Forward head position and its treatment with towel

Thesis submission for DPT

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20.02.2024

Abstract

The forward head posture is not a new thing. Rulers were already depicted with their heads bent forward in ancient paintings, mostly on Egyptian wall paintings. With the development of science and health care, the position and location of the head has come to the fore more and more. The head is closely related to posture and the skeletal muscles of the body. The weaker the supporting muscles of the body, the more difficult it is to maintain the weight and position of the head in an upright position. In this situation, the so-called civilizational disease of civilization and people, long-term sitting, worsens the situation. Working in an inappropriate position in the office or at home, or spending time in the car significantly affects the quality of life. The different effects add up and produce organ symptoms and musculoskeletal changes. Headaches, back and waist pain make everyday life difficult. In this thesis, I try to summarize the history of head posture, the situations that impair the quality of life, the muscles involved in posture, and the posture pain syndrome that develops due to muscle imbalance. Some exercises that can be done at home or at work with a towel can reduce the harmful effects.

What is postural pain syndrome?

Postural syndrome is a condition of the lumbar and cervical spine that causes symptoms such as neck, head, shoulder, lower back pain, and even hip and leg pain, usually due to persistent poor posture. Bad posture is a position of the body that causes unnecessary strain.

The breakdown of the strength of the muscles involved in muscle balance determines our posture. The treatment methods are developed accordingly. I will summarize the possibilities for this.

History of Forward Head Position (FHP)

While the exact origin of FHP is difficult to determine, it is likely the result of modern lifestyle changes. Forward head position (FHP) is a common postural misalignment where the head protrudes forward relative to the shoulders and spine. This posture can lead to various problems like neck pain, headaches, muscle tightness, and even breathing difficulties.

Pre-industrialization

Less reliance on technology and manual work is likely to mean less strain on the neck and spine. Postural problems may have existed before, but they were not as widespread or documented. As a result of the physical work, the muscles used their function better, so the posture of the people was also perhaps better. In any case, it is necessary to mention the diseases and spinal deformities of the time, as well as rickets, which weakened the skeletal system, thereby also affecting posture.

Industrialization (XIX-XX centuries)

Increased desk jobs and sedentary lifestyles have led to longer periods of neck bending and poor posture.

Technological advances such as telephones and computers have further contributed to FHP.

It is possible that knowledge of FHP was limited or less of a concern in the past, but as the population grew, so did the number of illnesses resulting from housing problems.

End of the 20th century and in the present days

Ergonomic research and studies have highlighted the prevalence of FHP and its potential health consequences.

Health professionals and researchers have begun to investigate and document FHP in more detail.

Public awareness and understanding of FHP has increased, focusing on preventive measures and treatment options. What is also important in this case is prevention and adequate information.

FHP is a complex problem with multiple factors

After the COVID-19 epidemic, many people are still working or studying from home. In this case, part of the studies are still taking place in distance learning, which involves concentrated attention and many sessions. However, working and studying at home can again cause forward head posture if the environment is not suitable and the ergonomic design is also poor.

How technology contributes to FHP

Technological advances: Phones, computers and tablets encourage prolonged neck flexion.

Screen time: Looking down at screens for extended periods forces the neck into a flexed position, straining the muscles and ligaments over time.

Weight of devices: Holding heavy devices like tablets and laptops adds extra weight to the head, increasing strain on the neck and spine.

Workstation issues:

- **Monitor height:** Screens positioned too low force the neck into a flexed position for prolonged periods, straining muscles and tendons.
- **Chair comfort and adjustability:** Uncomfortable chairs with inadequate back support or lumbar support encourage slouching and contribute to FHP.
- **Keyboard and mouse placement:** Awkward hand and wrist positions due to improper keyboard and mouse placement can lead to muscle imbalances and poor posture.
- **Limited legroom:** Insufficient legroom under the desk restricts movement and encourages slumped sitting, straining the neck and spine.
- **Poor lighting:** Inadequate lighting can encourage straining the neck and shoulders to see better.
- **Television height:** Watching TV with the head tilted upwards for extended periods contributes to FHP.

Poor ergonomics at work and home

Creating an environment at home is often more difficult than at a workplace, where laws regulate the working environment and conditions. For this reason, the home environment is decisive for children, employees, students and the elderly. Time spent in an inappropriate environment (I am referring here to the quality and quantity of sitting) adversely affects the body and homeostasis.

