Low Muscle Tone

Muscle tone - the basis of posture
Berta Bobath

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Can you imagine the frustration and the agony to be constantly reminded by a parent or a teacher to sit up straight and to pay attention. You are putting in such a lot of effort and energy to maintain an upright position and yet your muscles feel so heavy and your movements feel akward and clumsy. You try so hard to sit still, but your muscles keep on moving and adjusting to enable you to to find a more comfortable position.

Some children has to put in more effort and energy to maintain an upright posture and some children has to constantly move and change position to be able to pay attention and focus on given tasks. The child with low muscle tone often seems weak and he tires easily because he has to use a lot of effort to just hold his head and body up against the pull of gravity. Symptoms of hyperactivity e.g. wiggling, rocking, swinging or shifting can occur in an attempt to keep his body upright. (Ayers,2005: 52, Kranowitz,2003: 125).

Man is dependant on the maintenance of an upright position in sitting, standing and walking to be able to perform more complex and skilled movements of the arms and hands without fatigue. Functional muscle tone assist the body to maintain an upright position, allowing the individual to focus effectively on the more skilled activities e.g. to read or write or to independently eat and dress himself. If a child finds it difficult to process information from his muscles and joints, his arms and legs feel heavy and it is difficult to guide him through activities e.g. putting on shoes and socks or to lift him onto a chair or a jungle gym.

1. Definition of muscle tone

Muscle tone is the speed and the degree of restistance to passive external manipulation of the limbs for a period of time without changing length. It is a function of the tactile, vestibular and proprioceptive systems enabling the person to maintain body position against the pull of gravity in a resting position (static) as well as the performance of movement patterns (dynamic).

Bobath ,1975:11 described the functional significance of muscle tone as follows:

1. Tonus is an **ongoing physiological adaptation** and organization and is not a condition of elasticity but a condition of readiness
2. Tonus is not merely a condition of the muscles but of the **entire neuromuscular** apparatus
3. Tonus is related to **co-ordination**

Some children can present with low muscle tone, others may experience hypertonia (spasticity) and others may present with fluctuating muscle tone.

2. Hypotonia or flaccidity

Typical muscle tone is firm, but not so firm that it is rigid and hard to move a joint like an elbow (Biel & Peske 2005:175). Low muscle tone is the lack of supportive muscle tone usually with increased mobility at the joints. A child will require more active effort to start and to maintain a movement pattern.

To compensate for low muscle tone the child may compensate by holding his body stiffly or he may widen his base when sitting to allow him to use his arms and hands to play. By bearing weight equally on his bottom, legs, knees, ankles and feet, he resembles a **W,** but this position does not encourage the appropriate senario for the development of balance, equilibrium and postural control.

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The person with low muscle tone seems loose and floppy and parents or teachers tend to describe the child's performance or appearance as "floppy doll" …" feels jello"…"sack of potatoes"… or "double jointed". The muscles feel soft, sluggish and floppy.

The child born with low muscle tone and with no underlying medical condition have the opportunity to normalize the function of muscle strength, co-ordination and control with appropriate treatment programmes.

Low muscle tone can be remedied and reversed in most cases with the appropriate therapy and management excercises at home and at school.

When first established, these routes require mental strain and stretching. New connections take time to form and strengthen, but rewiring is possible throughout life.
J. Ratey

Early evaluation and referral for treatment are stressed

3.Low muscle tone in pathology

It is very important that any pathologies are taken into consideration and a thorough evaluation and examination must be performed by a therapist or Medical Practitioner. Low muscle tone can present as a sign or a symptom of a host of known disorders e.g. Downs Syndrome, Multiple sclerosis and Muscular dystrophy (Dawson,2009:11). Hypotonicity in one muscle does not indicate that all muscles will be hypotonic especially under the influence of certain reflexes (Ayers,1980:136). Not a single case of pathological

co-ordination is known in which there is not at the same time a pathology of tonus (Bobath,1975: 11).

The article will focus on the child with low muscle tone where all possible medical or pathological conditions were excluded.

