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Physical & functional management of children with locomotor disability

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Abstract
This article includes discussion of locomotor disability, cerebral palsy, spastic diplegia, hemiplegic cerebral palsy, dyskinetic cerebral palsy, quadriparetic cerebral palsy, hypotonic cerebral palsy, dystonia, choreoathetotic cerebral palsy, and extrapyramidal cerebral palsy. The foregoing terms may include synonyms, similar disorders, variations in usage, and abbreviations. According to the Persons with Disabilities Act of 1995 "Locomotor disability" means disability of the bones, joints or muscles leading to substantial restriction of the movement of the limbs or any form of cerebral palsy.

Keywords: Cerebral palsy, locomotor disability, spastic diplegia, hemiplegia, neuroprotective, intellectual disability, abnormalities, quadriplegia, quadriparetic

Introduction
'Locomotor Disability' refers to a person's inability to execute distinctive activities associated with movement of self and manipulation of objects resulting from affliction of musculoskeletal and/or nervous system. The percentage of persons with locomotor disability is the highest among the total disabled population of India constituting a sizable portion of 20.3 percent population of total individuals with disabilities. The persons with locomotor disabilities face difficulties to use one or more of his/her extremities, or may have lack of strength to walk, grasp, or lift objects. Assistive devices like wheelchair, crutches, or a walker may be utilized to aid in their mobility. Locomotor disability could be the result of disease, injury or malformation of bones, joints, muscles, nerves, spinal cord and brain.

Poliomyelitis
Known as polio in short, is an infectious disease. It is caused by a virus and affects the spinal cord and damages the motor cells. It is transmitted by droplet infection and oral ingestion. The incubation period varies from 3-30 days. During the period 7-14 days is the most important interval between infection and clinical illness. After polio, paralysis/weakness of affected limb/s is more usual and one or two limbs get affected. The lower limbs are more often affected than the upper limbs. The paralyzed muscles show atrophy i.e. become thin due to lack of nutrition. The imbalance of muscles leads to deformity and contractures. No sensory problem occurs in children affected by polio as the sensory nerves are not involved. The effect of paralysis on growing 82 limbs results in poor and slow growth and this leads to shortening of limbs, long standing contractures of joints resulting in the separation of joint. The effect of unsupported walking on weak joints may lead to secondary deformities and contractures.

Fig 1: Affected lower limbs of a polio & History of Polio

Cerebral palsy

The brain controls all that we do. Different parts of the brain control the movement of every muscle of the body. In cerebral palsy, there is damage to, or lack of development in, one of these areas of the brain. 'Cerebral' – refers to the brain. 'Palsy' – can mean weakness or paralysis or lack of muscle control. Cerebral palsy describes a group of genetic and acquired childhood neurologic disorders characterized by abnormalities in tone, posture, and movement as a result of early injury to the developing brain. Cerebral palsy is often associated with language and intellectual disability, social impairment, epilepsy, other organ involvement, and functional limitations. An appropriate diagnostic assessment and resource environment is important to ensure proper treatment and management. Neuroprotective strategies, including therapeutic hypothermia and adjuvant therapy, show promise for the reduction of morbidity and mortality caused by hypoxic-ischemic encephalopathy, including cerebral palsy. In this article, the author discusses the many aspects of diagnosis and management of cerebral palsy.

Therefore cerebral palsy is a disorder of muscle control which results from some damage to part of the brain. The term cerebral palsy is used when the problem has occurred early in life, to the developing brain. Children with cerebral palsy can have problems such as muscle weakness, stiffness, awkwardness, slowness, shakiness, and difficulty with balance. These problems can range from mild to severe. In mild cerebral palsy, the child may be slightly clumsy in one arm or leg, and the problem may be barely noticeable. In severe cerebral palsy, the child may have a lot of difficulties in performing everyday tasks and movements.

