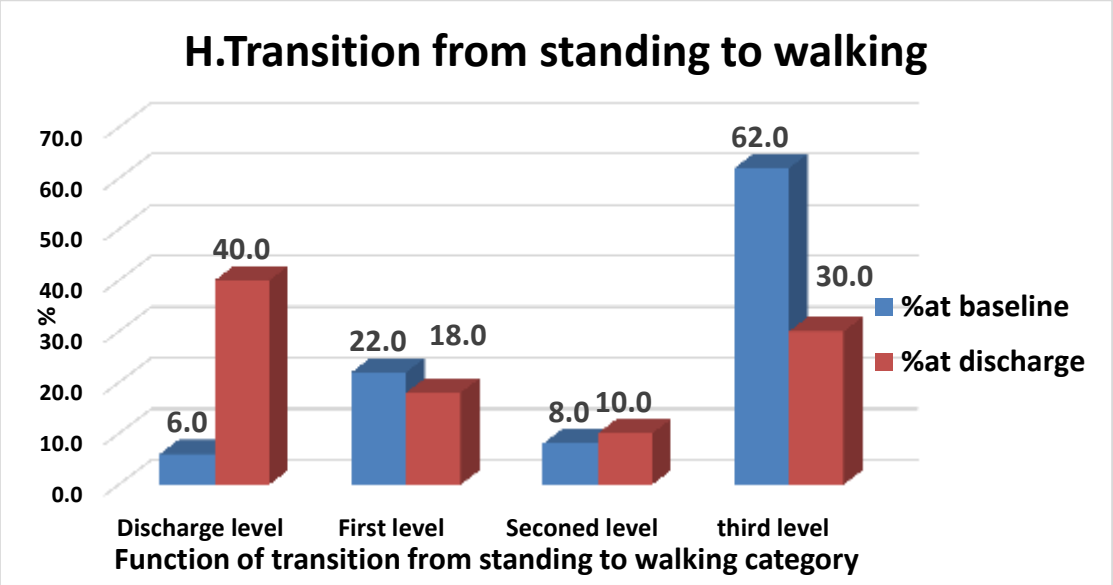

Figure 4. 18 Function of transition from standing to walking category at baseline and discharge.

The third category level went down from 62% to 30% whereas the discharge level went up 34%

4.2.1.9 I Transition from walking to standing

Nearly third of the participants moved to the discharge category at the end of the intervention period, (figure 4.19), with more than 1.35 points of improvement at the mean of this functional task (Figure 4.18)

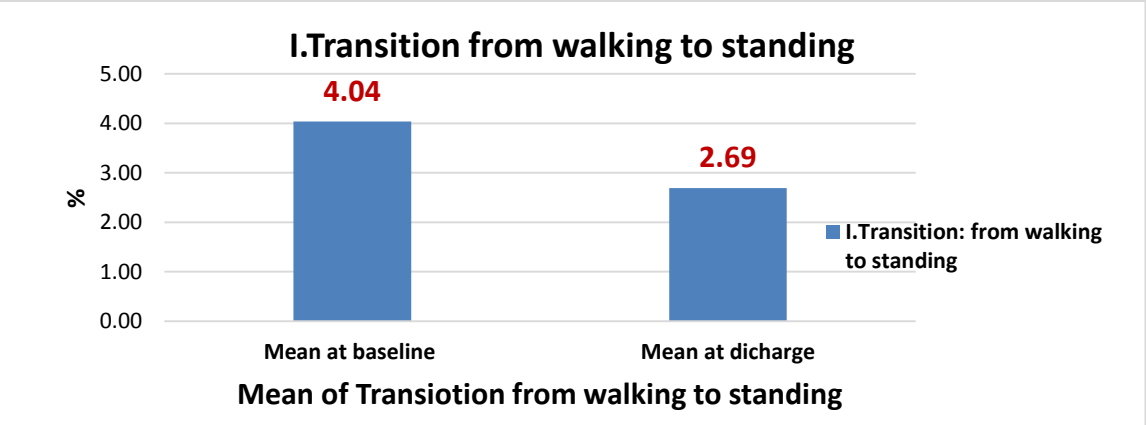

Figure 4. 19 Transition from walking to standing

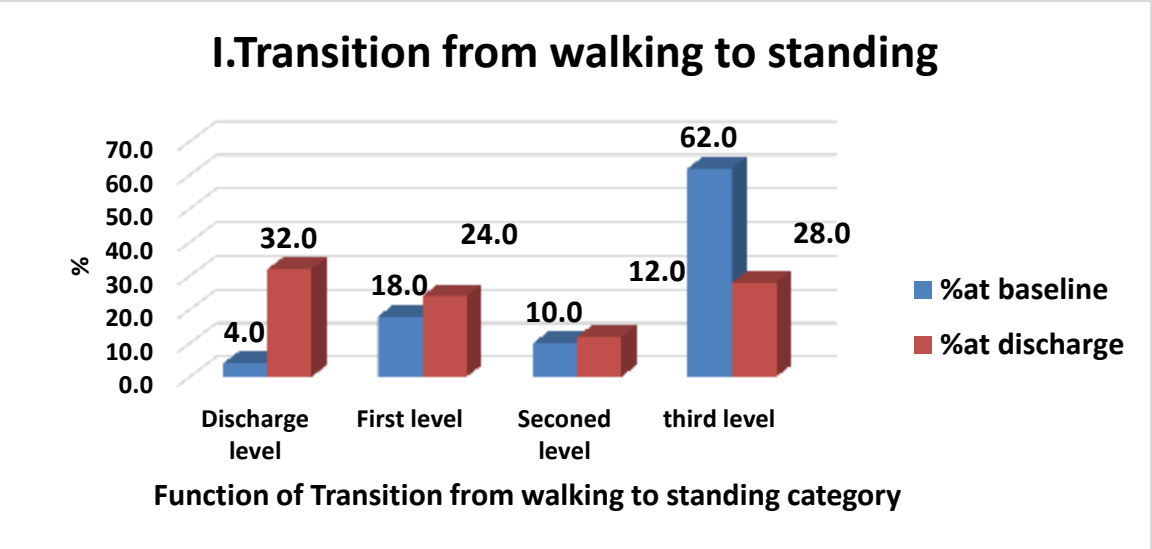

Figure 4. 20 Function of transition from walking to standing category at baseline and discharge.

The third category level went down from 62% to 28% whereas the discharge level went up from 4% to 32%.

4.2.1.10 J Walk backward

Nearly third of the participants moved to the discharge category at the end of the intervention (figure 4.21), and 1.28 points at mean functional task (figure 4.20)