Home environment

Laptop use on couches or beds:

Using laptops in unsupported positions puts extra strain on the neck and shoulders. Without proper support, the balance of the trunk muscles and the muscles of the arm and neck is upset. The uneven distribution of muscle power again affects the head and posture and this generates a bad program in the central nervous system via the peripheral nervous system.

Monitor Height: On couches or beds, laptop screens are usually lower than natural eye level. To look at the screen, have to tilt the head, putting a significant load on the neck muscles,

especially the anterior flexor muscles. Imagine the chin reaching forward and creating a spasm in the upper back.

Lack of Back Support: Couches and beds often lack proper lumbar support, leading to slouching. This disrupts the natural curvature of the spine, putting extra pressure on the neck and shoulders to hold the head up. Imagine sinking into the soft cushions, further compromising the posture.

Unsupported Arms: When using a laptop on the lap, arms are in an awkward, unsupported position. This can lead to tension in the forearms, shoulders, and neck, especially as type or use the mouse. Think of holding the arms out for extended periods – they get tired and sore eventually.

Poor Wrist Position: On soft surfaces like a bed, the laptop may sink, causing the wrists to bend unnaturally while typing. This can lead to carpal tunnel syndrome and other repetitive strain injuries in the hands and wrists. Imagine hunching over with the wrists bent uncomfortably against the edge of the laptop.

Reduced Movement: While lounging, people has less likely to get up and move around, leading to prolonged static postures that tighten muscles and exacerbate FHP. Think about staying in one position for a long time without stretching or changing the posture.

Sitting on Sofas and armchairs

Soft furniture often lacks proper back support, leading to slouching and neck strain. Sitting on soft furniture like sofas and armchairs can negatively affect the posture in several ways, ultimately contributing to Forward Head Position (FHP):

Loss of Lumbar Support:

Soft sofas and armchairs often lack proper lumbar support, which curves inward to fit the natural curve of the lower spine. Without this support, the spine tends to slump into a "C" shape, causing thhe abdominal muscles to weaken and the back muscles to overwork. This creates a domino effect, leading to:

- **Increased pressure on the intervertebral discs:** This can cause pain, discomfort, and potentially lead to disc herniation.
- **Rounded shoulders:** Slouching causes the shoulders to round forward, tightening the chest muscles and further straining the neck.
- **Protruding head:** With a rounded spine and slumped shoulders, the head naturally moves forward to maintain balance, contributing to FHP.

Improper Hip Angle:

The depth of many sofas and armchairs can cause the hips and knees to bend at an unnatural angle when seated. This position tightens the hip flexors and weakens the glutes, further disrupting the postural alignment.

Restricted Movement:

Sinking into soft furniture makes it harder to shift positions and move around regularly. This lack of movement leads to muscle stiffness and tightness, exacerbating postural imbalances.

Additional Factors

Armrests: If the armrests are too high or low, they can strain the shoulders and neck when to try to maintain a comfortable position.

Reading or using devices: When to hold a book or phone in front of the face while sitting on soft furniture, more likely to hunch the neck and shoulders forward, worsening FHP.

Consequences of Poor Posture

What can it cause the poor posture?

- **Neck and shoulder pain:** The strain on the neck and shoulder muscles due to FHP can lead to discomfort, pain, and stiffness. The work of the muscles of the shoulder girdle is significantly influenced by the condition of the muscles of the chest.
- **Headaches:** Poor posture can contribute to tension headaches.
- **Reduced lung capacity:** Slumping compresses the diaphragm and lungs, limiting the ability to breathe deeply.
- **Digestive issues:** Improper posture can put pressure on the digestive organs, leading to discomfort and bloating.

How you can do minimizing risks:

- **Choose supportive furniture:** Opt for chairs and sofas with firm cushions and good lumbar support.
- **Use pillows:** Place pillows behind the lower back and neck to maintain proper alignment while seated.
- **Get up and move:** Regularly adjust the position and take breaks to move around and stretch the muscles.
- **Maintain good posture:** Be mindful of the posture even when relaxing on soft furniture, aiming for a straight spine and neutral head position.

- **Reduced physical activity:** Dependence on technology for communication and entertainment often leads to less physical activity, weakening postural muscles that support proper head and neck alignment.
- **Stress and anxiety:** Can lead to muscle tension and poor posture which can causes postural pain syndrome again.
- **Lack of awareness:** Many people may not be aware of correct posture or its effects on health.

