

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

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RESEARCH QUESTION:

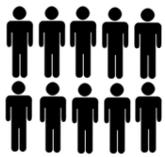
What is the influence of the posture in the dental occlusion and in the balance of the Stomatognathic System?

AIM:

To analyze the interplay between the head kinematic and masticatory muscle characteristics in different postures with and without visual input.

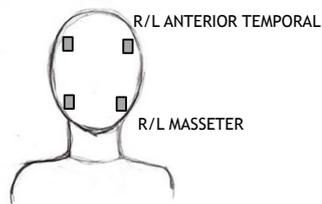
METHODS:

PARTICIPANTS



10 healthy adults
(mean age: 41.6±5.4 years)

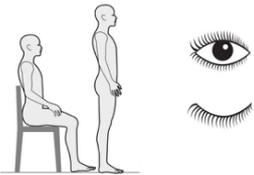
ELECTRODES POSITION



PROTOCOL

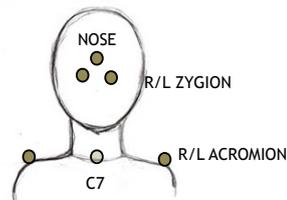
To standardize the EMG potentials, two 10 mm-thick cotton rolls were positioned on the mandibular second premolar/first molars of each subject, and a 5 seconds-maximum voluntary contraction was recorded'. Then, subjects were invited to clench as hard as possible with the maxillary and mandibular teeth in maximum contact, and to maintain the same level of contraction for 5 seconds.

CONDITIONS



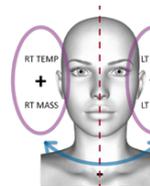
Four different conditions:
1) sit down with the eyes opened (SDEO); 2) sit down with the eyes closed (SDEC); 3) Stand up with eyes opened (SUEO); 4) Stand up with eyes closed (SUEC).

MARKERS POSITION

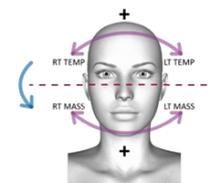


The 3D trajectories of reflective markers positioned on the nose, right and left zygion, C7, right and left acromion, was obtained with a motion capture system.

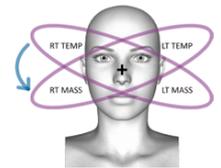
VARIABLES



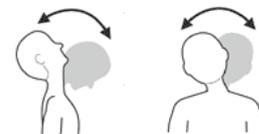
BAR [%]: evaluation of the center of gravity of the occlusal plane.



ASYM [%]: evaluation of the asymmetry between right and left side.



TORS [%]: evaluation of the torsional position of the mandible on the horizontal plane.



Head pitch [°] and roll [°] angles.

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.

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 [%]	-0.296	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	0.229	-0.657	0.156
	TORS [%]	-0.600	0.298	-0.429	0.397
	ASYM [%]	-0.600	0.298	0.429	0.397

CONCLUSION:

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.
- [2] Hugger A, Hugger S, Schindler HJ. Surface electromyography of the masticatory muscles for application in dental practice. Current evidence and future developments. *Int J Comput Dent.* 2008;11:81-106.
- [3] Tartaglia GM, Moreira Rodrigues da Silva MA, Bottini S, Sforza C, Ferrario VF. Masticatory muscle activity during maximum voluntary clench in different research diagnostic criteria for temporomandibular disorders (RDC / TMD) groups. *Man Ther.* 2008;13:434-440.

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