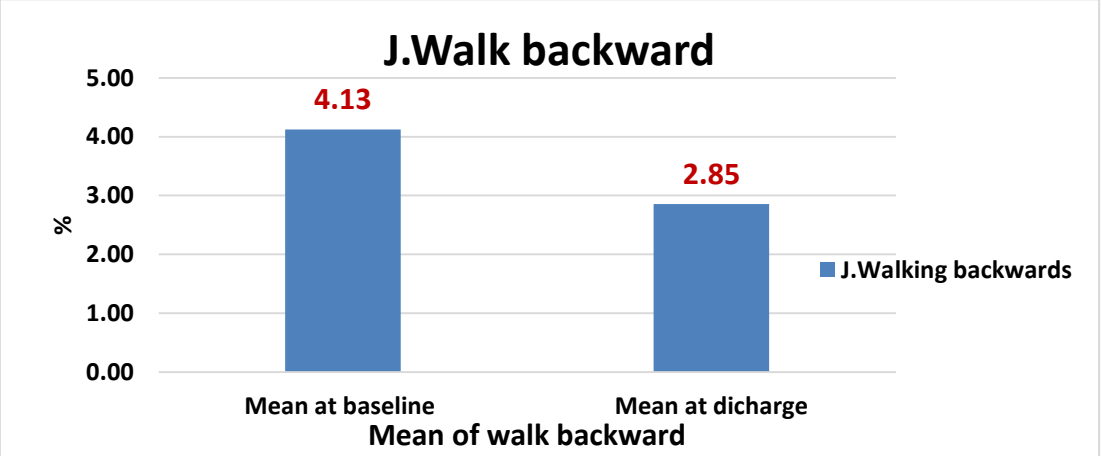

Figure 4. 21 Walking Backward

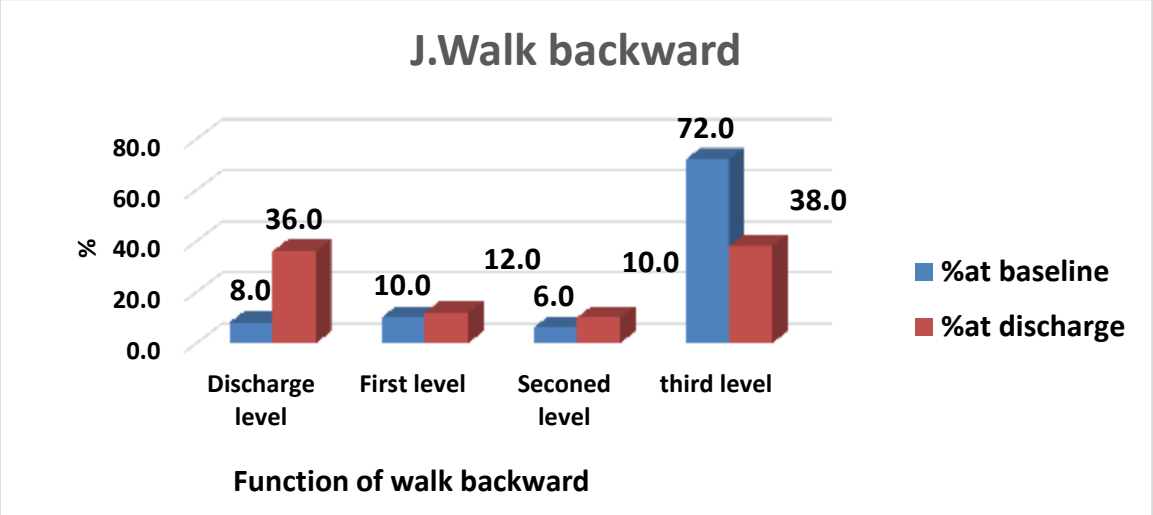

Figure 4. 22 Function of walk backward category at baseline and discharge

The third category level it went down 34% whereas the discharge level went up to 28%.

4.2.1.11 K .Turn while walking

there was 1.84 points improvement in the mean of turning around while walking function (figure 4.23), while 38% of the participants sustained the discharge level category at the end of the intervention . (Figure 4.24)

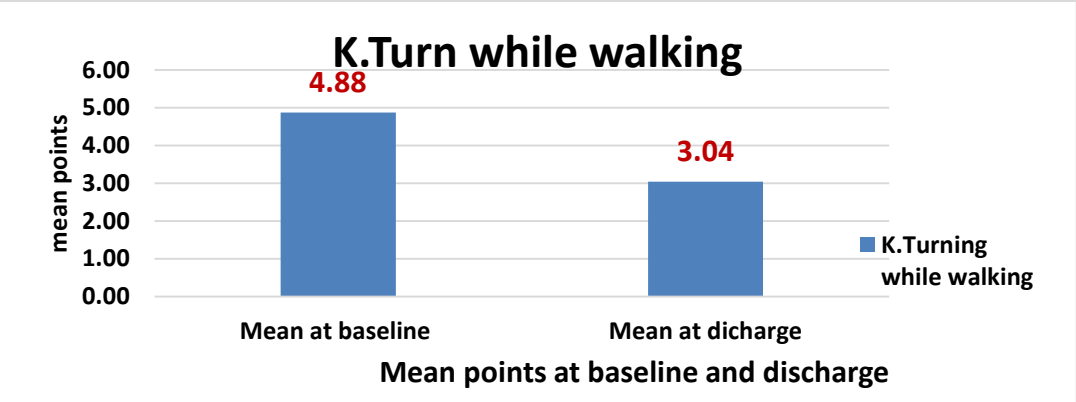

Figure 4. 23 Function of walk backward category at baseline and discharge

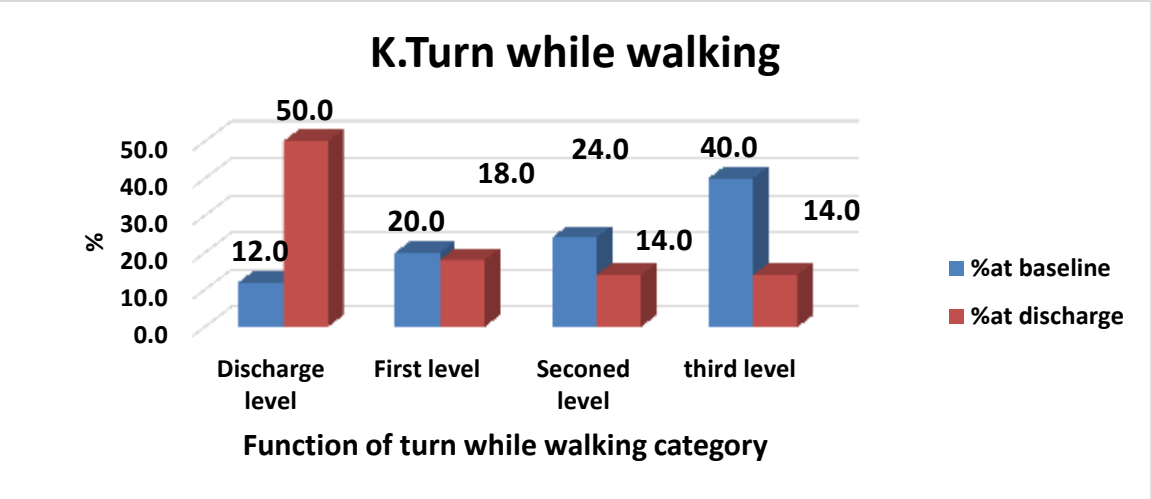

Figure 4. 24 Function of turn while walking at baseline and discharge

Third category level went down to 26% whereas the discharge level went up from 12% to 50%.

4.2.1.12 L walk up steps

There was 1.21 pints improvement in the mean points of the walk up steps function (figure 4.25) and a 32% more participants sustaining the discharge level category at the second assessment (figure 4.26)