Fig 2: Support a child living with cerebral palsy

- Cerebral palsy describes a group of nonprogressive genetic and acquired childhood neurologic disorders characterized by abnormalities in tone, posture, and movement as a result of injury to the developing brain.
- Although characterized by their motor dysfunction, children with cerebral palsy frequently have other associated impairments, which include language delay, seizures, strabismus, dysphagia, orthopedic deformities, and cognitive problems.
- Advances in neuroimaging and genetics promise to further the understanding of the pathogenesis and pathophysiology of cerebral palsy.
- Effective management of cerebral palsy requires a team with medical and rehabilitative specialists to provide careful, ongoing neurodiagnostic evaluation and rehabilitation to maximize functional capabilities.
- Neuroprotective strategies, chiefly therapeutic hypothermia, have demonstrated decreased death and disability related to cerebral palsy.

Spina Bifida

Spina Bifida is a congenital midline defect resulting from failure of the bony spinal column to close completely during fetal development. The development of the spine and spinal column in children with spina bifida is incomplete. The resulting damage to the nerves generally causes paralysis and/or lack of function or sensation below the site of the defect.

Definition

Spina bifida is a birth defect that falls under the category of neural tube defects. The neural tube is the embryonic structure that eventually develops into the baby's brain and spinal cord and the tissues that enclose them. This defect can occur anywhere on the spine and it may result in cognitive and physical disabilities. Spina bifida can range from mild to severe, depending on:

1. The size and location of the neural tube defect.
2. Whether skin covers the affected area.
3. Which spinal nerves come out of the affected area of the spinal cord?

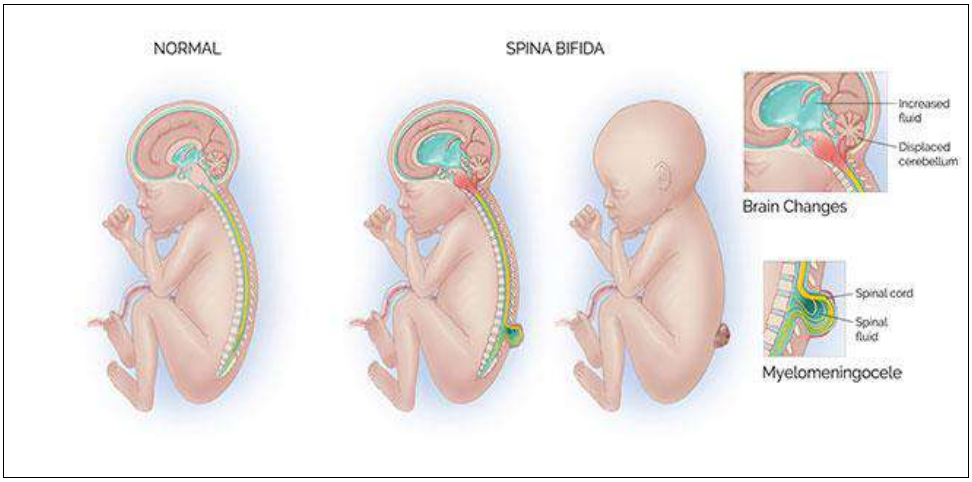

Fig 3: Spina Bifina- Stanford children's health

Spina bifida is a birth defect that occurs when the spine and spinal cord don't form properly. It's a type of neural tube defect. The neural tube is the structure in a developing embryo that eventually becomes the baby's brain, spinal cord and the tissues that enclose them. Typically, the neural tube forms early in pregnancy and it closes by the 28th day after conception. In babies with spina bifida, a portion of the neural tube doesn't close or develop properly, causing problems in the spinal cord and in the bones of the spine. Spina bifida can range from mild to severe, depending on the type of defect, size, location and complications. When necessary, early treatment for spina bifida involves surgery - although such treatment doesn't always completely resolve the problem.

