The Rehabilitation Psychologist

Association of Rehabilitation Psychologists - India

www.rehabilitationpsychologist.org

Volume IV, Issue 11

25th Jan., 2015

Psychosocial Issues in Conditions of low-vision / Visual impairment / Blindness

There is no unique psychology of blindness and no special personality attributed to individuals who are blind. The quality and characteristics of the social interaction between a blind and a sighted person are determined by the capacities and attitudes of each. Psychosocial issues are broadly divided into three areas: **1.** Individual's needs and desires; **2.** Physical and social environment; **3.** Common conceptions of blindness.

The visually impaired population is extremely heterogeneous. There are a variety of impairments each limiting different aspects of vision. The word limiting should not be taken lightly. Limit is related to vision not to behaviour in general. Earlier studies noted that loss to the lower half of the visual field usually implies difficulties in mobility and does not mean that the individual cannot watch television, do a crossword puzzle or work with a computer. Individuals who are blind or have low-vision must rely to a greater extent on auditory and tactile cues. While this type of information still allows for the discerning of moods, emotions and can help the individual make inferences about a person's character and emotional state; it lacks the visual complement afforded by facial expressions. These studies also found that the blind are not very accurate at deducting and judging personal characteristics by voice alone. For this reason, communication must be clear, reliable and as redundant as possible. In some individuals who are blind or have low-vision the normal appearance of the eyes can lead to a certain amount of confusion and in some cases lead to mistrust, suspicion or doubts about the degree of impairment. Low-vision manifests itself in contradictory behaviours. It is not uncommon to see the student with low-vision who cannot read from a blackboard but is able to comfortably ride a bicycle or the individual who can watch television from a distance but continuously stumbles on a step or curve. This lack of understanding often results low vision to total vision loss or at least leads to assumptions about general ability disproportionably discrediting the individual. We must seek to understand these limits and refrain from making false assumptions and generalizations that can have disabling effects. The same is true for blindness where the uninformed assumes that those who are blind have more acute senses or that because of their loss there are incapable of independently coping with life in society. Individuals with low vision or who are partially sighted do not quite fit into the category of either the blind or sighted population. Consequently, they often have special needs that are overlooked. The social community often lacks understanding of the true nature of vision impairment, so that individuals with low vision are ridiculed in public for appearing to see more than would be expected by a person with visual impairment.

Vision is crucial for many activities of daily living. Adjustment to vision loss is not necessarily correlated with the degree of remaining vision. Because partially sighted individuals have some remaining sight, they may attempt to “pass” as a sighted person to avoid potential rejection or avoidance by others. Individuals who lose vision later in life must modify their self-perception as a result of physical changes and the subsequent need to restructure daily activities. Individuals who are newly blind may experience grief and despair over their loss of visual function. This might effect their self-esteem and have to restructure their psychological makeup. Individuals with little or no vision must learn new techniques for carrying out routine activities of self-care and mobility. They must orient themselves to the home environment so that they may move freely from room to room without risk of injury.

Individuals differ in how they accept their disability. An important aspect of psychosocial adjustment is the development of a positive self concept. A positive self-concept is usually associated with the ability to cope and overcome the consequences of a disability. Negative self-concepts are usually associated with isolation, depression and mental and health problems. There is no general agreement as to whether the self-concept of individuals who are blind or have low-vision differs from that of the sighted. Counseling individuals to understand sighted people's reactions may facilitate social interactions and enhance the development of constructive and realistic interactions. At times, individuals with

visual impairment may find it helpful to share their experiences and problems with others who also have low vision. Clearly there will be differences in the adaptation of the congenitally and adventitious impaired. Time is an important variable to consider. First, a congenital impairment forces an almost automatic acceptance of the condition. An adventitious impairment on the other hand is often accompanied by an element of surprise, trauma and depression that requires a certain accommodation period. The shock usually affects the individual and the family and communication between both parties is essential. Training or experience should also be considered because functional and positive self-development will depend on the individual's mastery of the other senses and/or residual vision for the organization of information and active participation in society.