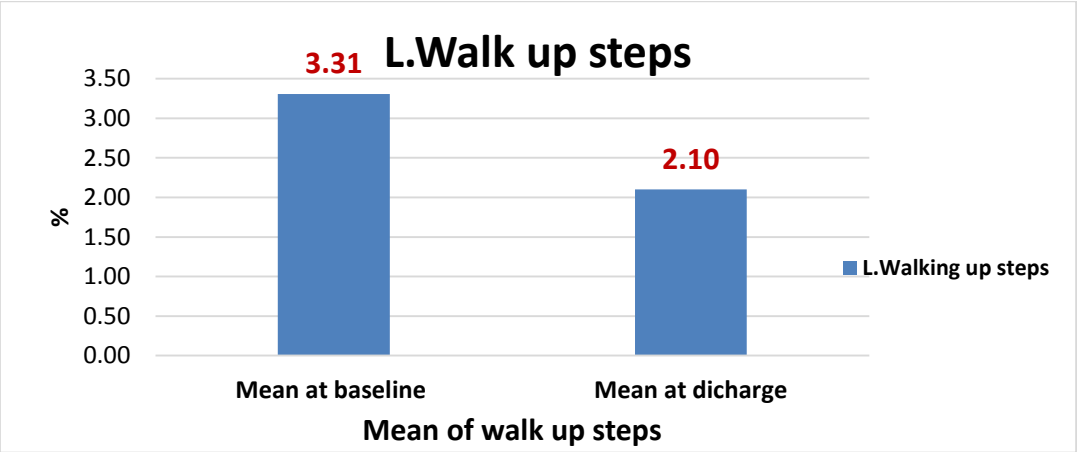

Figure 4. 25 Walking up Steps

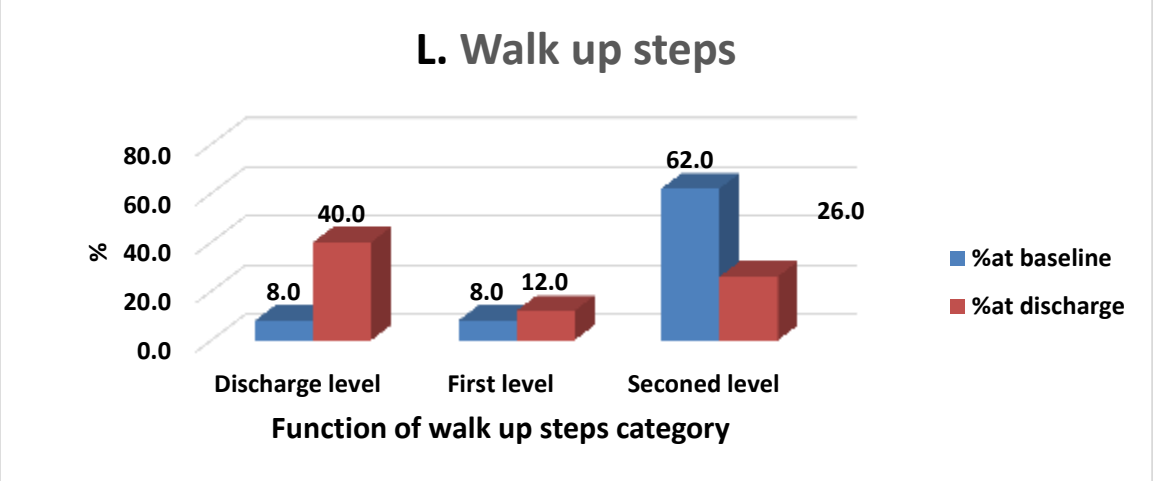

Figure 4. 26 Function of walk up steps category at baseline and discharge

The second category level went down from 62% to 26% whereas the discharge level went up from 8% to 40% .

4.2.1.13 M: Walk down steps

Down steps walking improved by 1.28 points, between baseline (figure 4.27), with 34% more participants achieving discharge level category in between the two assessment points (figure 4.28)

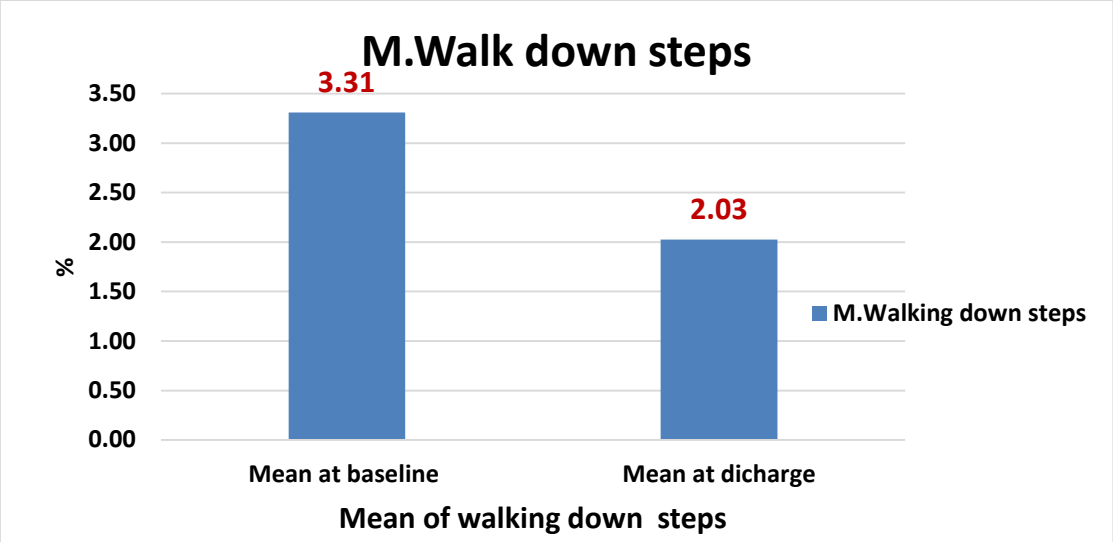

Figure 4. 27 Walk down steps

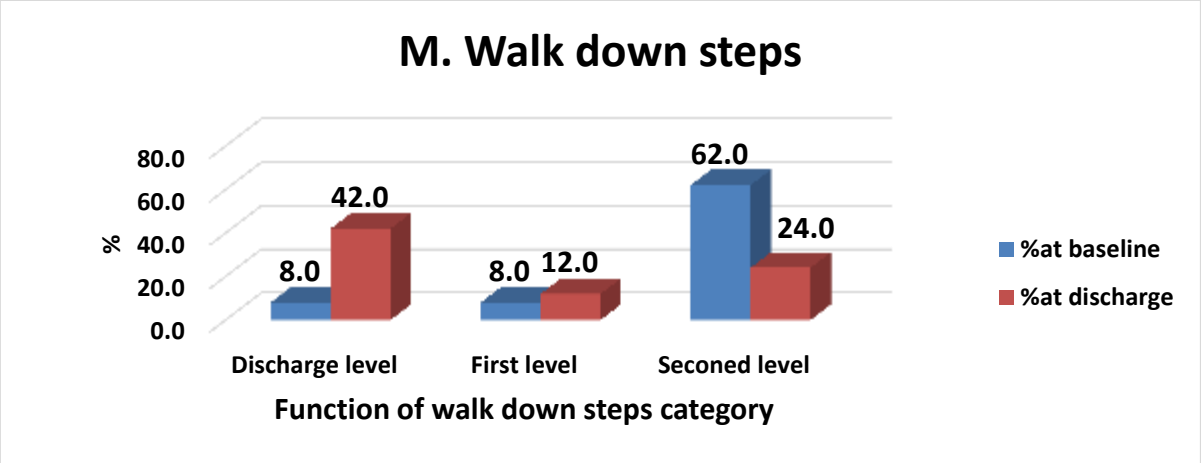

Figure 4. 28 Function of walk down steps category at baseline and discharge

The second category level went down from 62% to 24% whereas the discharge level went up from 8% to 42%.

4.2.1.14 N: Walk on uneven ground

as shown in (Figure 4.28) there was a 1.7 point improvement in the mean function of walk on uneven ground, 24% of participants reaching the discharge level between baseline and assessment (figure 4.29)