4. Diagnoses of low muscle tone

Dawson 2009:11 suggested that low muscle tone should only be diagnosed under the following 3 circumstances**:**

1. **If 66% or higher of the symptoms described below , excist.**
2. **EEG excludes conditions e.g. epilepsy**
3. **Exclude all possible pathology e.g. Down Syndrome, Poliomyelitis and Muscular dystrophy**

5. Physical appearance of a child with low muscle tone

- rounded shoulders and shoulder blades protrude
- a protruding tummy /"pot bellie"
- hollow back with pelvis tilted forward
- double jointed knees and elbows
- flat feet and ankles turning in
- chin-poking with weak lip closure
- eye contact may fluctuate
- shallow breathing with an open mouth
- lacks the ability to maintain a position
- stand on a wide base
- constantly seeking support to keep his body upright against gravity

6. Symptoms of low muscle tone

The effect of low muscle tone can have an impact on the amount and the quality of movements performed by the child with the result that he is likely not to have the same sensory and motor experiences that are crucial building blocks for later social and emotional skills as well as academic learning. The parts of the body that you are not supporting will feel heavier than their actual weight and might flop towards the pull of gravity.

The lower the muscle tone, the more effort is required to take part in activities. The child with low muscle tone will rather prefer to play inside and avoid taking part in physical games or sport activities outside.

Supple joints are not easily recognized in the baby under three or four months of age because up to that time the state of the muscles is one of mild tension. If however pronounced suppleness of joints is noticed by doctor or parent at any time, the advantage of baby excercises should be considered (Wenham,1980:15).

Dawson devided the symptoms of low muscle tone into the infant aged 0-2years and the child 2 years to 9 years.
The infant 0-2 years can present with:

- Floppy baby
- Weak crying
- Sleep excessively
- Respiratory problems
- Passive physical behaviour
- Drooling
- Sucking and swallowing difficulties
- Poor head control
- Reduced postural or rightning reactions
- Avoid tummy time
- Increase mobility in the joints
- 'frog-leg' posture or W-sitting

The older child can present with:

- Drooling
- Flat feet
- Poor posture
- Clumsy and it can be a challenge to handle tools or equipment
- Balance problems
- Finds it difficult to sit upright
- Supports his head with his hand
- Lean against objects to be able to maintain an upright position
- Motor planning difficulties and use the whole body when doing activities e.g. writing
- Take maximum time to complete tasks
- Avoid motor movements and sport and prefers passive activities e.g. TV or computer games
- Tires easily and may be lethargic
- Speech difficulties
- Gross motor co-ordination difficulties
- Hearing difficulties

Secondary signs

- Scholastic difficulties
- Difficulties to focus on instructions and academic work
- Inability to complete tasks
- Socio-emotional challenges
- Poor self esteem

(Ayers,2005: 52, Biel, 2005: 175, Cheatum,2000: 164,164, Dawson,2009: 7-21, de Jager,2009b: 49, Kranowitz, 2003: 131,132, Oberholzer & Harris, 2009: 10).

7. MUSCLES AFFECTED

Low muscle tone affects ALL muscles in the entire body
Pamela Dawson

Dawson stated that reduced muscle tone of the vocal cords can present in a baby as a weak cry and because of the lack of stamina the mom will experience the baby as a dream baby that sleeps a lot. Suckling from the breast could be very hard work for the muscles of the sucking and swallowing muscles and the baby may rather prefer to be bottle fed which is an easier option. Due to the low tone of the diaphragm the child might find it difficult to breath effectively. Respiratory infections can occur due to mucus build up in the chest because the child finds it difficult to cough effectively. Even the small muscles of the feet are affected. Low tone of the small muscles of the feet which support the longitudinal arch, produces dropped arches which result in flat feet (Dawson,2009: 7,8,17) .

Many children with low muscle tone appear to have an athletic build while muscle tone in the supporting muscles close to the skeleton is still low. De Jager 2009c: 49 mention that the child needs sufficient muscle tone from two kinds of muscles to free the thinking brain from maintaining posture to rather focus on learning :

- muscles close to the skeleton that assume and maintain posture against gravity and
- the superficial muscles that are involves in movement

If there is low muscle tone in the muscles close to the skeleton, the surface muscles increase in size to compensate and give support.

8. Muscle tone in the upright position

Man is dependant on the maintenance of an upright position in standing and walking to be able to perform more complex and skilled movements of the arms and hands without fatigue. According to Cheatum ,2000;164,165 the child with low muscle tone have to repeatedly contract and relax muscles to be able to stabilize a limb or his body. It is therefor a challenge to sit or stand still long enough to perform activities .

Posture is the product of an integrated ochestration between the
sensory and motor system of the body
Jane Carreiro

Movement is needed to shake up the fluid in the inner ear and to instruct the muscles how to respond. The inner ear works with proprioception (inner body map) to judge position, direction, speed and depth of a movement pattern. It also combines the information from the eyes, ears, skin, nose and mouth to decide the best plan of action before instructing the muscle to move.