Current trends and future implications:

- Continuing to teach ergonomics and posture in workplaces and schools.
- Development of new technologies and treatments to treat FHP.
- Awareness of the importance of good posture for general health and well-being.
- Although the exact history is uncertain, understanding its development can help to manage it more effectively.
- Continued research, education, and preventative measures are key to managing and preventing FHP in the future.

Improving Awareness and Habits:

- **Mind the posture:** Throughout the day, consciously check the head position. Imagine a plumb line dropping from the earlobe. Ideally, it should run straight down through the shoulder and hip.
- **Take breaks from screens:** Limit the screen time on phones, computers, and tablets. Take regular breaks to stand up, move around, and stretch the neck muscles. I will example few exercises later int he thesis.
- **Ergonomics matter:** Set up the workstation ergonomically. Ensure the monitor is at eye level, the chair provides proper back support, and the keyboard and mouse are positioned for comfortable hand and wrist placement.
- **Posture reminders:** Use phone apps or sticky notes as reminders to maintain good posture throughout the day.

Forward head posture (FHP) and Upper Crossed Syndrome (UCS)

If the muscle balance is upset due to the daily routine and environmental influences, it has a reciprocating effect on the body. Below we look at the relationship between forward head posture and upper cruciate syndrome. If we know the connections, we can quickly find the root causes. If there is a reason or at least one of them, then we can treat it. Treatment of the cause would often be more important than treatment of the symptoms.

Relations between UCS and FHP:

Many muscles are involved in moving and stabilizing the upper body. Many of these are also responsible for maintaining the position of the head.

Forward head posture (FHP) and Upper Crossed Syndrome (UCS) are closely related. In fact, FHP is a common consequence of UCS. Here's how they connect:

Upper Crossed Syndrome (UCS) as a Cause of FHP:

- UCS is characterized by tight and shortened upper trapezius, levator scapulae, and pectoralis major muscles, along with weak and lengthened lower trapezius, serratus anterior, and deep neck flexor muscles.
- The tight upper trapezius and levator scapulae muscles pull the head forward, contributing to FHP.
- The weak lower trapezius and serratus anterior muscles, which normally help maintain proper posture, are unable to counteract the pull of the tight upper trapezius, further promoting FHP.

Muscles Involved:

Tight and Shortened in UCS (Contributing to FHP):

- **Upper trapezius:** Located in the upper back and neck, this muscle helps lift and rotate the shoulder blade. When tight, it pulls the head forward.
- **Levator scapulae:** Situated on the back of the neck and upper shoulder blade, this muscle elevates the shoulder blade. Tightness in this muscle can also contribute to FHP.
- **Pectoralis major:** The large chest muscle that helps with arm movement. Tightness in this muscle pulls the shoulders forward, indirectly promoting FHP.

Weak and Lengthened in UCS (Unable to Maintain Proper Posture):

- **Lower trapezius:** Located in the lower back and connected to the shoulder blade, this muscle helps pull the shoulder blade down and back. Weakness here allows the upper trapezius to pull the head forward unopposed.
- **Serratus anterior:** Situated on the side of the chest and attached to the shoulder blade, this muscle helps stabilize the shoulder blade and rotate it upward. Weakness in this muscle can contribute to a rounded shoulder posture and indirectly promote FHP.
- **Deep neck flexors:** These muscles located at the front of the neck help hold the head upright. Weakness here can make it difficult to maintain proper head posture and contribute to FHP.

The Vicious Cycle:

FHP can further worsen UCS. The prolonged forward head position can lead to:

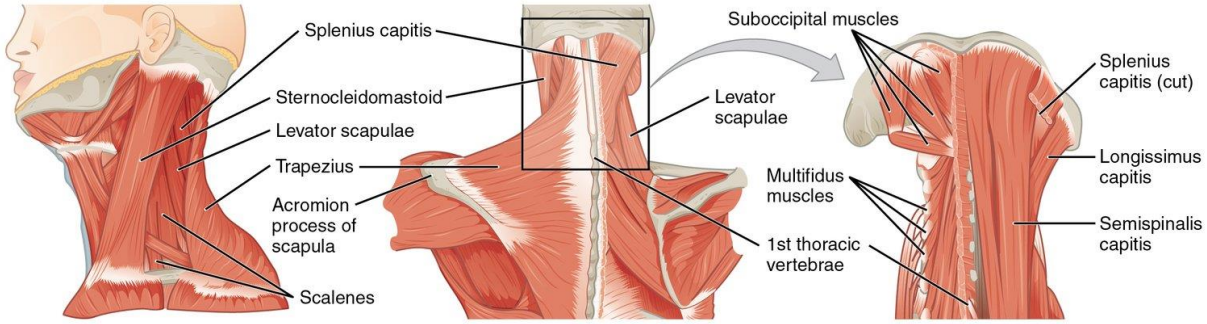
- **Increased tightness** in the upper trapezius, levator scapulae, and pectoralis major due to sustained shortening.