Muscular Dystrophy

Muscular dystrophy is a group of hereditary genetic degenerative muscle disease causing a progressive weakening and wasting away of muscles tissues that move the human body. Persons with multiple dystrophy have incorrect or missing information in their genes, which prevents them from making the proteins they need for healthy muscles. It is characterized by progressive skeletal muscle weakness, defects in muscle proteins, and the death of muscle cells and tissue. The early common sign known as 'Gower's Sign' is generally seen in children with muscular dystrophy when they try to get up from the ground from sitting to a standing position by grasping and pulling on body parts from knees to hips, walk up their thighs with hands (Werner, 1987) until they are in erect position.

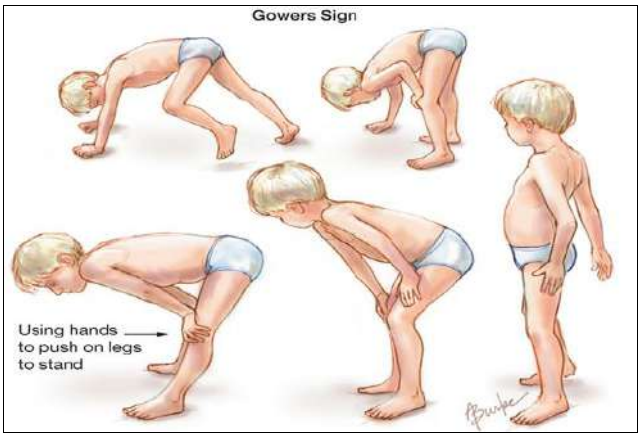

Fig 4: Muscular Dystrophy- Therapies for Kids

Types of muscular dystrophy

There are more than 30 different types of muscular dystrophy. Some of the more common forms include

- **Duchenne muscular dystrophy (DMD):** This condition tends to affect boys between the ages of 2 to 5, but girls can get it, too. You may notice that your toddler has a hard time running, walking or jumping. As the disease progresses, it can affect a child's heart and lungs. DMD is the most common form of muscular dystrophy. It affects approximately six out of 100,000 children in North America and Europe.
- **Becker muscular dystrophy (BMD):** BMD is the second most common muscular dystrophy. Symptoms of BMD can appear anytime between age 5 and 60, but typically come on during the teen years. Males are more likely to get BMD. The disease affects the hip, thigh and shoulder muscles, and eventually the heart. Approximately one out of 18,000 to 30,000 U.S. boys develop BMD.
- **Facioscapulohumeral muscular dystrophy (FSHD):** FSHD is the third most common muscular dystrophy. The disease affects muscles in the face, shoulder blades and upper arms. Symptoms tend to appear before age 20. About four out of 100,000 people in the U.S. have this form.
- **Congenital muscular dystrophies (CMD):** Congenital conditions like CMD are present at birth. An infant may have weak muscles, a curved spine and joints that are too stiff or loose. Children with CMD may have learning disabilities, seizures and vision problems.
- **Emery-Dreiffus muscular dystrophy (EDMD):** This condition tends to affect children. Symptoms, such as weak shoulders, upper arms and calf muscles, appear by age 10. EDMD also affects the heart.
- **Limb-girdle muscular dystrophy (LGMD):** This disease affects the muscles closest to the body including the shoulders and hips. It affects people of all ages. Approximately two out of 100,000 people in the U.S. have LGMD.
- **Myotonic dystrophy:** People with myotonia have trouble relaxing their muscles. For instance, you might find it difficult to let go of a loved one's hand. The disease also affects the heart and lungs. This condition tends to affect adults of European descent and occurs in approximately 10 out of 100,000 people.

Assessment and identification

Physical Disabilities

- Deformity in neck, hand, finger, waist, legs
- Difficulty in sitting, standing, walking
- Difficulty in lifting, holding, keeping things on floor
- Difficulty in moving or using any part of the body
- Difficulty in holding pen
- Using a stick to walk
- Jerks in walking
- Lack bodily coordination
- Epileptic behaviour/have tremors
- Joint pains
- Any part of the body is amputated.