9. GUIDELINES TO ENCOURAGE DEVELOPMENT OF MUSCLE TONE

- Aim to present a meaningful / purposeful activity that will provide a variety of appropriate sensory and motor experience for the child. Be sensitive to the child's needs and his reaction on the movements e.g. breathing, heart rate, swallowing ect.
- Important to control the speed and the quality of the movement pattern.
- Provide purposeful activities with fluctuating tone. The more the child uses his muscles the more the muscles will develop.
- Encourage symmetrical movements where the position and the movement is the same on both sides of the body.
- Pay attention to recognizing tension in a muscle and releasing tension in a muscle
- Alternate activities between weightbearing and relaxing the muscles

- Encourage a variety of sensory input in a different body positions

1. Prone – lying on the tummy to strengthen muscles which straighten the back and the hip joints to improve posture
2. Supine – lying on the back to improve head control, strengthen the abdominal muscles and encourage trunk rotation
3. The sitting position to improve muscle control and balance to free the arms and hands for easy eating, dressing, drawing and writing
4. The kneeling position assist in the control of the pelvis in preparation for standing

10. PROVIDE OPTIMUM POSITION TO ENCOURAGE THE CORRECT POSTURE

All movements require a stable point of origin. A stable, but dynamic base ensures that the person can reach out to the world around him. He does not have to focus that hard to keep his body in an upright position, and his hands, eyes, mouth and feet are able to function effectively e.g. to read or write or to independently eat or put on shoes. This stable but dynamic posture enables a person to partake in the interactive learning process that is constantly on the lookout for new challenges and learning opportunities. It is of utmost importance to maintain the three natural curves of the spine in order for the core muscles to give the necessary stability to the body while the eyes, mouth, arms and legs can move independently and perform tasks. (Ernsperger, 2004:141, Hansford, 2009;8,9).

The shoulders form a solid base on which the head and neck rests. The part between the shoulders and hips are known as the trunk. The trunk supports the body so that we can maintain the upright position. The body, in a stable, upright position, gives freedom to the arms to function effectively e.g. to eat, write and read with minimum tension.

It sounds impossible when we say that the position of the hips influences head-control, breathing, speech, reading and writing. When the hips are tilted into any direction, the spine has to continuously make adjustments to accommodate the trunk of the body. The person's body has to continually compensate or adjust to suit the curve of the spine. Breathing can become strained and you have to concentrate much harder on the adjustments your muscles must make to keep your body upright.
The sit-position especially requires a lot of exertion to maintain an upright position when listening to information or to actively take part in activities such as eating writing and reading.

Any inefficiency in the sensory-neuro-musculo-skeletal system leads to collapse under the effect of gravity. The stabilizing muscles (core muscles) functions effectively when 5% or less strain, stress or discomfort is felt in the sitting position (Hansford, 2009:2).
Rather encourage kneeling, squatting or sitting crossed legged on a telephone book to activate the appropriate muscles to work against gravity and to avoid unnessary stress on the joints. Hansford suggest that the child sit on a telephone book (with the back of the book to the back of the person) on the floor to maintain an upright position with ease .
As we learn and master movement and skills, our brains require less energy and function more efficiently (Hannaford, 2005: 113).

Sitting on a Chair
Sit on a horizontal seat and tilt the hips slightly forward to maintain the natural upright curve of the spine. Sitting on a telephone book can also be helpful to tilt the hips forward. In this position the knees are relatively lower than the hips, and the feet rest on the floor. Lean lightly on the desk with your arms to lengthen the distance between the ribcage and

the pelvis. Symmetric movements are encouraged in order for the head and shoulder movements to balance comfortably over the hips.

11. GUIDELINES AND INSTRUCTIONS

- The optimal position of the head and neck to listen effectively to instructions is with the chin slightly tilted forwards. Avoid the position where the head tilts backwards and the mouth opens in an attempt to make eye contact when listening to instructions.
- Slanted work surface 30 ° from the body to maximize stability
- Give support to the person by discussing instructions step-by-step. Always begin at a set starting point and move towards a defined destination e.g. we are going to jump 5x on the trampoline and then we are going to have a rest.
- Pay attention to the quality of the tone of your voice tone when giving instructions. A rhythmic tone can be calming and guarantee a safe place for trying new movements. More active movements can be encouraged by more action driven sounds.
- Consequent action and support during the learning process forms the pattern/ format with which further learning opportunities are encouraged. Consistency acts as an anchor during the learning situation because, at first, the learner uses copying to copying to learn new tasks / skills.