- **Further weakening** of the lower trapezius, serratus anterior, and deep neck flexors due to a lack of activation in the lengthened

Muscles involved in forward head posture:

Overactive and Tight Muscles:

- **Upper Trapezius:** This muscle in the upper back and neck becomes overactive as it tries to hold the head in a prolonged forward position. This can lead to tension headaches and neck pain.
- **Levator Scapulae:** Located on the side of the neck and upper back, this muscle also becomes overactive in FHP to elevate the shoulder blade and compensate for the head position. This can contribute to neck stiffness and limited shoulder mobility.
- **Sternocleidomastoid:** This prominent muscle on the side of the neck connects the head to the sternum and clavicle. In FHP, it shortens and tightens as it pulls the head forward. This can contribute to neck pain and headaches.
- **Suboccipital Muscles:** These small muscles at the base of the skull become overactive in an attempt to stabilize the head in its forward position.

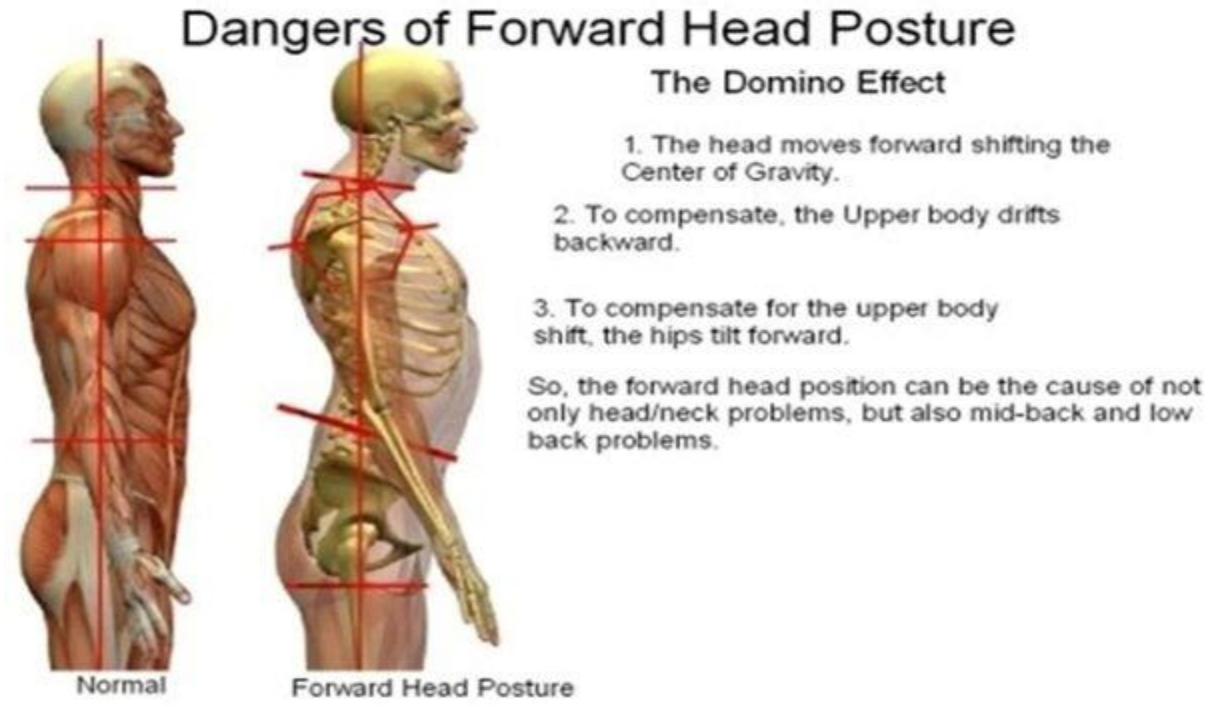


www.miamiacusolutions.com/blog/forward-head-posture

Weak and Lengthened Muscles:

- **Lower Trapezius:** This muscle runs along the middle and lower back. Weakness here due to FHP can worsen posture and make it harder to maintain proper shoulder blade position. This can lead to rounded shoulders and discomfort.
- **Deep Neck Flexors:** These muscles located at the front of the neck are responsible for proper head and neck posture. With FHP, they become lengthened and weak, making it difficult to maintain an upright head position.
- **Cervical Extensors:** These muscles on the back of the neck are responsible for extending the head and neck. In FHP, they become lengthened and weak, further contributing to the forward head position.
- **Lower Cervical Flexors:** These deep neck muscles located along the front of the cervical spine are responsible for flexing the head and maintaining proper posture. With FHP, they become lengthened and weak due to a lack of need for proper neck flexion.

- **Deep Neck Extensors:** While not directly stretched, these muscles responsible for neck extension can become inhibited due to the altered head position and reliance on the suboccipital muscles for head stability.
- **Cervical and Upper Thoracic Extensor Spinae**: These muscles run along the back of the neck and upper back and are responsible for spinal extension. FHP can lead to a lengthened and weakened state, affecting posture and potentially leading to a rounded upper back (kyphosis).
- **Scapular Retractors:** The rhomboids and middle trapezius muscles, responsible for pulling the shoulder blades back, become weak and stretched due to the forward positioning of the shoulders associated with FHP.



www.adamsback.com.au/blog/the-damaging-effects-of-forward-head-posture

Additional Considerations:

- **Scapular muscles:** Muscles like the serratus anterior (helps stabilize and pull the shoulder blade forward) and rhomboids (helps retract the shoulder blade) can also be weakened due to FHP, affecting shoulder stability and posture.
- **Postural muscles:** Core muscles that help maintain overall posture can also become weak with FHP, further compromising body alignment.

Stretching

Tight or shortened neck muscles are a common contributor to Forward Head Posture (FHP) and Upper Crossed Syndrome (UCS) and can lead to various discomforts like neck pain, headaches, and reduced range of motion. Stretching plays a crucial role in treating shortened neck muscles for several reasons:

Increased Flexibility: Stretching lengthens shortened muscle fibers, improving their ability to contract and relax effectively. This increased flexibility allows the neck muscles to support the head in a more neutral position, reducing strain and improving posture.

Improved Blood Flow: Tight muscles can restrict blood flow, limiting the delivery of oxygen and nutrients needed for muscle repair and function. Stretching helps improve blood flow, promoting healing and reducing muscle stiffness.

Reduced Pain and Tension: Shortened muscles often feel tight and achy. Stretching helps break down tension knots (trigger points) within the muscles, leading to reduced pain and improved overall comfort.

Enhanced Range of Motion: Tightness can limit the range of motion in the neck, making it difficult to turn the head or look up and down comfortably. Stretching helps restore proper movement patterns and flexibility in the neck.

Improved Posture: By addressing shortened neck muscles, stretching helps pull the head back into a more neutral position, alleviating FHP and its associated problems.

Here's an analogy to visualize the benefits of stretching: Imagine a rubber band. When new, it's flexible and stretches easily. However, if you leave it in a crumpled position for a long time, it becomes stiff and loses its elasticity. Stretching shortened neck muscles is like gently stretching the rubber band back to its original, flexible state.

Additional Benefits of Stretching:

Reduced risk of future injuries: Improved flexibility can help the neck muscles better absorb impact and cope with sudden movements, reducing the risk of strains and sprains.

Improved performance: Increased neck flexibility can enhance athletic performance and daily activities that require good neck mobility.

Better overall well-being: Stretching can promote relaxation and stress relief, contributing to a sense of well-being.

Stretching to UCS at doorframe:

Chest stretch: Stand in a doorway and place the forearms on either side of the doorframe. Lean forward gently to stretch the chest muscles. Hold for 30 seconds and release.

Neck stretching with towel

In this case, I use a towel for the following exercises because:

- The towel can be found in every household

- easy to clean

- can be used for several purposes

- doesn't tear like a rubber band

- we can also use it to improve posture

- suitable for muscle strengthening and stretching.

We will use a medium-sized towel for the exercises. A large bath towel is a bit more difficult to fold, while a small hand towel is short when performing exercises. If possible, always hold the towel at the opposite corner of the rectangle and twist it into a rope shape. We will use it in this form for stretching, exercises and muscle relaxation.

