CORRELATION BETWEEN THE DEGREE OF BRAIN DAMAGE AND THE COMMUNICATIVE DISABILITY OF THE BRAIN-DAMAGED MOTORY HANDICAPPED CHILDREN

M. D. Thesis for Partial
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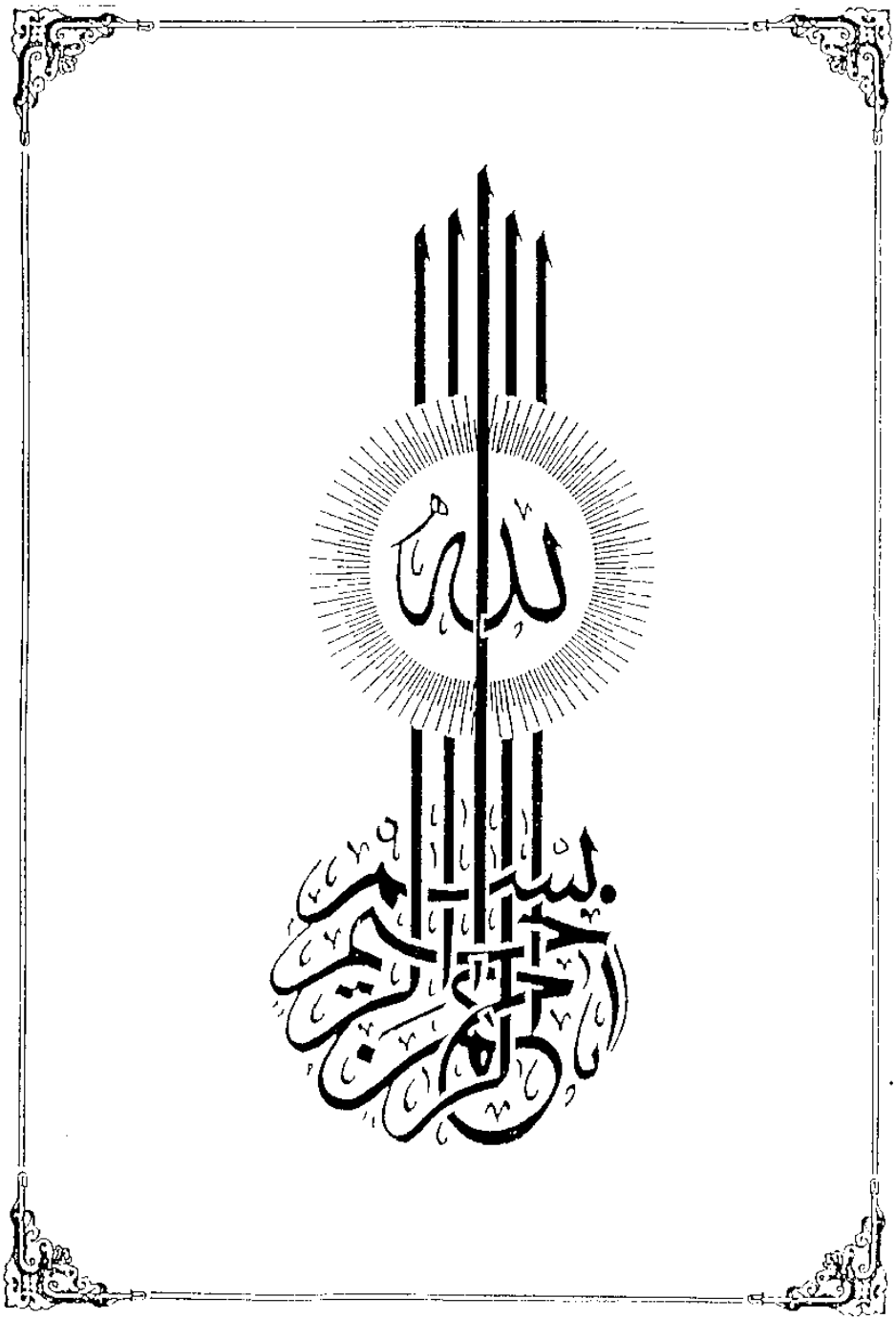

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INTRODUCTION

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Thanks to the progress in medical sciences especially in obstetrics anesthesiology and pediatrics, more and more infants and children are saved from fatal issue, but consequently the number of brain-damaged-motory handicapped children - previously called cerebral palsied children - is increasing (Sokol, 1984). This group comprises a wide variety of neurological conditions that arise from damage to the immature brain interferring with its normal sequence of development. According to the definition adopted by the World Commission of Cerebral Palsy, in 1966, it is considered as " a persistant - but not unchanging - disorder of posture and movement due to a dysfunction of the brain present before its growth and development are completed." The brain pathology in these cases is inflicted in utero, during birth or in early childhood. It is usually assumed that the insult to the developing brain took place before 3 years. The main motor pathology is rather a disturbance in coordination and refinement of movement. According to the site and degree of brain damage the patient may show - besides his motor disability - a disturbed pnonatory articulatory system resulting in dysarthria, disturbed perceptual and cognitive abilities, and other handicaps like hearing impairment, visual problems, mental retardation and epilepsy.

As regards the motor disability, the brain damaged motory handicapped child may fall in one of the following syndromes:

- The spastic syndrome; having the site of lesion in the pyramidal tract. The child has a degree of hypertonus which varies with the child's general condition, his excitability and the strength of stimulation, the exact site of lesion and the extent of involvement of the extrapyramidal tract. (Bobath, 1950).

