Bahrain Medical Bulletin, Vol.23, No.1, March 2001

Voice Overuse and Abuse among Professional Voice Users

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Objective: To determine the incidence of pathological conditions resulting from voice abuse or overuse in professional voice users.

Design: Prospective study from 1978 to 1999.

Setting: Outpatient clinic.

Subjects: 123 Muslim Preachers and 7 Singers. One hundred and nineteen presented with hoarseness of voice, pain while singing or speaking and difficulty to go up to higher notes.

Results: During the study period one hundred and thirty professional voice users were seen. Females 38, males 92. All had been subjected to upper endoscopy and flexible per nasal endoscopy. Some of them had more than one pathology. One hundred and fifteen pathological conditions were seen either directly or indirectly related to voice abuse or overuse by the professional voice users (injected vocal cords 49, haemorrhage of the vocal cords 27, nodule of vocal cords 19, reflux laryngitis and pharyngitis 8, laryngeal polyps 5, severe tension 4, mogiphonia 2, pachydermia 1). Other pathological entities seen in this group which are unrelated to voice abuse or overuse are: tonsillitis 7, vasomotor rhinitis 7, allergic rhinitis 4, sinusitis 4, superior laryngeal nerve paralysis 2, cancer phobia 2, left vocal cord carcinoma 1, myasthenia gravis 1, miscellaneous 18.

Conclusion: The majority of preachers and singers (59%) in this study group suffered from injected vocal cords, haemorrhage, and vocal cord nodule due to voice abuse and overuse, because most of them have not received any formal training and many of them sing or deliver their speech outside their own capability. Many of these preachers do smoke but do not consume alcohol, the singers however, in this group consume alcohol, cigarettes, caffeine and even some use drugs. Reflux laryngitis was more common among singers than preachers because of the previous factors and late night meals.

Bahrain Med Bull 2001;23(1):12-18.

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Bahrain Medical Bulletin

State of Bahrain

A stimulating voice can bring people to their knees and tears to their eyes. It can trigger the most dangerous and primitive instinct of mass aggressiveness or mass hysteria. Certainly it is a great asset and natural gift to have a beautiful and stimulating voice. Leaders and singers can have the people at their fingertips if they have effective voice such as it happened with President Nasser of Egypt and John F Kennedy. It was believed in the past that the voice is the mirror of the soul. Therefore, hoarseness of voice or aphonia indicates that the soul to be in disarray[1,2,3].

The voice as we can hear it is generated through the respiratory system, which produce the voice activating air-stream. The air-stream then passes through the voice generator (the larynx with its vocal folds) which causes the air to vibrate. The voice produced here does not have the final quality until it passes through the voice resonators, which are the pharynx, oral cavities and sinuses. Therefore, voice change could be due to disturbance of the respiratory system, voice generator system or the resonators.

A human being is gifted with a voice, which is used for complicated communication (speech) compared to animal, which uses its voice mainly for simple communications such as sexual attraction, regrouping and warning of impending danger. The quality of voice is individualised. A person is characterised by his/her own voice. Voice can express a diversity of emotional states ranging from sadness, anger, frustration and great elation or happiness.

Professional voice users and athletes have something in common. They both have the inherited ability to perform certain tasks and their muscles are adapted genetically for such tasks. The difference between the two is the size of the muscles used by the athletes which are big while the muscles used by the professional voice users are small and delicate and can be damaged easily if abused or overused.

Abuse or overuse of voice is not uncommon among voice users. Abuse can be attributed to many factors. Lack of training is one of them and as they say a well-trained speaker or singer can go on for several hours without developing fatigue such as Diana Ross, Um Kalthoom or President Nasser. Voice fatigue can be due to misuse of abdominal and neck musculature which are essential for the production of voice[4,5,6].

Public speakers and singers are usually very sensitive individuals and they are subjected to a great deal of anxiety and stress due to the nature of their hard work and the long hours they have to endure, all these factors can lead to voice abuse.

