

Self-Perception of Vocal Loading Effects and Short-Term Voice Care Outcomes in Egyptian Soccer Fans Volunteers

Original
Article

Nesreen Fathi Mahmoud^a, Alshimaa M. Mohamed Lotfy^b

Department of ^aPhoniatrics Unit-Department of ENT, ^bPublic Health and Community Medicine, Faculty of Medicine, Beni-Suef University Egypt.

ABSTRACT

Background: Soccer fans create violent vocalizations for hours and not adjust their voices as professional voice users. Acute phonotrauma is the result of sound produced when one's voice is shouted or strained. To our knowledge, no further studies are available in the research area performed on a related group of samples in Egypt.

Objective: Self-assessment of acute changes in voices of soccer fans who volunteered to the current study after a soccer match as a vocal loading challenge and assessed in three different times (pre-match, post-match) and 1 week post-match after receiving vocal hygiene measures and investigate the impact of voice hygienic measures in overloading vocal tasks.

Patients and Methods: During the 2019 Africa Cup of Nations a longitudinal follow-up was conducted among volunteer soccer fans. Clinical laryngoscopic examination (CLE) was performed to all participants to exclude vocal fold lesions before the match. Auditory perceptual voice analysis (APA), and Voice Handicap Index (VHI) questionnaire were administered in three time points apart: before the match, within 9 to 15 h post-match, and 1 week after the match. All participants were subjected to voice hygiene instructions post-match and reevaluated after 1 week.

Results: VHI scores increased statistically significantly after the match, compared with pre-match scores ($P < 0.05$). There was a significant positive correlation between post-match VHI scores and post-match dysphonia grade ($P < 0.05$). Positive statistical significance was found when comparing grade of dysphonia post-match and follow-up.

Conclusion: Phono-traumatic behaviors are the likely source of vocal impairment. It is thought that VHI and perceptual voice analysis should be done together for diagnosis and follow-up of voice changes in vocal loading tasks. Short-term vocal hygiene program was beneficial in improving vocal quality.

Key Words: Auditory perceptual analysis, Egyptian soccer fans, laryngoscopy, voice handicap index, vocal loading.

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Corresponding Author: Nesreen Fathi Mahmoud, MD, Lecturer of Phoniatrics, Phoniatric Unit-Department of ENT, Faculty of Medicine, Beni-Suef University, Beni-Suef, Egypt, **Tel.:** 01006501928, **E-mail:** Nesreen.hussien@med.bsu.edu.eg

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INTRODUCTION

Vocal loading is a vocal behavior that refers to voice tasks stressing the larynx, causing trauma to the laryngeal mechanism and hindering optimal laryngeal function. Also described as phono-trauma were those vocal behaviors include shouting, screaming, and throat-clearing. Vocal loading is affected not only by intrinsic loading factors, such as excessive use of loud voices, but also by extrinsic loading factors, as loud background noise, which has induced negative voice changes.^[1-4]

A wide range of possible and serious vocal lesions often occurs due to phono-trauma, such as laryngeal inflammation, vocal fold hemorrhage granuloma related to vocal behavior and tension, acute or soft vocal fold nodules, polyps, and even vocal fold scar after repetitive trauma.^[5-9]

Laryngologists and specialists in voice rehabilitation have shown a serious concern for occupational groups who

are at high risk of vocal damage, for example, teachers, actors, students, and people active in physical fitness activities.^[10]

Soccer fans are another category that may create violent vocalizations for hours and not adjust their voices as professional voice users do and do not obtain any voice hygiene instructions. So, they have been identified as at-risk due to the duration and intensity of their voice use. Soccer fans presented to Phoniatrics outpatient clinics to be treated for different voice problems associated with misuse of the voice.

Laryngeal endoscopy is the most useful test for the diagnosis of many laryngeal disorders. In addition, other examination methods such as GRBAS scale, which is the main tool used in the auditory-perceptual evaluation to assess subjectively the degree and quality of hoarseness^[11]. There is also the voice handicap index

(VHI) that patients used to subjectively evaluate social and lifestyle limitations (functional aspects), voice and larynx condition (physical aspects), and what the patient is feeling (emotional aspects).^[12] According to the results of previous assessment tools, an appropriate treatment plan is selected.