Victor Roger Schinazi(). Psychosocial implications of blindness and low-vision, paper 114

Self – Esteem and Adjustment: Psychosocial Aspects of Blindness and Visual Impairment in Self-Esteem and Adjusting to Blindness: the Process of Responding to Life's demands, 2004, By Dean W. Tuttle and Naomi R. Tuttle

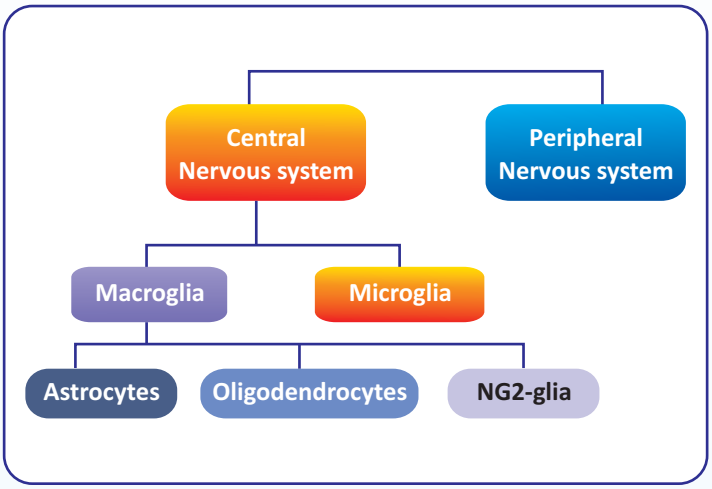
Brain and Behavior

Glia, An unsung Hero - Past, present and future

The evolution of nervous system has led to a specialization of neurones, which become perfect elements for signalling and information processing. This came as price of losing essential housekeeping functions, as neurones are generally incapable of regulating their own immediate environment and are vulnerable for environmental insults. This main housekeeping functions went to neuroglia, which have specialized into many types of cells performing specific aspects of nervous system homeostatis. Many existing definitions highlight the support role of these cells but most common definition assigned to neuroglia is: "cells residing in the brain that are not electrically excitable". The fundamental function common to these cells is homeostatis of nervous system. (Verkhratsky and Butt, 2013).

The concept of neuroglia (Glia=Greek word for 'glue') was introduced by Rudolf Virchow in 1856. Virchow conceived neuroglia as a kind of connective tissue and found that this tissue also contained cellular elements. Since the original discovery and description of glial cells, these non-neuronal cells were largely ignored. Recent studies, however, suggest glia play a vital role in brain cell communication, and perhaps in the development of higher functions of nervous system.

The ratio of glia and the neuron 10:1 which is widely used in the text books of physiology is a myth and that the ratio in human and other primate brain is much close to 1:1. Herculano – Houzel and her colleagues from Rio de Janerio Brazil published their results in 2009 (Scientific American June 13, 2012). They consistently found a whole human brain glia to neuron ration of almost exactly 1:1. Specifically they found that the human brain contain about 170.68 billion cells. 86.1 billion neurons and 84.1 billion glial cells. Regional differences between the neurons and glial cells do exists. In cerebral cortex 60.84 billion cells are glia and 16.34 billion cells are neurons giving a ratio of glia to neuron 3.76:1. Similar differences exists in other regions of the brain too.



Classification of Glial Cells:

Generally, the neuroglia in the mammalian nervous system are subclassified into peripheral nervous system (PNS) glia and Central nervous system (CNS) glia. Glial cells in the central nervous system can be divided into microglia and macroglia. Microglia represent the innate brain immunity and defence. Macroglia are composed of three types of cells: Astrocytes, Oligodendrocytes and Oligodendrocytes precursor cells (NG2-glia). Glia are now known to be active players in the formation and function of synapses, the tiny gaps between neurons that allow them to communicate with each other. They, however, do not generate an action potential as neurons do but they communicate with the other glial cells by calcium waves. They also modulate the synaptic transmission by calcium waves.