Categories of Locomotor Disability

- Permanent Physical impairment of Upper Limb
- Permanent Physical impairment of Lower Limb
- Permanent Physical impairment of Trunk (Spine)
- Permanent Physical impairment in case Short Stature/ Dwarfism
- Permanent Physical impairment in Amputees
- Longitudinal deficiencies
- Permanent Physical impairment in Neurological conditions
- Permanent Physical impairment due to cardiopulmonary Diseases

The estimation of permanent impairment depends upon the measurement of functional impairment

- **Impairment:** Impairment in any loss or abnormality of psychological, physiological or anatomical structure or function in a human being.
- **Functional Limitations:** Impairment may cause functional limitations which are partial or total inability to perform these activities necessary for motor, sensory or mental function within the range or manner of which a human being is normally capable.

If the child has locomotor disability contact: Orthopaedic Surgeon or specialist in physic al medicine and rehabilitation – Available at block, district, State hospital for assessment,

Organizations for education

Formal schools, Open School – Non - Governmental Organisations working in the field of locomotor disabilities

Organisations for providing aids and appliances

Field, Sub - health Centre, Primary Health Center, Gram Panchayat, Rehabilitation centre if available, NGOs working in the field of disability.

Nature and Needs of Children with Locomotor Disabilities

Children with locomotor disability may have following difficulties which restrict their bodily movement as the way other children do:

1. The impaired strength, speed, endurance, coordination and manual dexterity may result in need for medical and therapeutic interventions and require attention for physical accessibility to the environment around including academic tasks such as reading, writing, note taking, test taking and computing and physical participation in group project and activities.
2. Impaired range of motion and control of limbs may result in a need for continuous physical therapy and occupational therapy exercises and require planned intervention for optimum performance in academic tasks and class room activities.
3. Impaired mobility may result in use of aids such as wheelchair, walker, crutches, splints and communication devices. The use of these aids requires all environments be accessible.

Therapy like

1. 1.Alternative therapy
2. 2.Occupational therapy
3. 3.Physical therapy
4. 4.physio therapy

The goal of physical therapy is to help individuals:

- Develop coordination.
- Build strength.
- Improve balance.
- Maintain flexibility.
- Optimize physical functioning levels.
- Maximize independence.

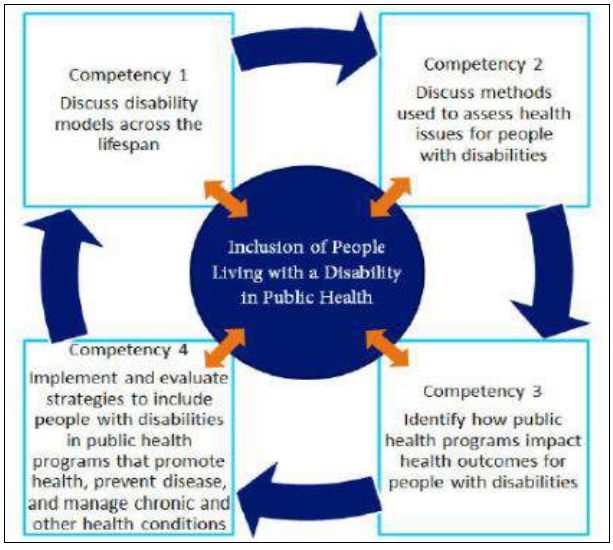

Fig 5: Inclusion of people living with a disability in public health

Conclusion

People with disabilities are at a higher risk for poor health outcomes. There is a clear need for public health efforts to reduce health disparities among people with disabilities.

Knowledge about the health status and public health needs of people with disabilities is essential for addressing these and other health disparities.

The four Competencies and associated learning objectives will address the knowledge gaps for public health professionals about disability, and health disparities. They provide foundational knowledge about the relationship between public health programs and health outcomes among people with disabilities. The Competencies can also be embedded into existing public health curriculum and training programs.

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