The need for vocal hygiene education and voice training in such a population is clearly evident and a successful method of conservative treatment. Vocal hygiene as an indirect therapeutic tool is considered a patient-centered behavioral treatment, which includes modification of vocal habits and the implementation of principles to improve vocal health.^[13]

Most of vocal hygiene programs^[14] addresses both speech and non-speech factors include decreasing phonotraumatic behaviors such as throat clearing, yelling, crying, laryngopharyngeal reflux, allergies, irritants and dehydration, loud voice use and screaming, speaking over background noise, and unconventional voice production; improved hydration; and enhanced lifestyle issues elimination of tobacco, alcohol, recreational drugs and caffeinated beverages, sleeping habits, diet, medical conditions, and medications.

Previous studies of vocal loading have examined healthy individuals, professional voice users, and individuals with voice disorders^[15-17].

The aim of the study was to assess acute changes in voices of soccer fans who volunteered to the current study after a soccer match as a vocal loading challenge and assessed in three different times (pre-match, post-match, and 1 week post-match after receiving voice hygiene measures) and investigate the impact of voice hygienic measures in to overloading vocal tasks.

PATIENTS AND METHODS:

Study design: Cohort study was conducted during the 2019 Africa Cup of Nations.

Setting: The outpatient clinic of phoniatics unit-Otolaryngology department.

Study participants: the volunteers were recruited by flyers placed throughout social media before and during the Africa cup of nations 2019. The participants went to the soccer match, encouraged loudly, and exposed to an environment that promoted vocal loading behavior.

Sample size:

Initially, 33 soccer fans volunteer agreed to participate in the study. Eleven individuals were excluded due to failure to receive or complete the questionnaires or refuse to be assessed by the laryngoscope. The final sample consisted of

22 volunteers who decided to continue the investigations. All participants were males. All participants who were invited to participate in the current study were interested in contributing to scientific research. Every volunteer was informed about the specific protocol for the study and its value to prevent, detect or treat medical conditions and made sure the risks were as low as possible and were worth any potential benefits to the volunteer and participation being a voluntary decision on their part. Participants did not pay any investigation or study-related care cost and compensated for time. After institutional approvals, The Faculty of Medicine, Research Ethics Committee has approved the study protocol (FMBSUREC/03112019/Mahmoud). Each volunteer received written informed consent before participation.

Inclusion and exclusion criteria:

Participants met the following criteria : self-reported normal speech and language, no history of voice-related organic or functional pathology, no history of respiratory problems (i.e, asthma, chronic obstructive pulmonary disease), no history of head, neck, or chest cancer or surgery, no history of stroke, neurological disorders or psychological disorders, no history of formal voice training, normal cognitive function, and ability to follow directions (confirmed via direct observation), and no cold, upper respiratory infection, sinusitis, or allergy symptoms on the days of testing (confirmed via direct observation)

Tool of study

All volunteers underwent the following:

(1) Socio-demographic and clinical related data:

Age, gender, occupation, smoking habits. History of reflux symptoms, abuse of voice, temperament and dysphonia.

(2) The auditory perceptual analysis (APA):

Modified GRBAS^[18] scale is used to subjectively assess the degree and quality of hoarseness by physicians and speech pathologists. The following voice parameters were measured: Overall grade, character, pitch, register, loudness, glottal attacks and associated laryngeal functions, evaluated and tabulated according to the modified GRBAS scale, which gives scores of 0, 1, 2, or 3 for the Grade of hoarseness; Roughness, Breathiness, Asthenia, and Strain, where 0 is normal, 1 is a slight degree, 2 is a medium degree, and 3 is a high degree. The assessment was done in an acoustically favorable environment and based on approximately 5 min of spontaneous speech, describing the vocal complaint, number counting from 1 to 20, and prolonged /a/. Each judgment was performed by two certified examiners specializing in voice disorders expert in

vocal evaluation and rehabilitation with more than 10 years of experience and familiarity with the modified GRBAS scale; without knowing the identity of the subject. To assess intra-rater and inter-rater reliability, all subjects and their voice samples were re-evaluated by each examiner individually two days apart.