12. TIPS

- Alternate heavy solid toys, wooden blocks, rubber toys and with light toys e.g. foam or hollow plastic toys
- Vary non-skid surface for fine motor work with smooth working surface
- Provide wooden ridge around work to form a fence to keep uncontrolled movements at bay (Levine: 1991:75).

13. GOAL OF TREATMENT

1. The first step is to ensure that the body is **relaxed.** Pay attention to the rhythmic breathing pattern between exhalation and inhalation.
2. With the repetition of a variety of purposeful and funfilled activities we assist the child to become aware of the position and function of the muscles and joints.
3. The organised repetition of the variety of movement patterns enable us to build strong connections between the senses and the muscles.
4. Strong muscles assist the body to maintain balance in an upright position
5. Providing the optimum upright posture, enable the hands to work together in a co-ordinated manner to free the brain for learning.

14. EXERCISES TO DEVELOP MUSCLE

1. RELAX THE BODY

- Massage the outlines of the body (de Jager, 2009b: 80).
  Firm touching and massaging of the outlines of the body defines the orientation of the body with regards to the environment. This feeling of caring and belonging creates a safe haven from which the person can reach out and move. The skin receives messages from the two types of receptors in the skin namely the protective layer and the learning layer. The protective layer tells us where the body ends and gives us an indication of the space around us. “Am I safe?or must I withdraw? The learning layer can only respond if everything is safe. This comforting feeling gives a sense of “feeling whole” as well as the confidence to participate in activities.

2. Build strong muscles

Tummy time

Rug time

3. Pull baby on a towel in different directions on a smooth flat surface
4. Rock baby in different directions on your lap
5. Play piggy-back riding
6. Riding on a rocking horse
7. Jumping on a trampoline. Nb start and stop movements must be encouraged to alternate the movement pattern to encourage building of strong muscles
8. Roll back and forth on different surfaces e.g on a carpet or on the grass or in the sand
9. Push, pull, carry or build with different objects. Vary size, weight and shape
10. Load, push and unload a play-play wheelbarrow

CAUTION

To prevent dislocation of the child's joints, avoid activities with excessive pull on the joints e.g. pulling up rapidly or swinging around by the hands.The treatment of low muscle tone and movement disorders should be addressed by a qualified Physio Therapist or Occupational Therapist.

BIBLIOGRAPHY

1. Ayers, J. 2005. Sensory Integration and the Child 25th Edition. Los Angeles: Western Psycohological Services.
2. Ayers, J. 1980. Sensory Integration and learning disorders. Los Angeles: Western Psychological Services.
3 . Bobath, B. 1971. Abnormal postural reflex activity caused by brain lesions. London: William Heinemann Medical Books Ltd.
4. Biel, L. 2005. Raising a Sensory Smart Child. London: Penguin Books.
5. Cheatum, B.A. & Hammond, A.A. 2000. Physical activities for improving children's learning and behaviour. Ilinois: Human Kinetics.
6. Dawson, P. 2009. Low muscle tone in children. Durban: P. Dawson.
7. de Jager, M. 2006. BabyGym Instructor Training Manual. Linden. The Connextion.
8. de Jager, M. 2009a. Babygym . Welgemoed: Metz Press.
9. de Jager, M. 2009b. Mind Moves - moves that mend the mind. Linden: Mind Moves Institute.
10. de Jager, M. 2009c. Mind Moves Advanced Instructor training manual. Linden: Mind Moves Institute.
11. Ernsperger, L. & Stegen-Hanson, T. 2004. Just take a bite. Arlington: Future Horizons.
12. Fiorentino, M. 1976. Reflex testing Method for evaluating C.N.S. development. Illinios: Charles C Thomas Publisher.
13. Goddard, S .2005. The well balanced child. Gloucesterhire: Hawthorn Press.
14. Harrison,A & Taylor, J. 2007. Start Write, Stay right. Nottinghamshir:

TTS Group Ltd.
15. Hansford, P. 2009. Enhancing Learning with children with subtle problems of posture and movement. Cape Recife School Port Elizabeth.
16 .Hannaford,C. 2005. Smart Moves. Why learning is not all in your head. Utah: Great River Books.
17. Kranowitz, C. 2003. The Out of Sync child has fun. New York: Berkley Publishing.
18. Levine Johnson, K. 1991. Fine motor dysfunction. Arizona: Therapy Skill Builders.
19. Oberholzer,N & Harris,A.2009. Intelli-Moves-A core stability programme for children. Derbyshire: Activity Plus Ltd.
20. Wenham, A. 1980. Lend baby a hand. London: William Heinemann Medical Books Ltd.

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McKenzie,S. (OT) Sensory Integration.