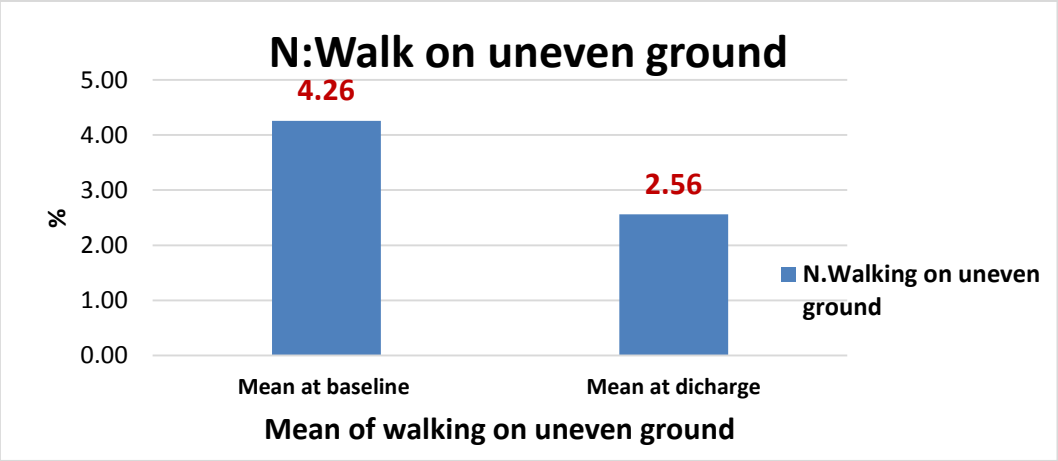

Figure 4. 29 Walk on uneven ground

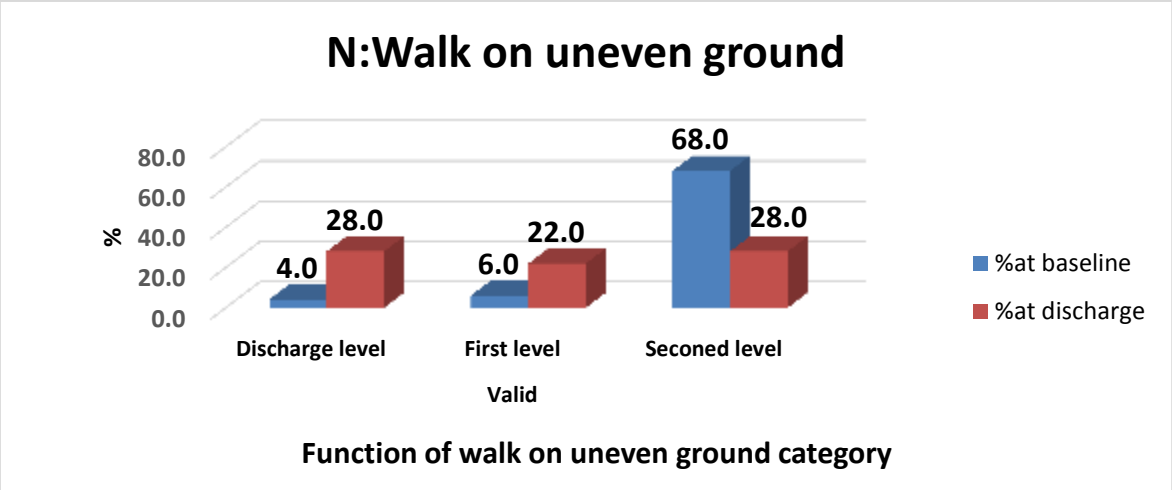

Figure 4. 30 Function of walk on uneven ground category at baseline and discharge

The second category level it went down from 68% to 28% whereas at discharge level it went up 24%

4.3.3.3. Variables correlated with improvement

table 4.6 presents a strong negative association between age of participants and prognosis (table 4.6) and a statistically significant correlation between number of months of treatment and prognosis.

Table 4. 5 Variables correlated with improvement.

Correlations

		Total improvement average	months	Age in years
Total improvement average	Pearson Correlation	1	.336*	-.457**
	Sig. (2-tailed)		.017	.001
	N	50	50	50
months	Pearson Correlation	.336*	1	-.072
	Sig. (2-tailed)	.017		.619
	N	50	50	50
Age in years	Pearson Correlation	-.457**	-.072	1
	Sig. (2-tailed)	.001	.619	
	N	50	50	50

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

4.2.1.15 O : walk up slopes

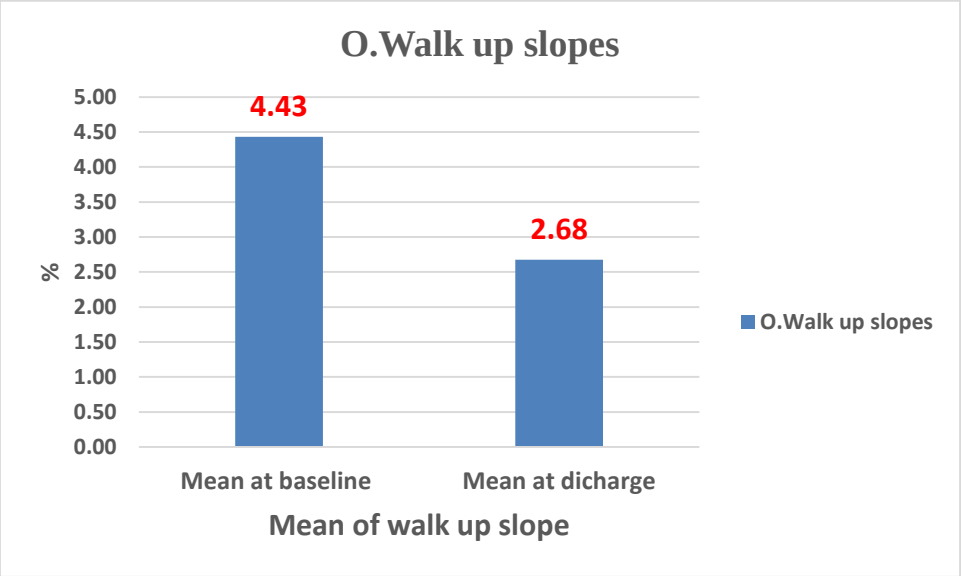

Figure 4. 31 walk up slopes

Around 22% more participants achieved the discharge level of uphill walking (figure 4.31), with 1.75 points improvement of the mean of this function at baseline and discharge (figure4.30)

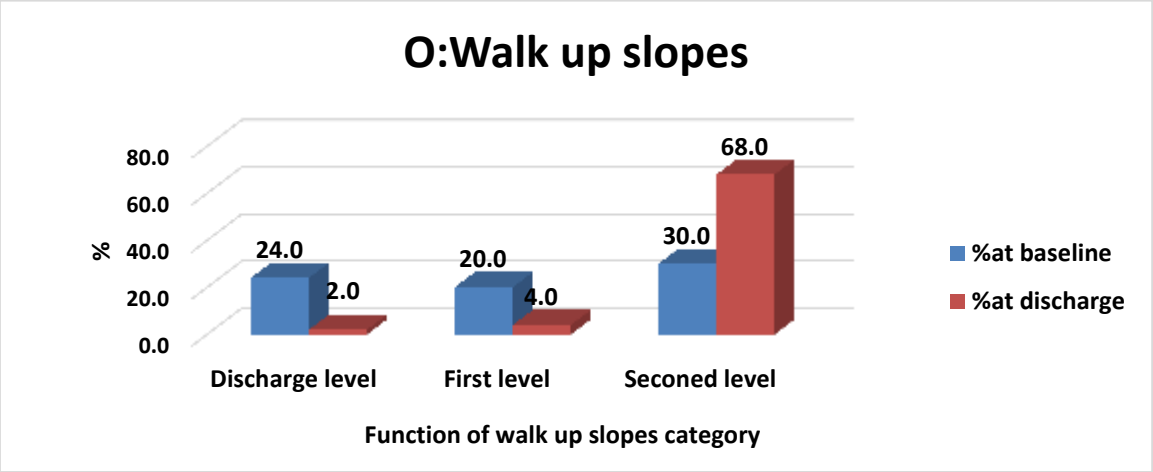

Figure 4. 32 Function of walk up slopes category at baseline and discharge

The second category level it went up from 30% to 68% whereas at discharge level it went down to 2% no improvement although there was a mean difference of 1.75.

4.2.1.16 P: Walk down slopes

Walking down slopes improved by 1.76 points in between baseline and discharge (figure 4.32). With more than 22% of participants reaching the discharge level category (figure 4.33)

