Therapeutic Riding From A Neuropsychological Point Of View For Patients With Brain-Disorders.

Author: Pia Tillberg, Pia Tillberg
           Hjalmar Olssons v 16, 134 40 Gustavsberg, Sweden
           pia.tillberg@swipnet.se

Patients with brain disorders are not a homogeneous group. The causes of the disorder could be trauma, stroke, tumour, epilepsy or infection. Within the group there is a wide range of dysfunction in various combinations. Some symptoms are obvious; others are invisible and difficult to comprehend. In the western world stroke is one of the main causes of dysfunction in grown-ups. In Sweden about 25 000 people (population of nearly nine million) suffer from strokes every year. The need for efficient rehabilitation has demanded an increase in research in the neurological field and also increased knowledge among the rehabilitation personnel.

Neuropsychology can be defined as the science of how our behaviours are biologically organised. It means that one maps the connection between psychological performance and brain structure and processes. A basic knowledge of the brain’s anatomic and physiological structures is also included in the neuropsychological literature.

Knowledge of neuropsychology gives insight into how the brain normally functions as well as how an injury alters this. It gives the therapist a tool to analyse a dysfunction and to design the rehabilitation to suit the individual. A tool used not only to understand the cause of the shortcomings, but also to recognise the abilities that remain intact.

Most physiotherapists working within neurological rehabilitation in Sweden today have some insight into neuropsychology. According to a study of the importance of neuropsychological knowledge in neurological rehabilitation, the respondent (physiotherapists) viewed it as a filter, through which other knowledge and experience of profession and life pass and develop into a changed approach. It influences for example choice of treatment, evaluation of outcomes and the therapist’s personal attitude towards the patient.

Therapeutic riding is used for patients with a number of different diagnoses and for many therapeutic reasons. The horse’s movement and the art of riding have complex therapeutic qualities, which involve many aspects of a person’s ability.

In this presentation I have chosen to present a limited number of the neuropsychological aspects of dysfunction, caused by brain injury, that we come across as physiotherapists working within neurological rehabilitation. These aspects are viewed in relation to what therapeutic riding, as a complex activity, can offer as a method of rehabilitation. The full analysis, which includes more aspects than presented here, is an outcome from the project “Developing of therapeutic riding as a method of treatment within neurological rehabilitation”.

The following headlines are chosen mainly to give an idea of the relationship between neuropsychology and therapeutic riding. It is not meant to give a lecture in neuropsychology but more to illustrate its usefulness.
• **Sensory Input And Perception**

In order to function and even survive we need sensory input. We need information both from the surrounding world and from our own body. Studies in rehabilitation show that the brain needs stimuli to be able to utilise its plasticity and capacity for recovery.

In addition to sight, hearing, smell and taste there is also the somatosensory system and the vestibular system. The somatosensory system informs the central nervous system of the state of the muscle length and tension, joint angles (proprioception) and touch, pain, temperature and vibrations on the skin. The vestibular system is the sensory system that detects movement of the head and has an important role in postural control and balance.

The information from our senses has to be as precise as possible so that the interpretation within the brain will be accurate and our action appropriate. Nerve cells within this system can be damaged by illness or trauma and therefore not able to react properly on stimulus from the body. Changes in the ability to move also alter and/or decrease the somatosensory input.

Sitting on a moving horse simultaneously stimulates most of our senses. Sight, hearing, smell, touch and the movement of the different body parts give our brain a lot of information. Movement of the head while riding also stimulates the vestibular system.

The horse’s movements are rhythmically repeated over and over again during a riding session, which gives the rider an option to adapt to the movement. In the same time strides within a pace differ in length and tempo, even if they are alike, which activates the sensory systems. Horseback riding gives the somatosensory system input of ones own body in motion and provides the possibility to experiencing rhythmical movements, without the necessity to produce it oneself. It is not unusual that the rider experience their body as “normal” and that they recall how it felt to walk before the injury.

• **Wakefulness And Attention**

The reticular activating system, RAS, is situated within the brainstem. It communicates, via thalamus and hypothalamus, with many parts of the cortex to adjust the person’s wakefulness and attention. All types of sensory input inflict on the activity of RAS and raise our wakefulness.

The cortex also influences RAS. That means that we can, by will, raise our alertness, direct our attention and inhibit impulses that would disturb the desired activity. Damages in RAS negatively influence our ability for intellectual activity and the person seems generally somnolent, unable to concentrate, easily tired out etc.

Horseback riding increases the wakefulness and demands presence and concentration. The sensory input is massive and continues as long as the rider is on the horse. The fact that one is sitting on a big animal, with a will of its one, alerts our instincts and also puts press on our cognition to deal with the situation. Cortical activities, as said before, alert the RAS.
• **Concentration, Focus And Motivation**

These are basic fundamentals in all learning. One has to be able to focus on a task for an amount of time to learn and one has to be motivated. The Limbic system, which includes several structures deep within the brain, seems to play a major role for feelings, motivation and memory. For focus and concentration it is the prefrontal cortex that play the most important role. Besides lesions in these areas, motivation and the ability to concentrate can be affected by depression and decreased insight regarding the necessity for rehabilitation. Studies shows that in rehabilitation after brain disorders it is essential to offer training settings that are meaningful and includes active problem solving to gain the best results.