Lateral Neck Stretch

1. How to: Please twist the towel into a rope shape. Put the towel to your head and use your arm when pull the towel. Please see the picture. Gently tilt your head to one side, bringing your ear towards your shoulder. You should feel a stretch along the side of your neck.
2. Hold: Maintain this position for 30 seconds.
3. Repeat: Perform on the other side.
4. Tips: Breathe slowly and deeply throughout the stretch. You can also use your hand to provide gentle pressure on your head, increasing the stretch slightly. Avoid pushing your head to the point of pain.

Hold and pull the towel from tricepst towards down and 30 sec later release and move your head back to vertical position.

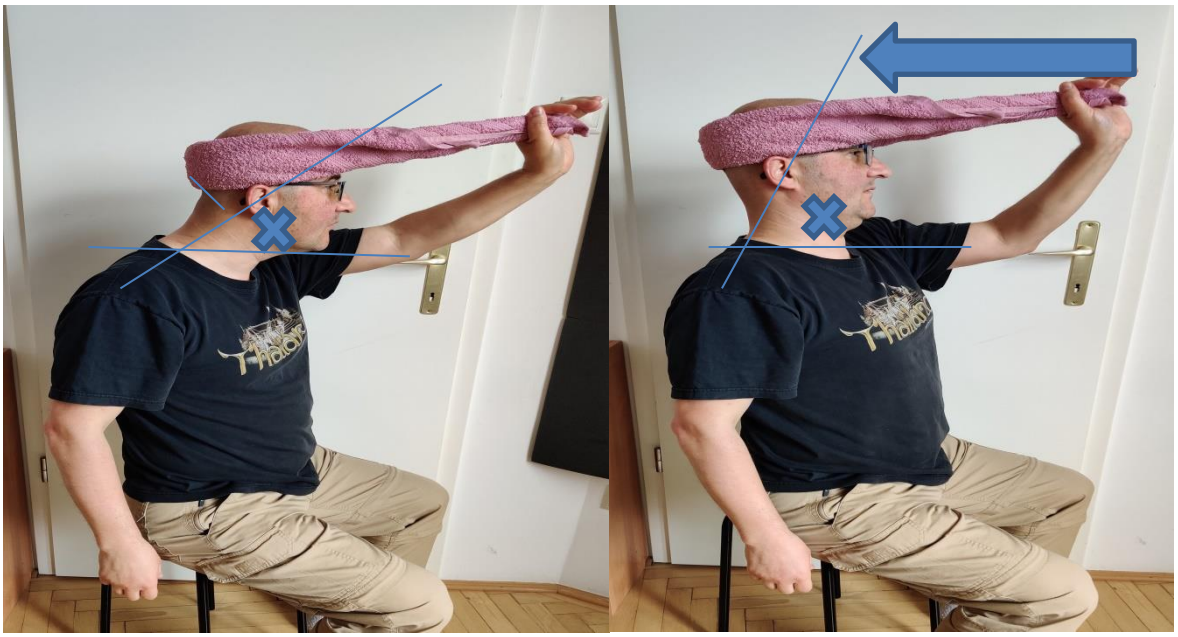
Upper Trapezius Stretch

1. How to: Sit tall with your back straight. Please twist the towel into a rope shape. Put the towel to your head and use your arm when pull the towel. Bring one shoulder down towards your hip while tilting your head slightly away from that side. You should feel a stretch along the upper part of your shoulder blade.
2. Hold: Hold for 30 seconds.
3. Repeat: Perform on the other side. Repeat 3 times on each side.