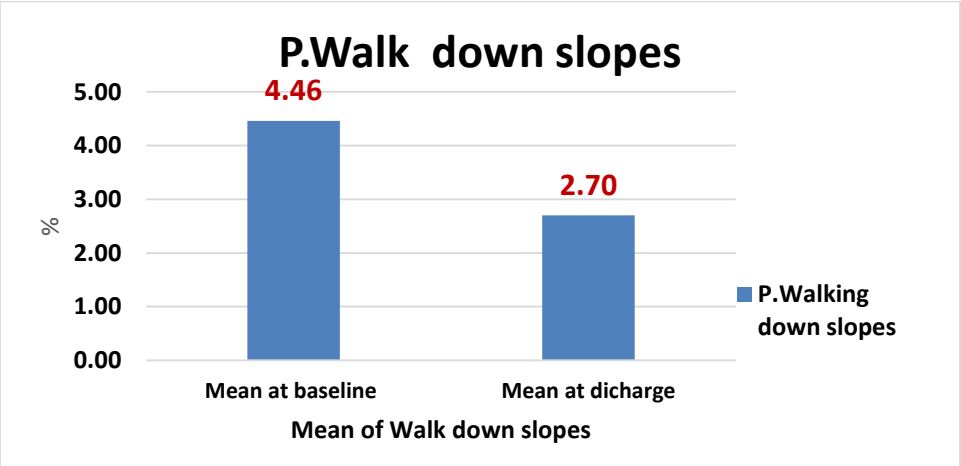

Figure 4. 33 Walk Down slopes

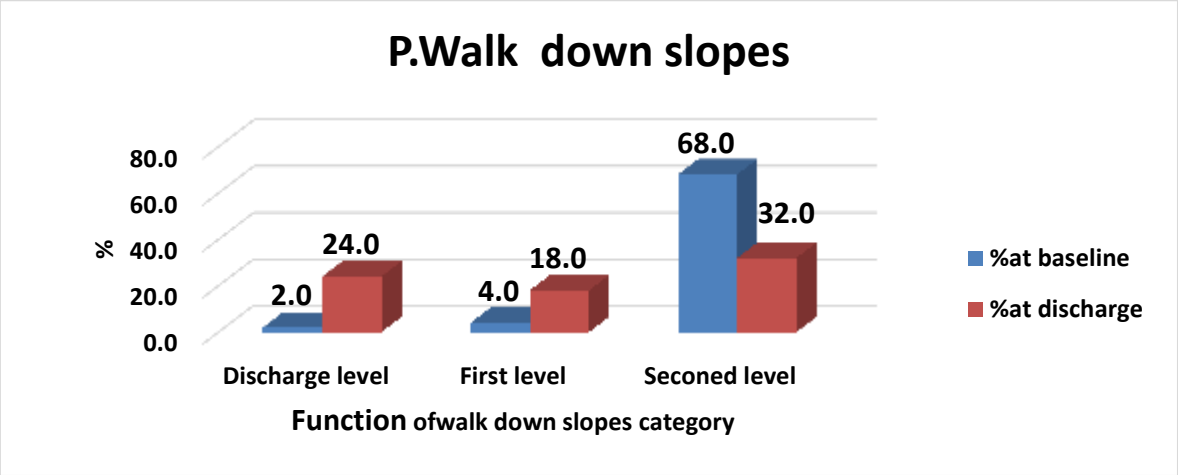

Figure 4. 34 Function of walk down slopes category at baseline and discharge

In the second category level it went down from 68% to 32% whereas the discharge level went up 22%.

4.3.3. Total improvement mean upon all domains

Table 4.5 presents the average improvement of the 16 functional domains for each participant, and it shows that the average improvement of mean points on the functional level was 1, 32 points.

Table 4. 6 Total improvement average

	N	Minimum	Maximum	Mean	Std. Deviation
Total improvement average	50	.19	3.13	1.3882	.89185
Valid N (listwise)	50				

4.3.3.1 Improvement upon diagnosis

The improvement upon diagnosis shows that the traumatic brain injuries and down syndrome were the most improved participants with an average of 2.31 points of the overall improvement mean , the least improvement seems to be among the spina bifida and brain atrophy (4.34)

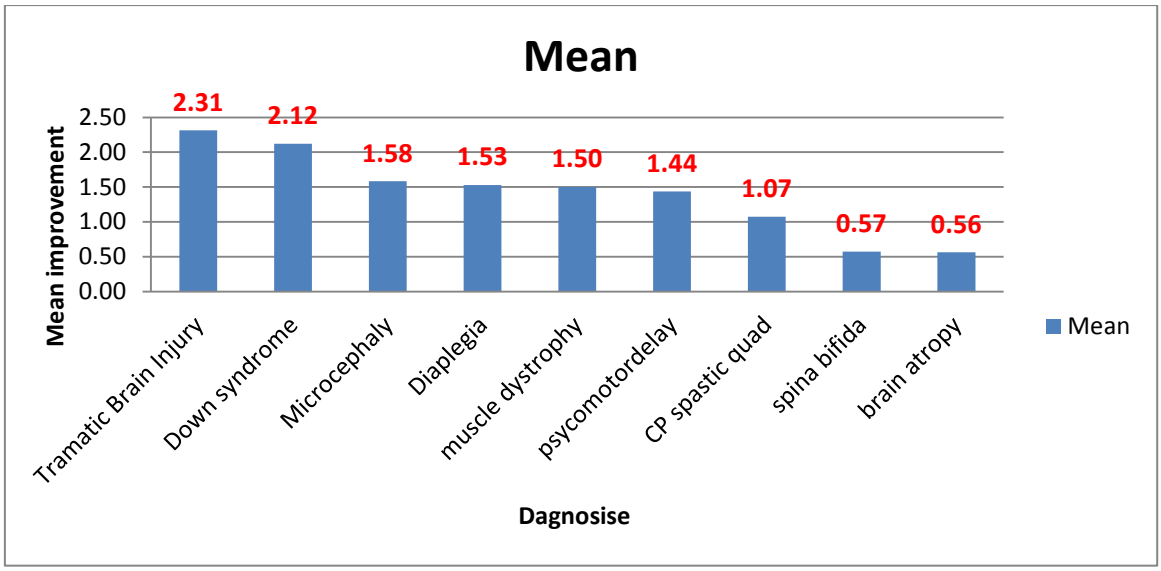

Figure 4. 35 Improvement upon diagnosis

4.3.3.2 Improvement upon Gender

As shown in table 4.6 there was no significant difference between male and female in terms of improvement.

Table 4. 7 Improvement upon Gender

Group Statistics

Gender of participant		N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
improvement in total score	Male	26.00	56.58	21.61	4.24			
	Female	24.00	60.46	14.88	3.04	-0.73	48.00	0.47

4.2 Discussion

Since MOVE methodology is dealing with all sorts of movement dysfunction, we notice that most of the children were either psychomotor delay or Cerebral Palsy. It is not clear if this percentage is representing the prevalence percentage of motor disorders in Palestine, or if it is only a sample of beneficiaries of MOVE methodology. At either case cerebral palsy seems to be one of the most prevalent motor disorders among children in Palestine. On the other hand, the MOVE methodology is not available at all the centers in west bank, and it is active in mainly 3 centers in whole west bank.

The average age of the participants in this study is 11.26 plus minus like the average age in the study of Van Der Putten which is 9.36. Children in the same age category in Van Der Putten study who received functionally focused activities (tailored as MOVE methodology applies) reached greater progression (63%) in performing functional activity independently (39).

As shown in figure 4.2, the highest functional demand task, were the least to improve, represented in stairs, and pivoting, which are tasks that may require significant improvement in more than one domain, as balance, strength, and motor control. while other tasks that represents transitional functional task like sitting to standing, standing to sitting and forward walking have improved much more than other functional tasks, it seems that having those activities is an integral part of the rehabilitation program, could contribute to improvement of those functional tasks, and this represents the essence of MOVE methodology through training by movement and repeating the practice of function in the proper context., sit to stand and stand to sit functions sustained 2.02 points improvement and 1.90 points respectively, whereas the function of pivoting in walking and standing improvement were 0.88 and 0.46 , these results, supports the results of other

studies since Whinery et al supports the idea of environmental importance and opportunities to practice new skills and Van der Putten emphasizes the focused activities whereas Low.SA encouraged the individualized educational program (IEP) and when you compare it to MOVE approach, all three were talking about the approach which makes it unique to apply as an alternative to other approaches/methodologies used in rehabilitation programs with children of movement dysfunction . (39) . These results may be justified by the fact that the more demanding the functions, the more time will be needed to improve with respect to other variables like age, severity, type of diagnosis and the period of MOVE rehabilitation.

In terms of maintaining sitting position which is the 1st functional task among the 16 tasks that MOVE assessment sheet has, the improvement in sitting position and maintaining it, is a reflection of improvement on an impairment level, that could include balance, strength and trunk control among much more other variables, and it is considered a basic task that enables the children to be in an independent sitting position, which is considered a priority of tasks to be practiced. The comparison in the literature were between traditional physiotherapy such as strengthening and stretching, hippotherapy compared to no interventions in improving the sitting balance anteroposterior and lateral sway. That is continuous physiotherapy regardless of the methodology it improves the functionality of CP children (41).

While 12% moved to discharge level category in movement in sitting task, that represents the dynamic sitting, also 4% moved from lower-level categories to the 1st level. And this represents the ability of those children to function in sitting rather than sitting still, and this movement in sitting is another reflection of possible activities of daily living in this

position, as eating in siting or playing, which is more functional advanced level than just sitting alone.

