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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.



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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

- <u>The highest frequency</u> value was at an angle of +60° (17.5-Hz (CI 17.0-18.1)), <u>the lowest</u> at -30° (12.3-Hz (CI 12.1-12.5)).
- <u>The highest decrement</u> value at -60° (1.5 (Cl 1.5-1.6)), the lowest - at +60° (1.1 (Cl 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 <u>between BMI and tension</u> (p<0.02, r_s =0.12).

Table. Sternocleidomastoid muscle biomechanicalparameters contingent upon head angle

Head angle (degre es)	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 ⁰	12.33 ± 1.2	12.15 (11.5-12.9)	190.3 5 ± 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 ⁰	12.29 ± 0.76	12.2 (11.8-13.0)	185.5 4 ± 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 ⁰ "	13.16 ± 0.92	13.2 (12.5-13.8))	198.2 4 ± 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 ⁰	15.56 ± 2.11	15.55 (13.8-16.9)	255.2 2 ± 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 ⁰	17.54 ± 2.64	17.4 (15.7-19.0)	313.5 7 ± 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)



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Results



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.



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Thank you for your attention!

If you have any questions please feel free to ask!

References and acknowledgment

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