(3) Visualization of the glottis by Rigid laryngoscope for assessment of vocal fold configuration, and gross mobility and exclude any vocal fold lesions is done pre-match.

(4) Assessment using the Voice Handicap Index (VHI) (the Arabic version)^[19], which consists of 30 items. These items are equally distributed over three domains: functional, physical, and emotional aspects of voice disorders. The functional domain includes statements that describe the 'impact of a person's voice disorders on his or her daily activities'. The emotional domain indicates the patient's 'affective responses to a voice disorder'. The items comprising the physical domain are statements representing self-perceptions of laryngeal discomfort and voice output characteristics. Patients rated their voice problem as being mild (0–30), moderate (31–60), and severe (61–120). The Arabic VHI is considered a good valid and reliable tool for estimating the degree of voice severity and a good follow-up assessment tool.

Auditory perceptual analysis, and VHI questionnaire were completed by the study subjects one day before and within 9 to 15 h after the match.

(5) Vocal hygiene instructions:

The entire study group was subjected to voice hygiene measures post-match in Phoniatics unit providing participants with vocal hygiene instruction sheets that carry strategies to eliminate abusive vocal behaviors and promote healthy voice production and advised to return for a follow-up after one week at our outpatient clinic and reevaluated by APA and VHI. Vocal hygiene instruction sheets are addressing the amount and type of voice user; Decreasing phono-traumatic behaviors such as throat clearing, loud voice use, screaming and, speaking over background noise, improved hydration; and enhanced lifestyle issues leading to improved vocal health, including the elimination of tobacco, alcohol, and caffeinated beverages, sleeping habits, diet, medical conditions, and medications.

Statistical Analysis:

Collected data have been coded, analyzed by Statistical Package for Social Science, (SPSS) version 20; processed and tabulated. Frequency distribution, percentage and descriptive statistics including mean \pm SD were calculated. McNemar's test is used to assess if there are

variations on a dichotomous dependent variable, student's t-test has been used to compare between two groups of numerical data. The correlation coefficient was used to evaluate the relationship between the various variables. *P* values of ≤ 0.05 were considered significant. The power of sample size was estimated using g*power software based on effect size of 0.5, overall type I error rate (α) ≤ 0.05 22 subjects expected to achieve a power of more than 80%.

RESULTS:

A total of twenty-two volunteer soccer fans, all of them were males completed the interview schedule. Their ages ranged were between 21 and 36 years old with a mean of 27.18 ± 5.43 . The majority of them were having a history of smoking, reflux symptoms, abuse of voice, and temperament in proportions (77.3%, 54.5%, 63.6%, and 77.3%) respectively. 50% of the participants were professional voice users (teachers, Quran reciters). All participants were non-dysphonic with normal voice characters (Table 1).

With relevancy to the assessment of Voice Handicap Index scores, the mean score after the match was higher for functional, emotional, physical and total VHI domains (4.82 ± 1.22 , 3.73 ± 1.08 , 1.68 ± 1.09 , and 10.18 ± 2.52) respectively, compared to it of follow-up (1.27 ± 0.88 , 1.23 ± 0.92 , 0.73 ± 0.88 , and 3.14 ± 2.47) respectively and pre-match (1.23 ± 0.075 , 1.32 ± 0.99 , 0.64 ± 0.79 , and 1.00 ± 0.00) respectively (Table 2). After the match, a statistically significant difference was observed relative to pre-match scores ($P < 0.05$), and after 1 week of follow-up, score values were not significant (Table 3).