Dynamic balance helps in carrying out upper and lower limb movements for functional activity such as reaching and walking, was improved with better trunk control (42)although adaptable seating for CP children as mentioned in literature was limited in developing functional ability (44).

Concentrating at the category of the standing function, we noticed that nearly third of the participants were in the lowest functional category (3^{rd} level), while at discharge only 2% were left there, with nearly the same percentage progressing towards the highest functional category in this standing function. Standing as function is especially important in mitigating tone complications, as it allows for active weight bearing and precedes walking as a functional ability. The improvement achieved in this task among this relatively high percentage of participants can show the change in life and quality of life of those children, giving them the chance to be in the erect position , regardless dependent or independent, standing is a function that improves abilities as studies showed which has so many positive implication on the psychological and functional level of the participants, which is an argument that was supported by many other studies in literature. (43)(44)

Both sit to stand and stand to sit functions were significantly improved, which is an a important part of the transition between frequently repeated functional tasks of sitting to standing and the opposite, this improvement is a possible result of tone improvement that would allow such a movement in CP , and a better motor control in other dysfunctions targeted by the MOVE methodology, while we are trying to justify the improvement, MOVE methodology may be interested in the task itself as a function practice, rather than

separated components of the functional task .In other words ,the function is subcategorized into different levels as a prerequisite to reach the execution of the movement to fulfill a specific function, whether standing from sitting to walking and vice-versa. For example the child at D2 level can stand from a chair and not from floor and still be in the same level but not same category .While the mean improved in the stand to sit function, the category did not improve, as the mean can detect the change in mean points of the scoring sheet, while the category could be constant while the mean is changing, especially that the one functional task category could be represented in 2-4 different points at the same category.It also protects the brain health since too much sitting damages the temporal lobe which is the center of processing language and memory (45) .

Pivoting in standing is one of the elements needed in changing direction while walking, and poor pivoting skills may be associated with more falls in walking, this functional task improvement may be investigated in future research, regarding its association with improvement in walking outcome measures like in 6MWT (six minutes walking test) as this was beyond the possibilities of this study (46) .

Both, transition from standing to walking and walking forward were significantly improved, in terms of mean points and category for the function, those two important locomotion progression variables, are representing independent walking and maneuvering, that may help the participants fulfill the requirements of basic ADL, especially those which depends on movement from one point to the other. This locomotion functional level is one of the patients and family most demanded prognosis, and this also represents a significant number of patients improving in this domain, which in turn reflects the importance of MOVE methodology as a successful intervention in motor disorder.

Mean points and categorical level of both pivoting while walking and walking backwards, were significantly improved, and those two tasks are high level maneuvering in the level of walking, and that are needed in changing position and both of those tasks require higher function of balance, that the researcher is recommending further research to the investigate its magnitude of association with improvement in these to high functional tasks. Backward walking as mentioned in the literature has a better outcome on hemiparetic children specifically, whereas generally it improves walking as a gait variable and coordination as mentioned in the literature if training was on downhill backward which can be a useful variable to consider in rehabilitation (47)(48).

Walking down and uphill's is one of the highest functions of gait, that may add to the independence in an un adapted environment like the stairs, and represents the ceiling of intended rehabilitation outcome, as documented in literature, uphill forward walking needs improvement in the concentric and eccentric muscle function, therefore improved Tibialis anterior muscle function, may help in the requirements of swing phase of the gait that may be associated with better participation and quality of life, according to litterateur it improved participation and social interaction within family and close society on the long run, and could come after and because of the improvement in the previous functional levels and tasks (48) .

Spina Bifida and brain atrophy's were the least to improve, in Spina Bifida the insult is mainly to the spinal cord that may not produce improvement and prognosis based on the neuroplasticity associated with brain dysfunctions, as in the case of traumatic brain injuries, down syndrome who has no tone abnormalities, and the cerebral palsy that despite

its complications associated with spasticity is still presenting a big window for neuroplasticity that could lay down the way to functional improvement (48).

Age in this study was negatively associated with improvement, which may be predicted, due to the possible secondary complications associated with older age, especially in cerebral palsy and tone associated disorders, and it leaves the brain with less chances of neural changes at older age, while the length of treatment period seemed to have a positive effect on the magnitude of positive progression, as with lengthening the time of treatment , there is a possible less chance for further complications , and a better motor control due to the extended periods of motor practices (49).

4.3 Study Limitations

The study has encountered some limitations that the researchers identify and summarized in the following points.

- The COVID19 has affected the second assessment for many of the children who have progressed without being able to conduct a second assessment on them, which may have contributed to a better vision of the rehabilitation outcome.
- The type of specialized assessment used in the move methodology makes it difficult to compare with other studies, and interventions who uses different outcome measures, like GMFCS, GMFM, Berg, and other common impairment, participation, and functional levels outcome measures.
- The categories of the functional abilities may adopt more than one score, which makes detection of minimal improvement, incredibly challenging, on the contrary of other outcome measures that usually are sensitive to even minor change.
- there was a difference in the assessment points of the post test, represented in the different rehabilitation period in between baseline and posttest assessment.
- the different movement dysfunction and diagnosis, in this study makes difficult to adopt separate conclusion for each dysfunction, since the sample is small could

have been separated to check the relevant improvement in scales that clinicians commonly used to evaluate the functional abilities functional abilities of the children

Chapter Five Conclusion and recommendation

5.1Conclusion

5.2Recommendations

5.3 Conclusion

This retrospective analytical descriptive study, aimed to track the progression and improvement sustained by movement and functionally challenged adolescents and children, treats by move methodology in Palestine. A retrospective cohort analysis was conducted using 3 MOVE centers in Jericho and Hebron Governorate (Yatta, Idna) through review of the participants files and assessment sheets, and have concluded the following.

- There is a significant change in the functional abilities of the participants at the 16 domains of the functional assessment of MOVE, in between baseline and follow up.
- Age was negatively associated with Improvement in the total score of MOVE assessment sheet.
- There is no difference in improvement in between males and females according the MOVE assessment score.
- Length of stay is associated with better outcome, in terms of functional tasks abilities, according to the total MOVE score.

5.2 Recommendations

Based on the discussion and results of the this study the researcher recommends the following

- **Recommendations for clinicians**
    - Promoting MOVE as a movement dysfunction effective Rehabilitation methodology.
    - Dissemination of the results of this study on national and international levels.
- **Recommendations for MOVE Methodology administration**
    - To consider using extra Impairment function, and Participation outcome measure that may help in quantification of the improvement and progression.
    - To conduct the assessment on periodic basis rather than therapist notice of an improvement.
- **Recommendations for other researchers**

    o To conduct an experimental design study that investigates the difference of outcome for 2 groups comparing MOVE methodology with other interventions.

    o To combine both, MOVE and other outcome measures, at the assessment times.

    o To select as similar period of rehabilitation of the participants, in terms of the period between baseline and post-test.

    o Investigating the effect of combination of MOVE methodology on the rehabilitation outcome, and other management methods. like NDT, and functional motor learning.