Physical fatigue and allergies can precipitate voice abuse. Alcohol, drugs, and cigarettes abuse can lead to hoarseness of voice. Late night meals can lead to reflux laryngitis, which leads to hoarseness and further abuse due to the individual trying to speak or sing better.

Disorder of voice can be due to diverse causes ranging from psychogenic or psychotraumatic, which could be due to anxiety neurosis, compensation neurosis, psychogenic aphonia, and spastic dysphonia. These diseases could be due to conversion symptoms, which may develop in people who bottled up their feelings and will not let go for crying or shouting, one of these examples is the whispering voice of psychogenic dysphonia[1,3].

The other causes of hoarseness ranging from habitual causes starting with improper use of voice leading to habitual dysphonia and thus hypo or hyperfunction, which can precipitate secondary organic diseases such as recurrent laryngitis, chronic nodular laryngitis and leukoplakia. Organic causes of hoarseness ranging from web, neuromuscular disorder, trauma, cyst, polyps, infection and tumours[1,3].

A prospective study was carried out to determine the incidence of pathological conditions resulting from voice abuse or overuse in professional voice users.

METHOD

This is a prospective study performed between 1978 to 1999. All preachers and singers attending the clinic for various ENT complaints were included in the study whether they complained of change of voice or not.

During this period 130 professional voice users were seen, 123 were Muslim preachers and seven were singers. According to the patient's complaint the voice quality was recorded based on Sataloff recommendations[7, 8].

Sataloff recommendations

Low		High
Loud		Soft
Powerful		Weak
Clear		Breathy/Hoarse
Sharp		Dull
Sonorous	Or	Thin
Resonant		Falsetto
Periodic		Raw/Harsh
Relaxed		Tense/Strained

The following data were documented: Nationality, age, sex, allergy, muscular tension, the profession, length of practicing, training received in public speaking or singing, did he/she have a voice coach or singing teacher and the number of performances per day. Other details noted were sleeping habits, eating habits, alcohol intake, cigarettes/caffeine consumption, reflux laryngitis, dental disease including TMJ disorders, medications taken especially antihistamines and megadoses of vitamin "C"(diuretic→dehydration). The posture of professional voice users during preaching or singing was noted.

The habits of yelling, loud talking, throat clearing, coughing, whispering, poor hydration, regular exercise, stress/tension and psychological intervention was documented. The condition of respiratory and digestive tracts, cranial nerves (swallowing, hypernasality) were inquired about. The date of onset of voice change (gradual or abrupt), the course, previous treatment, what was the voice like before the trouble began; hoarseness, breathiness, volume difficulties, pitch range, voice worse in the morning or worse in the evening, intensity difficulty, general health and systemic diseases were also recorded.

All the patients were subjected to a routine ENT examination plus mirror indirect laryngoscopy, upper endoscopy and flexible pernasal endoscopy under LA. Hearing assessment was done when deafness was suspected or complained off, because even a relatively slight hearing loss may lead a patient to speak or sing at an increased volume, resulting in voice abuse.

RESULTS

During the period from 1978 to 1999, one hundred and thirty professional voice users were seen, 123 were Muslim preachers (94.6%) and 7 singers (5.4%). One hundred and nineteen (91.5%) presented with hoarseness of voice, pain while singing or speaking and difficulty to go up to higher notes.

Among the 130 patients, seven were non Bahrainis (5.4%), the age range was 19-75 years, and the mean age was 37.5 years. There were 38 (28.7%) females and 92 (71.3%) males. A total of 161 pathological entities were seen in 130 patients, as some of them had more than one pathology.