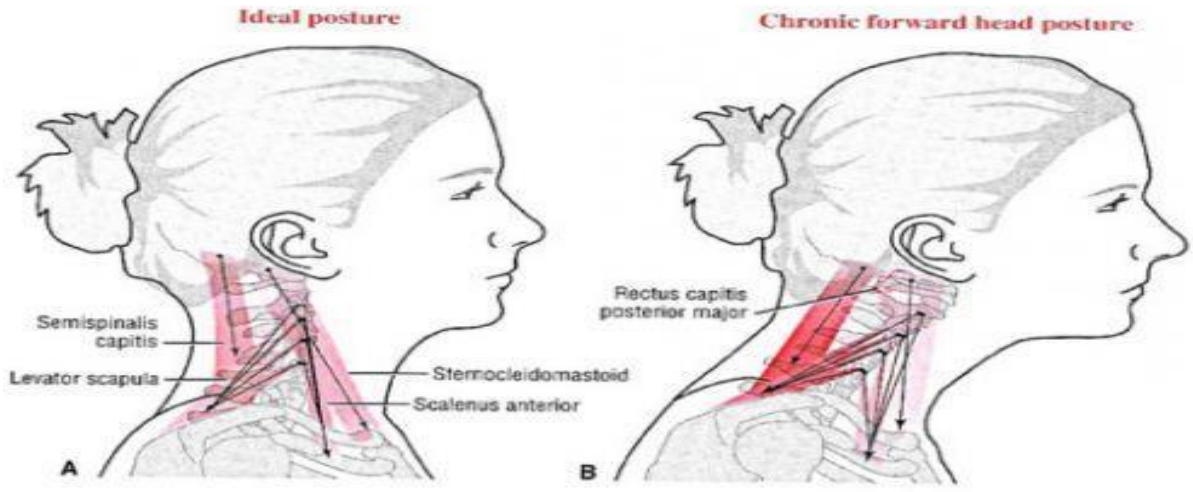
Hold and pull the towel from tricepst towards to your hip and knee and 30 sec later release and move your face with towel to another hip and knee and move your head back to vertical position.

Chin Tuck Stretch

1. How to: Sit tall with your back straight. Please twist the towel into a rope shape. Put the towel to your head and use your arm when pull the towel. Gently tuck your chin down and back, lengthening the back of your neck. Imagine creating a "double chin." Towel can give resistance to movement which will be increase the neck strenght.
2. Hold: Hold this position for 10 seconds.
3. Repeat: Perform 10 repetitions.
4. Tips: Maintain good posture throughout the exercise. You should feel a gentle stretch along the front of your neck.



When the head in forwarded position, the craniovertebral angle will be increase and can cause headache etc. Give resistance with towel to your head and try to move back your head to the „normal" position. Repeat few times.



source: www.physio-pedia.com/Craniovertebral_angle

Neck Rotation Stretch

1. How to: Sit and tall with your back straight. Please twist the towel into a rope shape. Put the towel to your head and use your arm when pull the towel. Slowly rotate your head in a clockwise direction, bringing your chin towards your chest as far as comfortably possible.
2. Hold: Hold for 30 seconds.
3. Repeat: Repeat the rotation in a counter-clockwise direction. Perform 5 repetitions in each direction.
4. Tips: Move slowly and deliberately. Avoid any jerky movements.

Pull the towel to your neck and for the occipital area. Move your hand an separately forward and backward. Towel will give rotation and mobilisation to suboccipital muscles and vertebraes.

Neck Release with towel

1. How to: Sit and tall with your back straight. Please twist the towel into a rope shape. Put the towel to your neck and use your arm when pull the towel. Slowly or fast move the towel on your neck in a forward-backward direction, bringing your chin towards your chest as far as comfortably possible. You can start from shoulder with the towel and after if you want you can put the towel to middle of neck. And do the movement again. Important: here is only the towel moving, not the head.
2. Hold: Move 10 to 20 seconds.
3. Repeat: Repeat the movement few times a day. Perform 5 repetitions in each direction.

Move your hand up and down and forward-backward. Pull the towel to your neck and the towel will move the soft tissue and fascia.

General Tips:

- Perform these stretches slowly and smoothly, avoiding any bouncing motions.
- Breathe deeply and evenly throughout each stretch.
- Stop if you feel any pain and consult a healthcare professional before continuing.
- Ideally, perform these stretches a few times a day, especially if you spend a lot of time sitting or looking down at screens.

Additional Tips:

Physical therapy: Consulting a physical therapist can help create a personalized exercise routine tailored to the specific needs and posture issues.

Sleeping posture: Use a supportive pillow that keeps the head and neck in alignment. Avoid sleeping on the stomach, as this can strain the neck muscles.

Stress management: Chronic stress can contribute to poor posture. Techniques like yoga, meditation, or deep breathing can help manage stress and improve overall well-being.

Strengthening Exercises:

Neck retraction: Gently tuck your chin in towards to the chest, hold for a few seconds, and then release. Repeat this 10-15 times.

Scapular retraction: Squeeze the shoulder blades together and hold for a few seconds. Relax and repeat 10-15 times. This strengthens the muscles that support the upper back and neck.