Horseback riding is an activity that captures the attention of the person involved. The relationship with the horse and the necessity to communicate in riding is exciting and moreover motivates the rider to participate actively. The level of alertness rises and the situation demands full participation. This stimulates the ability to concentrate and to learn. When riding there is little room for other thoughts and one is “trapped in the moment”.

The situation calls for the rider to keep focus on the task. To communicate with the horse, this big imposing animal seems to capture interest even if the person is not “into” horses. In addition to this, riding and handling horses provokes feelings, which greatly support the ability to remember and strengthen the memory.

The art of riding also includes a lot of different tasks that stimulates cognitive processing and there are an almost endless number of exercises, with different degrees of difficulties, to chose between.

• **Body Alignment And Postural Control**

Declined somatosensory input and/or decreased ability to interpret and comprehend the body’s spatial position effects symmetry and body alignment. Decreased muscle tone, motivation, wakefulness, paralysis etc is some other causes. Hemi-pareses can have the effect that the persons centre of gravity is shifted towards the non-effected half of the body.

Lesions on the right hemisphere of the brain sometimes cause neglect, which is a total lack of recognition of the left part of the body and the left part of the outer world. Milder forms, which are more common, are called hemi-inattention.

The position on the horse, when sitting astride, gives the rider a help to find his/hers central body line. The horse is for the patient a reliable source to relate to when finding a symmetrical position. The classical seat also gives physiological help for postural alignment and activates muscles on both sides of the body. For persons with hemi-inattention horseback riding gives a lot of somatosensory input from the “forgotten” side of their body which “reminds” the central nervous system of its existence.

The position and the movements of the horse activate the system that keeps us upright and triggers the muscles involved in postural control. The use of the horse’s movements that repeatedly influences the rider, gives her/him the opportunity to adapt to a body position that is upright and symmetric.
• **Moving Ability**

One of the most common effects after brain disorder is an alteration or loss of the ability to move the body efficiently. The effect on the walking ability, for an example, can be altered in many different ways depending on the location of the injury and how widespread it is. Moving ability are due to a lot of different neurological systems that work together to perform movements; sensory input and perception, motor activating areas, feedback systems, cerebellum, motivation, intention, wakefulness etc.

The horse’s movement can work as a substitute for ones own ability to perform rhythmical and repeated movements, like human walking motions. On the horse one is being moved without the pressure to move ones legs at the same time that one have to control balance and fight gravitation. Groups of muscles are bilaterally activated throughout the body and somatosensory receptors in joints and muscles are repeatedly stimulated and the vestibular system is activated.

Studies indicate that horseback riding has a positive effect on walking speed, length of stride and risk of falling among patients with stroke.

The upright position on the horse and the walk pace has also a positive influence on the muscle tonus. It can, in different degrees, normalise the tonus, which makes the spastic muscle easier to activate more efficiently. It also gives the person the possibility to use muscles that otherwise are under “siege” of the spastic muscle.

Given the opportunity to move the body with less restriction positively influence the feeling of movement. To be able to learn/relearn one must know to where one is aiming and horseback riding might just give the idea to where that is.

• **Social And Psychological Functions:**

After a trauma ones existential condition is radically changed. The internal image of one’s self might be altered and the loss of competence devastating. Ones role among family and friends might be changed and it may not be possible to return to work.

Besides the psychological effects, the “old me” may be changed due to the brain injury. Lesions within the frontal lob can give various symptoms of social misbehaviours but also decreased wakefulness, lack of motivation etc effects the “personality”. Different degrees of personality changes are not uncommon. Relationships with family and friends might be affected and social behaviour and interaction becomes a problem.

Studies of persons that have participated in therapeutic riding show that they feel satisfaction from being able to ride, in spite of the disability. They also see themselves as riders, which is an identity that involves skill and courage and provokes admiration in others. Horseback riding is also a “normal” activity for “healthy” people. To be a rider might open the door to a kinship with people with the same interest.

While handling horses one has to learn to behave socially. There are strict rules for safety and for consideration of the wellbeing of the horses. The rules are easy to understand and they are not negotiable. When learning to ride one has to listen to the instructor and to follow the instructions. One must learn to cope with feelings of failure because it is unavoidable to fail sometimes in an activity as difficult as horseback riding. Handling an animal demands responsibility for another living being and the relationship with the horse give a possibility to express and experience deep feelings.
According to a study “Recreation and psychic health”, contact with animals and nature is important to the health of the individual. The report points to a number of relevant components: physical activity, social interaction and adaptation after trauma. These components have a positive influence on physical health, integrating, stress managing, depression, strategies for adaptation, self-confidence and so on. These psychological benefits are of great importance for us as therapists, because they help our patients in their rehabilitation and in their future life. We can use these resources to improve the patient’s rehabilitation setting and outcome.

**Last word**

Knowledge of neuropsychology is a useful instrument for a pedagogic approach in therapeutic riding for patients with brain disorders. It is a important piece to the human puzzle but one always have to take in consideration that it is just a piece and not the whole truth about the unique individual. Another important fact to remember is that what we “know” today is the latest but of course not the last.
References


- Frid M. *The importance of neuropsychological knowledge in neurological rehabilitation – a phenomenographic study among physiotherapist*. Supplementary course in physiotherapy 10 credit points, Dept. of Physiotherapy, Karolinska Institute, Stockholm, Sweden, 1995.


