Perceptual-auditory and acoustic analysis of the voice of wind instrumentalists pre and post musical rehearsal

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INTRODUCTION

The mechanical act of playing a wind instrument use muscles of the head and neck, as when speaking or singing[3].

SOUND PRODUCTION: voice and instrument

Air flow from the lungs → Activates vocal folds vibration

Pressure of air flow from the lungs → Activates the instrument reed or mouthpiece

PURPOSE

To analyze the wind instrumentalist´s voice and continuous speech pre and post rehearsal

METHODS

PRESENTATION
- Presentation to explain the procedures
- Questionnaire[1-2-5]

RECORDING
- Pre and Post 30 min of rehearsal, recording of:
- sustained vowel /E/
- Counting numbers from1 to 20

PERCEPTUAL ASSESSMENT
- Double-blind perceptual auditory assessment of the voice and speech performed by three speech language pathologists

DATA ANALYSIS
- Voxmetria CTS version 2.0 for the acoustic analysis
- Statistical analysis pre and post the rehearsal

- ❖ Approved by the ethics committee under the protocol number 0576/04
- ❖ Double-blind observational analytical study
- ❖ 23 male, professional wind instrumentalists from the Musical Band of the Military Police of the State of São Paulo (Brazil), with at least 5 years of professional experience
- ❖ Aged between 18 and 50 years old, non-professional voice users, good health and no vocal complaints

RESULTS AND DISCUSSION

TABLE 1 – Perceptual auditory evaluation of the best vocal emission, in instrumentalists pre and post the rehearsal

EVALUATOR	BEST VOCAL EMISSION						
	Pre		Post		No difference		
	N	%	N	%	N	%	P-value
1	9	13.04	11	15.94	3	4.35	
2	6	8.69	11	15.94	6	8.69	
3	4	5.80	15	21.74	4	5.80	
TOTAL	19	27.53	37	53.62	13	18.84	0.035*

- ✓ ♦*Kruskal-Wallis test*
- ✓ Best pre vs best post p = 0.046
- ✓ Best pre vs equal p > 0.556
- ✓ Best post vs equal p = 0.011*
- ✓ *Mann-Whitney test*

TABLE 2 – Perceptive auditory evaluation of the best continuous speech sample, pre and post the rehearsal

EVALUATOR	BEST CONTINOUS SPEECH SAMPLE						
	Pre		Post		No difference		
	N	%	N	%	N	%	P-value
1	8	11.59	10	14.49	5	7.25	
2	5	7.25	14	20.29	4	5.80	
3	8	11.59	8	11.59	7	10.13	
TOTAL	21	30.43	32	46.37	16	23.18	0.295

♦ Kruskal-Wallis test

TABLE 3 – The acoustic measures average and p-values pre and post rehearsal (maximum phonation time – MPT in seconds, average, mode and standard deviation of the fundamental frequency - F0 in Hz, glottal to noise excitation ratio (GNE) in dB, jitter and shimmer in percentage.

ACOUSTIC PARAMETER	AVERAGE		P-value
	Pre	Post	
MPT	19.78	19.95	0.782
F_0 average	117.45	121.52	0.055
F_0 mode	117.41	121.95	0.028*
F_0 DP	0.7	0.74	0.552
GNE	0.79	0.85	0.021*
Jitter	0.25	0.17	0.322
Shimmer	6.46	6.37	0.891

♦ T- *Student Test*

* Statistically significant

- ❖ The acoustic outcome when playing a wind instrumental is similar to the acoustic outcome of a resonance voice[6-7]
- ❖ The compressed voice has many harmonics and it is similar to the sound produced by the instrumentalists

CONCLUSIONS

POSITIVE VOCAL IMPACT POST REHEARSAL
observed in the sustained vowel

POSSIBLE VOCAL WARM-UP
Higher f0 – higher pitch

Further therapeutic studies that aim to determine how the vocal tract impedance can improve the constriction of vocal and the vocal quality should be performed [8]

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