Chin tucks with head turns: Slowly turn the head to one side, then tuck the chin in towards to the chest. Hold for a few seconds and return to the starting position. Repeat on the other side. Do 10 repetitions on each side.

Benefits of Manual Therapy for FHP

Forward head posture (FHP) can lead to a cascade of issues in the neck, shoulders, and even beyond. Manual therapy offers a variety of benefits that can help address these issues and improve your overall posture and well-being. Here's a breakdown of how manual therapy can be beneficial for FHP:

1. Improved Mobility and Range of Motion:

- FHP often leads to tightness and shortening in muscles like the upper trapezius and levator scapulae, while weakening and lengthening others like the lower cervical flexors and scapular retractors.
- Manual therapists use various techniques like massage, joint mobilizations, and stretching to target these muscles, improving flexibility and range of motion in the neck, shoulders, and upper back. This can help restore a more neutral head position and improve overall posture.

2. Pain Relief and Reduced Muscle Tension:

- The muscle imbalances associated with FHP can cause pain and discomfort in the neck, shoulders, and upper back.
- Manual therapists can use massage techniques like deep tissue massage or myofascial release to target trigger points and areas of muscle tension, promoting relaxation and reducing pain.

3. Improved Joint Health:

- FHP can place undue stress on the joints in the neck and upper back.
- Manual therapists can use gentle joint mobilizations to improve the movement and alignment of these joints, potentially reducing stiffness and discomfort.

4. Increased Body Awareness:

- Through manual therapy techniques and exercises, a therapist can help you become more aware of your posture and how you move. This awareness can be crucial in retraining yourself to maintain a more neutral head position throughout the day.

5. Improved Strength and Stability:

- Manual therapists can prescribe specific strengthening exercises to target the weakened muscles associated with FHP, such as the lower cervical flexors and scapular retractors. Strengthening these muscles can improve overall postural support and stability, helping to maintain a proper head position.

6. Stress Reduction:

- FHP can sometimes be linked to stress-related muscle tension. Massage and other manual therapy techniques can promote relaxation and reduce stress levels, which may indirectly benefit FHP.

Specific Techniques Used in FHP

Cervical spine mobilizations and manipulations: These techniques gently mobilize the joints in the neck to improve their movement and reduce stiffness.

Myofascial release: This technique applies sustained pressure to release tightness and trigger points in the muscles of the neck and upper back.

Soft tissue massage: This technique can improve circulation, reduce muscle tension, and promote relaxation.

Postural therapy: Manual therapists can provide guidance on stretches and strengthening exercises to improve posture and head alignment.

Craniosacral therapy: This gentle form of manual therapy focuses on the connections between the skull, spine, and sacrum. It can help release tension and improve overall body alignment, potentially benefiting FHP.

Important Considerations

Seek a qualified therapist: Ensure the choose a licensed and experienced manual therapist with expertise in treating FHP.

Individualized treatment plan: Treatment plan should be tailored to the specific needs and goals.

Combination of therapies: Manual therapy is often most effective when combined with other modalities like posture exercises and strengthening programs.

Conclusion:

The forward head posture is slowly becoming a national disease, which has an impact on the population. Its treatment is important, and it is rather the organ and locomotor changes caused by it that make everyday life miserable. Its long-term effects are what place a great burden on society, due to the pain and musculoskeletal problems caused by FHD. Because of this, FHD treatment would be the task of all of us on weekdays. In summary, if we were to sit or work in the correct posture at home or at work, it would significantly reduce the occurrence of FHD. Regular gymnastics would also improve our posture and quality of life.

Additional Resources:

1. National Center for Complementary and Integrative Health: [https://nccih.nih.gov/health/acupuncture]
2. American Physical Therapy Association: [https://www.apta.org/]
3. American Occupational Therapy Association: [https://www.aota.org/]
4. National Strength and Conditioning Association: https://www.nsca.com/
5. American Physical Therapy Association: https://www.apta.org/
6. The Mayo Clinic: https://www.mayoclinic.org/diseases-conditions/cervical-spondylosis/symptoms-causes/syc-20370787
7. National Center for Complementary and Integrative Health: https://files.nccih.nih.gov/s3fs-public/Acupuncture_11-10-2015.pdf
8. https://caringmedical.com/prolotherapy-news/forward-head-posture/
9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6477943/