Before the match, the results of modified GRBAS scale assessment show that all participants were non-dysphonic with normal vocal character. Approximately half volunteer soccer fans suffered after-match (54.5%), while just 22.7% still suffered from mild dysphonia one week post-match. It found 27.3% of volunteers after the match increased the stressed voice. There was no significant difference associated with modified GRBAS scale assessment (Table 4).

Analysis of correlation between post-match VHI scores and post-match dysphonia grade, provided a significant positive correlation ($r = .580$; $P < 0.05$) (Table 5).

Table 1: Socio-demographic and clinical data of the volunteer soccer fans (n=22).

	Variable	No.	%
Sex	Male	22	100
	Female	0	0
Smoking	No	5	22.5
	Yes	17	77.3
Prof. Occupation	No	11	50
	Yes	11	50
Reflux symptoms	Absent	10	45.5
	Present	12	54.5
Abuse of voice	Absent	8	36.3
	Present	14	63.6
Temperament	Quiet	5	22.7
	Tense	17	77.3
Dysphonia grade	Normal	22	100
	Mild	0	0
	Moderate	0	0
	Severe	0	0
Age (in years) (mean ± SD)		(21-36) (27.18±5.43)	

Table 2: VHI scores among the volunteer soccer fans pre-match, within 15 h post-match and after one week follow up (n=22)

VHI	Pre-match	Post-match	Follow up
Functional			
Mean± SD	1.23±0.075	4.82±1.22	1.27±0.88
Range (Mini-Maxi)	(0-2)	(3-7)	(0-3)
Median	1	5	1
Physical			
Mean± SD	1.32±0.99	3.73±1.08	1.23±0.92
Range (Mini-Maxi)	(0-3)	(2-6)	(0-2)
Median	2	4	2
Emotional			
Mean± SD	0.64±0.79	1.68±1.09	0.73±0.88
Range (Mini-Maxi)	(0-2)	(1-4)	(0-2)
Median	0	1	0

Table 3: Comparison of total VHI questionnaire scores among the volunteer soccer fans (n=22)

	Pre-match		Post-match		Follow up		<i>P-value</i>		
	Mean	SD	Mean	SD	Mean	SD	A	B	C
VHI	1.00	0.00	10.18	2.52	3.14	2.47	0.001	0.001	0.665

A: *P-value* obtained as a result of the comparison of pre-match and post-match values ($P < 0.05$ significant).

B: *P-value* obtained as a result of the comparison of pre-match values with follow up ($P < 0.05$ significant).

C: *P-value* obtained as a result of post-match values with follow up ($P < 0.05$ is significant).

Paired T test was used

Table 4: Comparison of GRBAS scale assessment among the volunteer soccer fans

GRBAS scale assessment	Pre-match (n=22)	Post-match (n=22)	Follow up (n=22)	<i>P-value</i>		
	No (%)	No (%)	No (%)	A	B	C
Grade of dysphonia				*NS	*NS	0.016
Normal	22(100%)	10(45.5%)	17(77.3%)			
Mild dysphonia	0(0%)	12(54.5%)	5(22.7%)			
Voice character				*NS	*NS	*NS
Normal	22(100%)	16(72.7%)	22(100%)			
Strained leaky	0(0%)	6(27.3%)	0(0%)			

A: *P* value obtained as a result of the comparison of pre-match and post-match values ($P < 0.05$ significant).

B: *P* value obtained as a result of the comparison of pre-match values with follow up ($P < 0.05$ significant).

C: *P* values obtained as a result of post-match values with follow up ($P < 0.05$ significant).

*NS: Non-Significant

Paired T test was used

Table 5: Correlation between post-match VHI scores with post-match dysphonia grade (n=22)

Post-match VHI scores	Post-match dysphonia grade	
	<i>r</i>	<i>P-value</i>
	0.580	0.005

r: Pearson correlation value, $P < 0.005$: significant

DISCUSSION

The current study focused on the care of soccer fans' voice as a unique work. Soccer fans use their voices excessively during the match for many hours, with poor knowledge on how they can protect their voices. Thus, they are at high risk of voice disorders. Surprisingly, there are not many studies on the care of fans' voices investigating their voice problems and how to overcome them although they are crucial groups of people.

