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THE INFLUENCE OF DIFFERENT POSTURAL POSITIONS AND VISUAL INPUT ON RECRUITMENT OF MASTICATORY MUSCLES: A FEASIBILITY STUDY

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Aim: The interplay between the head kinematic and masticatory muscles characteristics was analyzed in different postures with and without visual input.

Methods: 10 healthy adults (mean age: 41.6±5.4 years) participated in the study. The 3D trajectories of reflective markers positioned on the nose, right and left zygion, C7, right and left acromion, was obtained with a motion capture system. Standardized surface electromyography (sEMG) of the right and left masseter and anterior temporal muscles was recorded. To standardize the EMG potentials, two 10 mm-thick cotton rolls were positioned on the mandibular second premolar/first molars of each subject, and a 5 seconds-maximum voluntary contraction was recorded. Then, subjects were invited to clench as hard as possible with the maxillary and mandibular teeth in maximum contact, and to maintain the same level of contraction for 5 s¹. The participant performed this protocol in four different conditions: 1) sit down with the eyes opened (SDEO); 2) sit down with the eyes closed (SDEC); 3) Stand up with eyes opened (SUEO); and, 4) Stand up with eyes closed (SUEC). The following sEMG indices were obtained¹: BAR [%] (evaluation of the center of gravity of the occlusal plane); ASYM [%] (evaluation of the asymmetry between right and left side); TORS [%] (evaluation of the torsional position of the mandible on the horizontal plane). Moreover, the head pitch [°] and roll [°] angles were computed.

Results: The Kruskal-Wallis test did not find differences among the four conditions (p>0.05). Table 1 presents Spearman correlations between the kinematic (pitch, roll) and the sEMG variables, separately for each condition: negative correlations (p<0.05) were observed for SDEO between ASYM and pitch, and ASYM and roll.

Discussion: In healthy subjects, standing or sitting positions with or without visual input do not seem to influence the masticatory muscles recruitment. Nonetheless, when each condition was individually analyzed, a high correlation was observed between ASYM and Pitch/Roll in the SDEO condition. This finding may possibly be explained by visual accommodation, which influences the position of the head (flexion and lateral inclination) and, consequently, may alter the recruitment of the masticatory muscles in a more or less symmetrical way. Further investigations need to be performed before these results can be generalized.

References:

[1] Ferrario VF, Sforza C, Colombo A, Ciusa V. An electromyographic investigation of masticatory muscles symmetry in normo-occlusion subjects. *J Oral Rehabil.* 2000;27:33–40.

Table

Table 1. Spearman correlations between the sEMG and kinematic variables.

CONDITIONS		Pitch [°]		Roll [°]	
		R	p	R	p
SDEO	BAR [%]	-0.283	0.460	-0.267	0.488
	TORS [%]	0.603	0.086	0.628	0.070
	ASYM [%]	-0.750	0.020	-0.750	0.020
SDEC	BAR [%]	-0.607	0.148	-0.464	0.294
	TORS [%]	0.537	0.215	0.643	0.119
	ASYM [%]	-0.286	0.535	-0.250	0.589
SUEO	BAR [%]	-0.476	0.233	-0.262	0.531
	TORS [%]	-0.381	0.352	-0.476	0.233
	ASYM [%]	-0.095	0.823	-0.024	0.955
SUEC	BAR [%]	-0.486	0.329	-0.657	0.156
	TORS [%]	-0.600	0.298	-0.429	0.397
	ASYM [%]	-0.600	0.208	0.429	0.397