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Appendixes

Appendix 1: Assessment Sheet

Assessment sheet

Code of participant:

Name of participant:

Date of birth:

Gender: ☐ **Male** ☐ **female**

Diagnosis: ☐ **brain atrophy.** ☐ **CPquad** ☐ **Microcephaly** ☐ **developmental delay.** ☐ **Spina bifida.** ☐ **Diplegia** ☐ **Psychomotor delay** ☐ **down syndrome.** ☐ **TBI.** ☐ **Muscular dystrophy**

MOVE center: ☐ **Jericho.** ☐ **Yatta** ☐ **Idna**

Date of assessment :_____

Date of discharge /graduation:_____

Cases included and excluded:_____

Type of exclusion: ☐ No reassessment

☐ Left center

☐ Still in center without reassessment

Appendix 2: MOVE Summary of assessment results

Top-Down Motor Milestone Assessment

Name :

Surname :

Summary of Assessment Results

Fill in the square representing the current skills level

	Graduate Level				Level I				Level II				Level Ill		
A. Maintains a sitting position	A.l				A.2	A.3			A.4	A.5	A.6		A.7		
B. Moves while sitting	B.l	B.2			B.3	B.4	B.5	B.6	B.7	B.8	B.9	B.10	B.11	A.7	
C. Stands	C.l				C.2				C.3	C.4			C.5	C.6	
D. Transitions from Sitting to Standing	D.l	D.2			D.3	D.4			D.5	D.6			C.5	C.6	A.7
E. Transitions from Standing to Sitting	E.l	E.2			E.3	E.4			E.5	E.6			C.5	C.6	A.7
F. Pivots while Standing	F.l				F.2				F.3				C.5	C.6	
G. Walks forward	G.1	G.2			G.3				G.4	G.5			G.6	C.5	C.6
H. Transitions from Standing to Walking	H.l				H.2				H.3				G.6	C.5	C.6
I. Transitions from Walking to Standing	I.1				I.2				I.3				G.6	C.5	C.6
J. Walks Backward	J.l				J.2				J.3				J.4	C.5	C.6
K. Turns while Walking	K.1	K.2			K.3	K.4			F.3				C.5	C.6	
L. Walks up	L.l				L.2					G.4	C.3				

Steps															
M. Walks down Steps	M.1				M.2					G.4	C.3				
N. Walks on uneven ground	N.l				N.2				N.3	G.4	C.3				
0. Walks up Slopes	0.1				0.2				0.3	G.4	C.3				
P. Walks down Slopes	P.l				P.2				P.3	G.4	C.3				

Category A

Top-Down Motor Milestone Assessment

MAINTAINING A SITTING POSITION

L	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
A.1. Can sit on a flat surface such as a bed or in a bath for a minimum of 30 minutes without prompts.	LJ DATE			
A.2. Can sit on the edge of a bed or on a stool without using a foot or a back rest for a minimum of five minutes.		LJ DATE		
A.3. Can sit on a conventional classroom chair at least 30 minutes without prompts.		LJ DATE		
A.4. Can maintain sitting balance on a conventional classroom chair for a minimum of 30 seconds without prompts.			LJ DATE	
A.5. Can maintain an erect head position for a minimum of 30 seconds while sitting with prompts at the trunk, hips, and feet as needed.			LJ DATE	
A.6. Can tolerate sitting in an upright position for a minimum of 30 minutes with prompts at the trunk, hips, and feet, as needed.			LJ DATE	
A.7. Can tolerate being placed in a sitting position with a minimum of 90 degrees flexion in the hips and knees.				LJ DATE

Category B

Top-Down Motor Milestone Assessment

MOVEMENT WHILE SITTING

t..	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL Ill
B.1. Can pivot entire body a minimum of 90 degrees while sitting in a bath or on a flat surface such as a bed.	LJ DATE			
B.2. Can pivot entire body a minimum of 90 degrees while sitting on a conventional classroom chair.	LJ DATE			
B.3. Can pivot legs a minimum of 90 degrees while sitting when arms are rotated to the left or right.		LJ DATE		
B.4. Can push self to a sitting position from a reclining position on a flat surface such as a bed or floor.		LJ DATE		
B.5. Can keep trunk in alignment when legs are pivoted a minimum of 90 degrees to the left or right while sitting.		LJ DATE		
B.6. Can realign trunk to an erect position after leaning forward, to the left, and to the right a minimum of 45 degrees.		LJ DATE		
B.7. Can realign trunk to an erect position after leaning forward, to the left, and to the right a minimum of 20 degrees.			LJ DATE	
B.8. Can raise head to an erect position when head is tilted back while sitting with upper trunk support.			LJ DATE	
B.9. Can bring head to an erect, midline position when head is turned to the left or right while sitting with upper trunk support.			LJ DATE	
8.10. Can raise head to an erect position from a chin on chest position while sitting with upper trunk support.			LJ DATE	
8.11. Can tolerate movement of head and limbs while in a fully supported sitting position.				LJ DATE
Can tolerate being placed in a sitting position with a minimum of 90 degrees flexion in the hips and knees. SEE: A.7.				LJ DATE

Category C

Top-Down Motor Milestone Assessment

STANDING

I	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
C.1. Can stand in one place without support for a minimum of 60 seconds.	LJ DATE			
C.2. Can stand in one place with one or both hands held for a minimum of five minutes.		LJ DATE		
C.3. Can maintain hip and knee extension to allow weight bearing for a minimum of three minutes while another person or appropriate equipment keeps the participant's body in alignment.			LJ DATE	
C.4. Can tolerate weight bearing on feet for a minimum of 45 minutes per day when knees, hips, and trunk are held in alignment by a mobile stander or similar standing device.			LJ DATE	
C.5. Can tolerate fully prompted extension of hips and knees.				LJ DATE
C.6. Can tolerate being placed in a vertical position.				LJ DATE

Category D

Top-Down Motor Milestone Assessment

TRANSITION FROM SITTING TO STANDING

	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
D.1. Can stand up from a bath or from the floor with one hand-held.	LJ DATE			
D.2. Can stand up from a conventional classroom chair without assistance.	LJ DATE			
D.3. Can push with legs to raise self from a sitting position in a bath or from the floor when the trunk is stabilized.		LJ DATE		
D.4. Can stand up from a conventional classroom chair with one or both hands held.		LJ DATE		
D.5. Can extend hips and knees and bear own weight when trunk is raised from a sitting position in a bath or on the floor.			LJ DATE	
D.6. Can extend hips and knees and bear own weight when trunk is raised from a sitting position on a chair.			LJ DATE	
Can tolerate fully prompted extension of hips and knees. SEE: C.5.				LJ DATE
Can tolerate being placed in a sitting position with a minimum of 90 degrees flexion in the hips and knees. SEE: A.7.				LJ DATE
Can tolerate being placed in a vertical position. SEE: C.6.				LJ DATE

Category E

Top-Down Motor Milestone Assessment

TRANSITION STANDING TO S rnm1 G

i	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL Ill
E.1. Can lower self into a bath or to the floor by holding a stationary object or with help from another person, while maintaining balance.	LJ DATE			
E.2. Can lower self to a conventional classroom chair without assistance.	LJ DATE			
E.3. Can use legs to lower self into a bath or to the floor when the trunk is stabilized by another person.		LJ DATE		
E.4. Can use legs to lower self to a chair when both hands are held by another person.		LJ DATE		
E.5. Can flex hips and knees when another person or appropriate equipment supports the trunk and lowers the participant into a bath or to the floor.			LJ DATE	
E.6. Can flex hips and knees when another person or appropriate equipment supports the trunk and lowers the participant to a chair.			LJ DATE	
Can tolerate fully prompted extension of hips and knees. SEE C.5.				LJ DATE
Can tolerate being placed in a vertical position. SEE: C.6.				LJ DATE
Can tolerate being placed in a sitting position with a minimum of 90 degrees flexion in the hips and knees. SEE: A.7.				LJ DATE

Category F

Top-Down Motor Milestone Assessment

PIVOTING WHILE STANDING

t	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
F.1. Can pivot while standing in place when holding on to a stationary object or another person's hand without additional prompts.	LJ DATE			
F.2. Can reposition feet to pivot in place while standing when another person rotates the trunk and helps the participant maintain balance.		LJ DATE		
F.3. Can maintain hip and knee extension while standing when another person rotates the entire body and helps balance the participant.			LJ DATE	
Can tolerate fully prompted extension of hips and knees. SEE: C.5.				LJ DATE
Can tolerate being placed in a vertical position. SEE: C.6.				LJ DATE

Category G

Top-Down Motor Milestone Assessment

WALKING FORWARD

t	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
G.1. Can walk forward a minimum of 7 metres without assistance.	LJ DATE			
G.2. Can walk a minimum of 330 metres with one hand held.	LJ DATE			
G.3. Can walk a minimum of 100 metres with one or both hands held or with a walker.		LJ DATE		
G.4. Can move legs reciprocally for a minimum of 3 metres while bearing own weight when another person assists with shifting weight and maintaining balance.			LJ DATE	
G.5. Can move legs reciprocally for a minimum of 7 metres while being supported by a front leaning walker.			LJ DATE	
G.6. Can tolerate fully prompted reciprocal leg movements while being supported in a front leaning walker.				LJ DATE
Can tolerate fully prompted extension of hips and knees. SEE: C.5.				LJ DATE
Can tolerate being placed in a vertical position. SEE: C.6.				LJ DATE

