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Tension in sternocleidomastoid muscle depending on the position of the monitor at different angles

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Objectives

- **The aim of the study** is to evaluate **how the posture of the head affects sternocleidomastoid muscle** (SCMM) **tension** and **clarify the optimal angle for the placement of the computer monitor**.
- Pathogenetically, too much **tension** in sternocleidomastoid muscle can cause the development of **head and neck pain, dizziness, and fatigue**. The wrong positioning of the screen might be related to these complaints in employees.

Materials and methods

- A quantitative, cross-sectional study was performed **in healthy participants** (the number of respondents was **41**, male-19, female–22; mean age - 25 years).
- Measurements of sternocleidomastoid muscle tension, decrement, stiffness, and relaxation were obtained by **MyotonPro** 5.0.0 **in the sitting position**. The change of head position occurred in the sagittal plane (1., 2., 3., 4., 5.).
- Data were analysed by IBM SPSS Statistics version 23 using Spearman's ρ.

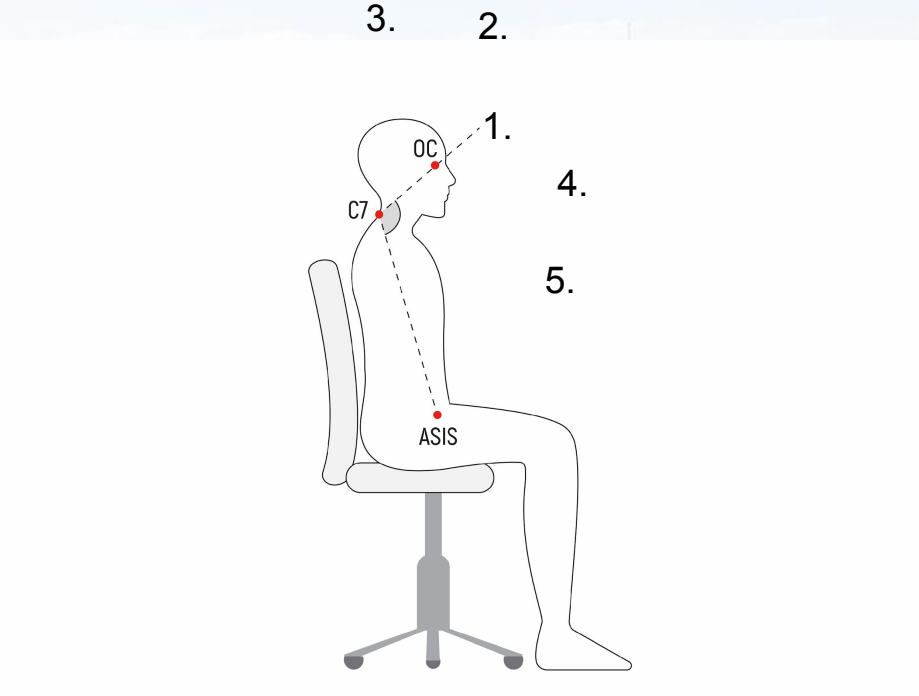

Figure 1. Obtaining the measurements with MyotonPro.
1. - The neutral position, 2. - +30° up, 3. +60° up, 4. - -30° down, 5. - -60° down.
OC – outer corner of the eye; C7 – C7 spinous process; ASIS – anterior iliac spine superior

Results

- The highest frequency value was at an angle of +60° (17.5-Hz (CI 17.0-18.1)), the lowest - at -30° (12.3-Hz (CI 12.1-12.5)).
- The highest decrement value - at -60° (1.5 (CI 1.5-1.6)), the lowest - at +60° (1.1 (CI 1.08-1.14)).
- There was no correlation between tension and dominant arm. There was a positive correlation between tension and angle ($p<0.001$, $r_s=0.76$), between angle and stiffness ($p<0.001$, $r_s=0.646$).
- There was a negative correlation between angle and decrement ($p<0.001$, $r_s=0.68$), between angle and relaxation time ($p<0.001$, $r_s=0.80$), and between BMI and tension ($p<0.02$, $r_s=0.12$).