In the past twenty years with the advent of new investigative methods in molecular biology, like glia electrophysiology, glial cell culture, patch clamp technique, ion imaging methods from 1980-1990 have considerably shaken glial serenity by demonstrating that these cells express a similar variety of ion channels (Voltage/Ligand gated) and neurotransmitter

receptor as neurons. This new information has provided new possibilities for better understanding the functional role of these cells in the information processing in the brain.

Ongoing research has helped us to divide the functions of the glia in three major categories:

1. Established : Past
2. Probable : Present
3. Emerging : Future

Astrocyte Function:

	Established	Probable	Emerging
Normal	**1.** Redistribution of K+ during neural activity **2.** Removal of Glutamate/GABA at the synapses **3.** Formation of precursor for GABA/Glutamate **4.** Ammonium detoxification **5.** Neural path finding	**1.** Providing energy substrate to neuron (e.g., lactate) **2.** Sharing energy substrate derived from glycogen with neuron. **3.** Brain water homeostasis **4.** Influencing Blood Brain Barrier **5.** Regulation of extracellular pH.	**1.** Modulation of excitatory / inhibitory synapses **2.** Regulation of synaptogensis (Tripartite synapses) **3.** Regulation of neurogenesis in adult brain (e.g., in Hippocampus) **4.** Detoxification of brain free radical **5.** Sleep/wakeful cycle, higher functions like learning and memory, cognitive functions
Pathological	**1.** Alexander Disease **2.** Cytotoxic brain edema **3.** Glioma formation **4.** Failure of extracellular glutamate homeostasis	**1.** Hepatic encephalopathy **2.** Modulation of stroke outcome: **i.** Free-radical scavenging **ii.** Glutamate homeostasis **iii.** Connexin expression	**1.** Tropic modulation of post-injury neural repair/axon regrowth **2.** Release of cytokines/chemokines **3.** Neuroinflammation **4.** Neurodegenerative diseases **5.** Psychiatric disorders **6.** Pathalogical pain

(**Some neuroscientists consider *Glia* to be the "Sleeping Giants of Neuroscience"**)

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Role of Folate in Fetal Brain Development

Optimal folate status is essential for placental and foetal growth, and development. During pregnancy, there is a decline in maternal folate concentrations to about 50% as compared to non-pregnant concentrations. This decline is partly attributed the increased folate requirements or rapid cell proliferation and tissue growth of the uterus and placenta, growth of the fetus and for expansion of the maternal blood volume. Folate supplementation protects against the first occurrence and recurrence of neural tube defects. This protective effect of folate supplementation is important in the early stages of pregnancy when the closure of the neural tube occurs. Poor maternal intake of key nutrients during pregnancy can affect brain development, because the fetal brain develops rapidly.

Evidence linking maternal folate status with Offspring cognitive performance:

Studies have reported positive associations between folate supplementation during the first trimester of pregnancy and the cognitive performance of the child. The developing brain is vulnerable to adequate nutrition during 24-42 weeks of gestation. All nutrients are important for brain development, but certain nutrients including folate are considered to have a greater impact during late fetal development. Overall, the available evidence indicates that maternal folate status does influence the later cognitive function of the child.

Reference: Nestle Nutrition Institute Newsletter, vol.3 (3) 2014

Early versus late referral for Intervention Services

A group of Paediatricians have done a retrospective study and observed that the medical professionals referring the children with developmental disabilities for Early Intervention Service was very late. The study out of two thousand and twenty cases, 62.8 % presented before 3 y of age (early presenters) and 37.1 % presented at 3 y or more (late presenters). There was no difference in the overall rates and severity of mental retardation in early and late presenters. The proportion of children with quadriparetic cerebral palsy, hearing impairment, vision impairment and multiple disabilities was significantly more in early presenters. The early presenters had better parental education status, less number of siblings, better immunization status and more were delivered at a hospital and residing in urban areas. They further concluded that due to late presentation the crucial time for early intervention is lost. Children with purely mental disability are the ones, most likely to be referred late. Socio-economic differences are significantly contributing to these delayed referrals.