- The ataxic syndrome: The cerebellar lesion shows itself in a lack of balance and coordination. Pure ataxia is rarely met with here . Generally speaking, ataxic, within the concept of brain-damaged motory handicapped cases constitutes a rag bag for several less well delimitted syndromes (Sanner and Hagberg,1974). Classification into two main subgroups "congenital ataxia and "ataxic diplegia" (Ingram, 1962) has, however, been widely accepted.

- The Dyskinetic Syndromes: Patients of this group have been previously treated under the heading "Athetosis" (Phelps, 1950) OR "Dyskinesia" (Ingran, 1964).

- Mixed categories: The brain insult, being due to many different factors, thus involving different parts of the brain, thus it is very likely to have mixed types.

Communication disorders in the brain-damaged motory handicapped child are mainly articulatory problems and less commonly language deficits. Darley, Aronson and Brown (1969) have written that the motor speech disorders that are "neurogenic" in origin are symptoms of dysarthria which may include problems of respiration, phonation, articulation, resonance and prosody. It varies from slight articulatory errors to total inability to move the speech organs sufficiently enough to utter any intelligible word. Dysarthria results from involvement of the neuromuscular mechanism of speech. Apraxia which is a disorder in motor speech programming manifested by errors in articulation and secondarily by compensatory alteration of prosody (Darley, Aronson and Brown, 1975); this articulation problem is sometimes met with. Delayed language development is encountered in many cases of the brain damaged motory handicapped children due to the brain insult itself resulting in a serious limitting effect on intellectual development or disturbance of symbolic perceptual abilities of the child (Kotby, 1977). Associated sensory problems as hearing impairment, visuo-motor perceptual deficits and oral sensation problems may all have negative effects on the developing language (Boone,1972). Lack of proper stimulation may be another contributing factor for the problem.

AIM OF THE WORK

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The main objective of this work is to find a correlation between the degree of brain damage and the communicative disability of the brain-damaged motory handicapped children, in order to be able to help in planning for better and comprehensive intervention strategy and in prediction of the prognosis in each case.