Table. Sternocleidomastoid muscle biomechanical parameters contingent upon head angle

Head angle (degrees)	Oscillation frequency (Hz)		Stiffness (N/m)		Decrement		Relaxation time (ms)	
	Mean ± SD	Median (IQR)	Mean ± SD	Median (IQR)	Mean ± SD	Median (IQR)	Mean ± SD	Median (IQR)
-60°	12.33 ± 1.2	12.15 (11.5-12.9)	190.35 ± 31.17	187.0 (169.0-210.3)	1.54 ± 0.24	1.52 (1.32-1.74)	25.87 ± 3.12	25.65 (23.88-28.6)
-30°	12.29 ± 0.76	12.2 (11.8-13.0)	185.54 ± 25.32	184.0 (166.9-204.0)	1.43 ± 0.23	1.41 (1.25-1.60)	25.33 ± 2.59	24.8 (23.35-27.33)
"0°"	13.16 ± 0.92	13.2 (12.5-13.8))	198.24 ± 25.76	193.5 (180.0-217.3)	1.25 ± 0.15	1.24 (1.14-1.36)	22.31 ± 2.38	21.7 (20.7-24.13)
+30°	15.56 ± 2.11	15.55 (13.8-16.9)	255.22 ± 60.99	255.0 (209.5-295.0)	1.11 ± 0.14	1.10 (1.01-1.22)	18.08 ± 3.24	17.8 (15.7-20.45)
+60°	17.54 ± 2.64	17.4 (15.7-19.0)	313.57 ± 83.77	301.5 (245.8-345.5)	1.11 ± 0.15	1.10 (1.01-1.19)	15.62 ± 3.04	15.3 (13.58-17.45)

Results

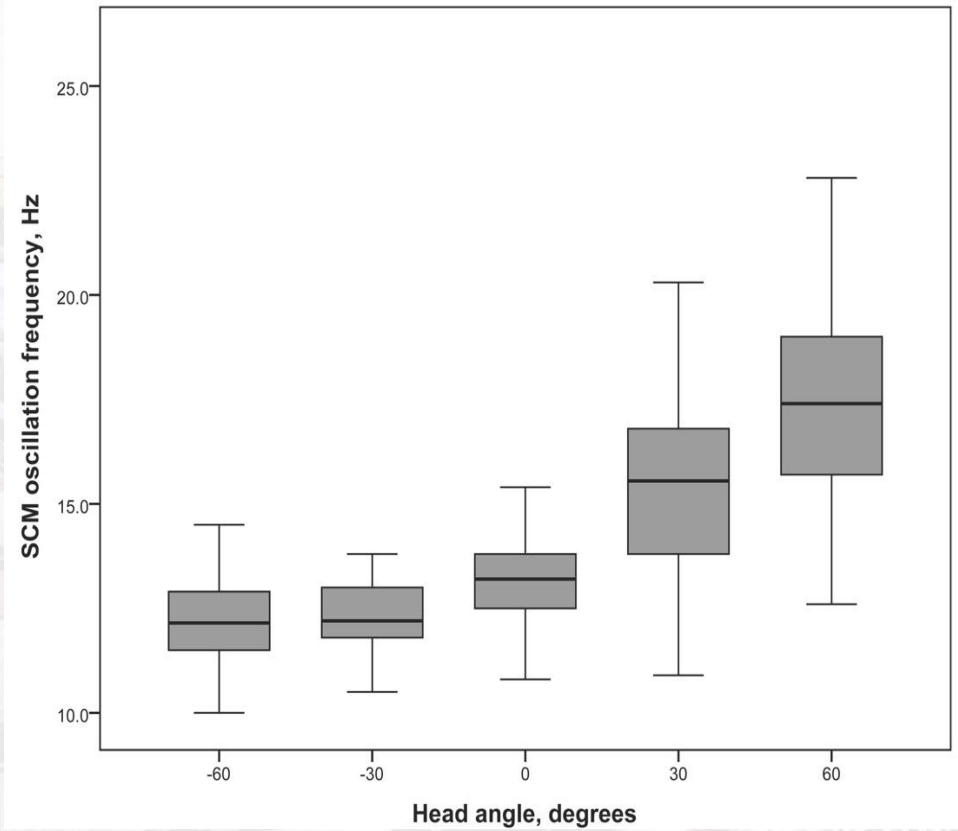

Figure 3. Sternocleidomastoid muscle (SCM) oscillation frequency at different head angles.

Conclusions

- **The maximal SCMM tension was at +60°, whereas the minimal - at - 30°, which corresponds with information about normal SCMM physiology and biomechanics.**
- To determine the optimal height of the monitor position, a study with extensor muscle tension measurements should be continued.

Thank you for your attention!

If you have any questions please feel free to ask!

References and acknowledgment

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