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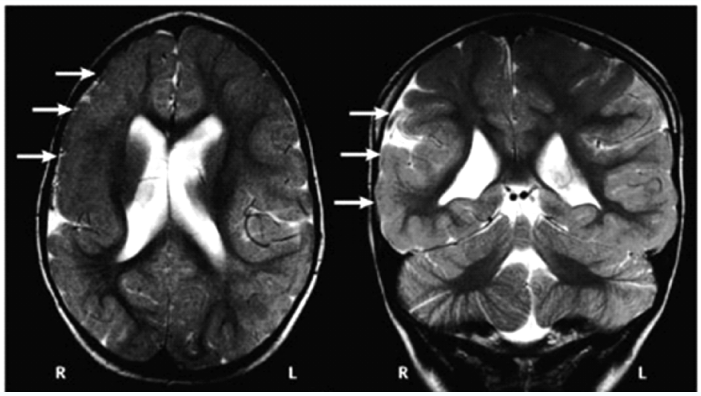
Handedness

In the human brain, distinct functions tend to be localized in the left or right hemispheres, with language ability usually localized predominantly in the left and spatial recognition in the right. Furthermore, humans are perhaps the only mammals who have preferential handedness, with more than 90% of the population more skilful at using the right hand, which is controlled by the left hemisphere. How is a distinct function consistently localized in one side of the human brain? Because of the convergence of molecular and neurological analysis, we are beginning to consider the puzzle of brain asymmetry and handedness at a molecular level. The recent behavioural studies in non-human primates, such as the investigation of handedness in chimpanzees, might help to better understand how human handedness has evolved. In particular, the comparison of human and chimpanzee genomes has enriched the knowledge of the evolutionary mechanisms of human brain development. Similar studies might help to understand the evolutionary regulation of human brain asymmetry.

Several human neurological disorders show disrupted normal brain asymmetry. For example, reduced and reversed anatomical brain asymmetry has been reported in individuals with schizophrenia, autism or dyslexia suggesting a potential indirect relationship between the causes of these disorders and the asymmetrical development of the human cerebral cortex. Recently, several studies have reported clinical cases of polymicrogyria — a malformation of cortical development that is characterized by many small gyri in the cortex — that occurs only on one side of the cortex; this is known as unilateral polymicrogyria. Patients have seizures, motor dysfunction and mental retardation. A genetic cause of unilateral right-sided polymicrogyria is suggested by the existence of several pedigrees in which the disorder is present in more than one individual of an affected family. These studies indicate that unilateral polymicrogyria can be inherited as a Mendelian trait, suggesting that there might be a gene that is required for the development of the right perisylvian region. Using forward genetic approaches to map genes that cause disrupted brain asymmetry might reveal their normal function in asymmetrical development of the brain.



Polymicrogyria (indicated by arrows) is detectable in the right hemispheres in both brains shown. An apparent increase in cortical thickness is observed in the right (R) hemispheres, whereas the cortices of the left (L) hemispheres appear entirely normal. (2006) Lippincott Williams & Wilkins.

Reference:

Tao Sun and Christopher A. Walsh (2006). Molecular approaches to brain asymmetry and handedness, Nature Reviews, 7, 655-662

Note: Should you have write-ups or voice your concern, please correspond to: E-mail: **rehabilitation.psychologist@gmail.com** or **The Rehabilitation Psychologist,** 3-5-314, Shri Lakshmivenkateshwara Nilayam, Vittalwadi, Narayanaguda, Hyderabad - 500 029.