REVIEW OF LITERATURE

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Neuro-anatomical and physiological correlates:

The Motor System:

The basis of the motor and postural control resides within the interaction of the various facets of the central nervous system. The performance of functional skills such as walking, feeding, dressing and writing requires very complex and selective patterns of muscular coordination. These depend on an intact and mature central nervous system and a fully developed background of basic motor patterns. The central nervous system is an organ of integration. Jackson (1958) expressed this idea in that "nervous centres represent movements, not muscles . From negative lesions of motor centres there is no paralysis of muscles, but loss of movements." All our movements require constant changes of posture and maintainance of equilibrium in constantly changing conditions. The postural adjustments are largely under the control of the extrapyramidal motor system and the vestibular and spinal reflexes. Voluntary movements require the participation of the precentral gyrus of the cerebral cortex "motor area", and the timing and degree of contraction or relaxation of the muscles of the synergy are coordinated by the cerebellum, especially when a movement involves more than one segment of a limb (Simpson, 1970). In other words, as indicated by Melyn

and Grossman (1978), it is the equilibrium of input and output within the central nervous system which produces the desired movement or lack of motion.

The action of the upper motor neurones from the motor area of the cortex, the extrapyramidal motor system and the cerebellum are brought directly or indirectly to the cells of the anterior horn of the spinal grey matter or motor cranial nuclei from which the lower motor neurone runs to a group of muscle fibres "motor unit". Thus the lower motor neurone is the final common path for all efferent impulses directed at the muscle and the groups of anterior horn cells may be considered to 'represent a muscle' in the same sense as the cells of the motor cortex 'represent a movement' (Simpson, 1970).

The pyramidal system:

It initiates movements of different parts of the opposite side of the body. The pyramidal tract fibres arise from Betz cells in area 4 in the percentral gyrus "motor area", descend in the corona radiata to reach the internal capsule, where it occupies the posterior third of the anterior, limb, the genu and the anterior two thirds of the posterior limb, then it descends in the mid-brain occupying the middle

three-fifths of the cerebral peduncle, then descends to the pons where it occupies the basis pontis and is separated into bundles by the transverse pontine fibres, and traversed by the sixth and seventh nerves. In the medulla, the pyramidal tract occupies the pyramid; and in the lower part,75-90% of the fibres cross to the opposite side and descend as the crossed pyramidal tract in the lateral column of the spinal cord. The remaining 25-10% fibres descend as the direct pyramidal tract and gradually cross to the opposite side to terminate at the anterior horn cells of all spinal segments (Simpson, 1970).

The extrapyramidal system:

It consists of all descending neurones other than the corticospinal (pyramidal). There are three main levels of the extrapyramidal system, which interact together, the higher levels tending to control the lower by inhibition (Simpson, 1970). These are: the caudate nucleus and putamen, the globus pallidus and the red nucleus, reticular formation and other lower centres. The extrapyramidal system originates mainly from area 6 in the frontal lobe and has its first relay station in the basal ganglia; the fibres being passing in through the caudate neucleus and out through the globus

pallidus. From the latter, fibres pass to the second relay station forming the following tracts: rubrospinal tract, tectospinal, reticulospinal, vestibulospinal and olivospinal tract. Also it passes fibres to the cerebellum. Then all terminate at the anterior and lateral horn cells of the spinal cord.
The extrapyramidal system regulates the activity of the lower motor neurones through the above mentioned tracts by a balance of a facilitatory and inhibitory impulses.

Traditional concepts of functions of the pyramidal system states that these fibres control fine coordinated movement, especially by the activation of one muscle group with inhibition of its antagonist muscles. The extrapyramidal system classically is thought to influence movement by activation of large muscle groups and suppression of other large groups of muscles. Both the pyramidal and extrapyramidal systems are necessary for the maintainance and suppression of muscle tone respectively (Gilroy and Meyer, 1969, Buchwald 1967). However, Buchwald (1967) has hypothesized another concept of motor control which combines many aspects of the two systems into perhaps a more functional approach. Simply stated, motor control is based on postural maintainance and kinetic energy translated into movement of