This study included a review of patient-reported factors (e.g., smoking, occupation, reflux symptoms, and temperament) that may have increased the likelihood of phono-trauma. Overloading vocal demands of that particular population creates an increased potential for hyperfunction from a combination of physiological, environmental, and psychological factors, thus increasing the risk of phonotraumatic injury^[20].

The current study performed the VHI questionnaire^[19] on pre & post-match and after one week follow-up soccer fans where they were exposed to an environment that promoted phono-trauma, the mean of VHI scores were higher in post-match than pre-match and after one week follow up. There was a statistically significant relationship between pre-match and post VHI scores and between pre-match and follow-up, but it was non-significant between post-match and follow-up. This questionnaire is the gold standard for self-assessment of voice, a 30-item questionnaire examining functional, physical and

emotional aspects of voice disorders^[21] and frequently used especially in studies conducted with professional voice users e.g. singers^[22]. A finding that was similar to a previous study conducted in Turkey^[23]

APA was used as a clinician-based perceptual assessment of the voice included the overall dysphonia grading, roughness, breathiness, asthenia and strain in a subjective manner^[24]. In fact, in this study, strained voice values increased after the match (27.3%) and such an increase was not significant. These findings were contrary to those reported by Pinarbasli *et al.* Who used the vocal assessment program and found that pre-match hoarse voice and breathy voice values increased significantly after the match ($P < 0.05$), whereas harsh voice values did not show any significant difference ($P > 0.05$)^[23].

Regarding the comparison between the grade of the dysphonia post-match and follow up, the current study found a positive statistical significance, indicating that the rationale for reducing voice used to promote laryngeal health in individuals with laryngeal injuries, or vocal fatigue and to prevent further damage was beneficial^[25, 26].

Our results demonstrated a positive significant correlation between APA post-match (grade of dysphonia) and post-match total VHI scores. Contrary to a recent study done in Turkey, which revealed no significant correlation between acoustic voice analysis (character of voice) and VHI score pre& post-match.

In addition, thus objective voice measures do not always correlate with the self-assessment of the individual^[23]. This discrepancy between objective and subjective assessment is an area warranted for further investigation.

Some authors claimed that to make self-assessment more worthy, it should be complemented by perceptual voice assessment. The perceptual evaluation is fundamental in assessing voice quality and the impact on the subject's ability to communicate.^[27] In this study, we tried to find a correlation between the voice perceptions assessment by modified GRBAS scale that performed by clinicians and the voice perceptions expressed by the participants themselves through VHI. Although our assessment tools were subjective, our findings explained the deterioration of voice that can occur after acute phonotrauma perceived by a clinician with considerations of functional or emotional domains of subjective voice assessment according to patient perspective. Keeping in mind voice fatigue syndrome as a functional voice disorder, which includes vocal symptoms not detected by the clinician and perceived only by patient e.g frequent attempts to clear the throat, reduced voice range, throat dryness, throat soreness. This suggested that VHI questionnaire is subjective and is not significant on its own in the diagnosis of patients with a voice problem. Thus this questionnaire could be used in the follow-up to identify the quality of life of the people with voice problems, and that perceptual voice analyses should also be performed hand on hand with the questionnaire.

The present study had limitations, such as limited sample size due to the fear of invasive examination of laryngoscopy, all participants were males, lack of a control group. The greatest limitation was the lack of means to quantify vocal loading during the match. So further studies should be conducted among this vulnerable group, soccer fans to early detect voice disorders.

CONCLUSION

Phono-traumatic behaviors are the likely source of vocal impairment. It is thought that VHI and perceptual voice analysis should be done together for diagnosis and follow-up of voice changes in vocal loading tasks. Short-term vocal hygiene program was beneficial in improving self perception of vocal quality.

CONFLICT OF INTEREST

There are no conflicts of interest.

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