Category H

Top-Down Motor Milestone Assessment

TRANSITION FROM STANDING mo WALKING

i	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL Ill
H.1. Can start walking from a standing position without assistance.	LJ DATE			
H.2. Can start walking from a standing position when using a walker or when another person helps the participant maintain balance by holding on to one or both hands.		LJ DATE		
H.3. Can start moving legs reciprocally from a standing position in a front leaning walker or while another person assists with shifting weight and maintaining balance.			LJ DATE	
Can tolerate fully prompted reciprocal leg movements while being supported in a front leaning walker. SEE: G.6.				LJ DATE
Can tolerate fully prompted extension of hips and legs. SEE: C.5.				LJ DATE
Can tolerate being placed in a vertical position. SEE: C.6.				LJ DATE

Category I

Top-Down Motor Milestone Assessment

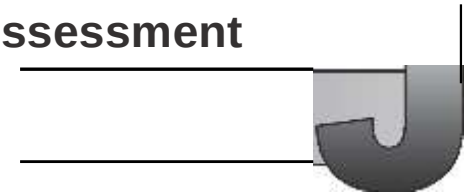
TRANSITION FROM WALKING li O STANDING

J	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
1.1. Can stop walking and maintain a standing position without assistance.	LJ DATE			
1.2. Can stop walking and maintain a standing position when another person helps the participant maintain balance.		LJ DATE		
1.3. Can stop moving legs reciprocally and maintain hip and knee extension for standing while in a front leaning walker or while another person helps maintain balance.			LJ DATE	
Can tolerate fully prompted reciprocal leg movements while being supported in a front leaning walker. SEE: G.6.				LJ DATE
Can tolerate fully prompted extension of hips and knees. SEE: C.5.				LJ DATE
Can tolerate being placed in a vertical position. SEE: C.6.				LJ DATE

Category J

Top-Down Motor Milestone Assessment

WALKING BACKWARDS



	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
J.1. Can walk backward a minimum of three steps while holding on to a stationary object or with one hand held.	LJ DATE			
J.2. Can walk backward a minimum of three steps with both hands held or while using a walker with guidance provided by another person.		LJ DATE		
J.3. Can move feet backward to adjust body alignment when the participant is moved backward while being supported by a front leaning walker or guided by another person.			LJ DATE	
J.4. Can tolerate fully prompted backward reciprocal leg movements while being supported in a front leaning walker or guided by another person.				LJ DATE
Can tolerate fully prompted extension of hips and knees. SEE: C.5.				LJ DATE
Can tolerate being placed in a vertical position. SEE: C.6.				LJ DATE

Category K

Top-Down Motor Milestone Assessment

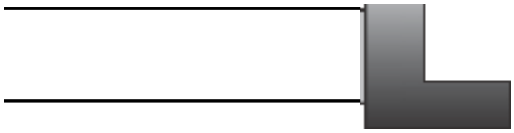
TURNING WHILE WALKING

	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
K.1. Can turn to the left or right in a maximum arc of 1 metre while walking independently.	LJ DATE			
K.2. Can pivot to the left or right while being guided with one hand.	LJ DATE			
K.3. Can turn to the left or right in a maximum arc of 1 metre while walking with one hand held.		LJ DATE		
K.4. Can pivot to the left or right while walking with a walker or with both hands held when another person rotates the walker or the trunk of the participant.		LJ DATE		
Can maintain hip and knee extension while standing while another person rotates the entire body and helps balance the participant. SEE: F.3.			LJ DATE	
Can tolerate fully prompted extension of hips and knees. SEE: C.5.				LJ DATE
Can tolerate being placed in a vertical position. SEE: C.6.				LJ DATE

Category L

Top-Down Motor Milestone Assessment

WALKING UP STEPS



1	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL Ill
L.1. Can walk up a minimum of three steps while holding a railing or with one hand held by another person.	LJ DATE			
L.2. Can maintain extension of one leg while another person prompts the lifting of the other leg then prompts the student to raise his/her own body weight to ascend a minimum of 3 steps.		LJ DATE		
Can move legs reciprocally for a minimum of 3 metres while bearing own weight when another person assists in shifting weight while maintaining balance. SEE: G.4.			LJ DATE	
Maintains hip and knee extension to allow weight bearing for a minimum of three minutes while another person keeps participant's body in alignment. SEE: C.3.			LJ DATE	

Category M

Top-Down Motor Milestone Assessment

WALKING DOWN STEPS

	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
M.1. Can walk down a minimum of three steps with both hands held by another person or with hand rails on both sides of the participant.	LJ DATE			
M.2. Can maintain extension of one leg while another person prompts the flexion of the other leg and helps the student balance while he/she lowers his/her body weight for a minimum of 3 steps.		LJ DATE		
Can move legs reciprocally for a minimum of 3 metres while bearing own weight when another person assists with shifting weight and maintaining balance. SEE: G.4.			LJ DATE	
Can maintain hip and knee extension to allow weight bearing for a minimum of three minutes while another person keeps participant's body in alignment. SEE: C.3.			LJ DATE	

Category N

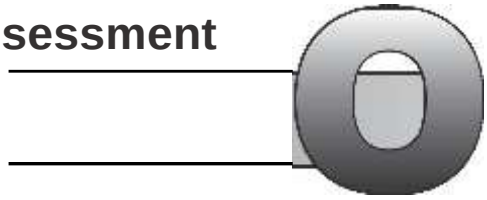
Top-Down Motor Milestone Assessment

WALKING ON UNEVEN GROUND

	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
N.1. Can walk on uneven surfaces with height variations of 10cm or less when one hand is held.	LJ DATE			
N.2. Can walk on uneven surfaces with height variations of 10cm or less when both hands are held.		LJ DATE		
N.3. Can walk on uneven surfaces with height variations of 10cm or less when each leg is prompted and partial support at the upper trunk level is offered by another person.			LJ DATE	
Can move legs reciprocally for a minimum of 3 metres while bearing own weight when another person assists with shifting weight and maintaining balance. SEE: G.4.			LJ DATE	
Can maintain hip and knee extension to allow weight bearing for a minimum of three minutes while another person keeps the participant's body in alignment. SEE: C.3.			LJ DATE	

Category O

Top-Down Motor Milestone Assessment



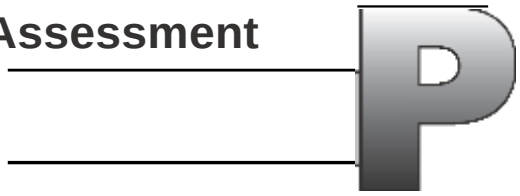
WALKING UP SLOPES

	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
0.1. Can walk up a slope of 30 degrees or less with one hand held.	LJ DATE			
0.2. Can walk up a slope of 30 degrees or less with both hands held.		LJ DATE		
0.3. Can walk up a slope of 30 degrees or less when each leg is prompted and partial support at the shoulder or upper trunk level is offered.			LJ DATE	
Can move legs reciprocally for a minimum of 3 metres while bearing own weight when another person assists with shifting weight and maintaining balance. SEE: G.4.			LJ DATE	
Can maintain hip and knee extension to allow weight bearing fora minimum of three minutes while another person keeps participant's body in alignment. SEE: C.3.			LJ DATE	

Category P

Top-Down Motor Milestone Assessment

WALKING DOWN SLOPES



	GRAD LEVEL	LEVEL I	LEVEL II	LEVEL III
P.1. Can walk down a slope of 30 degrees or less with both hands held.	LJ DATE			
P.2. Can walk down a slope of 30 degrees or less with prompts at the shoulder level.		LJ DATE		
P.3. Can walk down a slope of 30 degrees or less when each leg is prompted and partial support at the shoulder or upper trunk level is offered.			LJ DATE	
Can move legs reciprocally for a maximum of 3 metres while bearing own weight when another person assists with shifting weight and maintaining balance. SEE: G.4			LJ DATE	
Can maintain hip and knee extension to allow weight bearing for a minimum of three minutes while another person keeps participant's body in alignment. SEE: C.3.			LJ DATE	