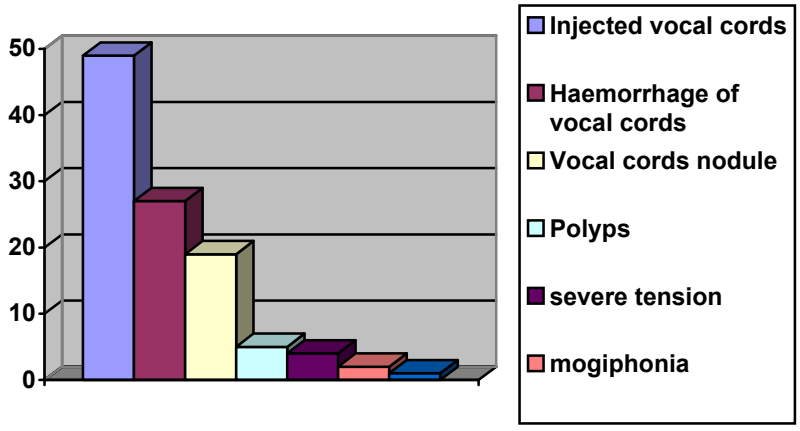
One hundred and fifteen pathological conditions were seen either directly or indirectly related to voice abuse or overuse by the professional voice users (injected vocal cords 49, haemorrhage of the vocal cords 27, nodule of vocal cords 19, reflux laryngitis and pharyngitis 8, laryngeal polyps 5, severe tension 4, mogiphonia 2, pachydermia 1) Table 1.

Other pathological entities seen in this group which were unrelated to voice abuse or overuse were: tonsillitis 7, vasomotor rhinitis 7, allergic rhinitis 4, sinusitis 4, superior laryngeal nerve paralysis 2, cancer phobia 2, left vocal cord carcinoma 1, myasthenia gravis 1, miscellaneous 18. See Table 2.

Table 1. **Pathological conditions seen directly related to voice abuse or overuse**

Pathological entity	*No of pathologies*	*Percentage*
Injected vocal cords	49	42.6
Haemorrhage of the vocal cords	27	23.5
Nodule of vocal cords	19	16.5
Reflux laryngitis	8	6.96
Laryngeal polyps	5	4.3
Severe tension	4	3.5
Mogiphonia	2	1.74
Pachydermia	1	0.9
Total	115	100

NB some patients had more than one pathology



NB some patients had more than one pathology

Table 2. **Pathological conditions seen directly or indirectly related to voice abuse or overuse**

Pathological entity	*No of pathologies*	*Percentage*
Injected vocal cords	49	30.4
Haemorrhage of the vocal cords	27	16.8
Nodule of vocal cords	19	11.8

Reflux laryngitis and pharyngitis	8	4.97
Tonsillitis	7	4.35
Vasomotor rhinitis	7	4.35
Laryngeal polyps	5	3.11
Allergic rhinitis	4	2.5
Sinusitis	4	2.5
Severe tension	4	2.5
Superior laryngeal nerve paralysis	2	1.24
Mogiphonia	2	1.24
Cancer phobia	2	1.24
Left vocal cord carcinoma	1	0.6
Myasthenia gravis	1	0.6
Pachydermia	1	0.6
Miscellaneous	18	11.2
Total	161	100

NB some patients had more than one pathology

DISCUSSION

Speakers and singers need a delicate balance of coordination of the phonatory, respiratory and articulatory system as "Malady of any part of the body may reflect on the other" including the voice.

Hoarseness of voice is a coarse, scratchy sound due to abnormalities of the vibratory margins of the vocal cords or laryngeal conduit, such as laryngitis, vocal fold haemorrhage, mucosal disruption, mass lesions and carcinoma. Fatigue of the voice is inability to continue speaking or singing for extended periods without changes in voice quality[7]. Volume disturbance may present as inability to speak or sing loudly, or softly. Pain while speaking or singing can indicate vocal cord lesions, laryngeal joint arthritis, infection or tumour[9].

This is a study of a group of religious preachers and singers, who are at risk of prolonged vocal abuse, impairment of vocal range and quality, which result in difficulty in producing high notes due to thickened or irregular vocal cords. Many of these religious preachers smoke (70%) and some do so heavily. Those who do not smoke are passive smokers because of the audience smoking. Luckily this study group do not consume alcohol otherwise their problems will be compounded[10].

In Bahrain, religious preachers and other voice professional users are subjected to great demand and tension especially in the months of Muharram and Ramadan, which eventually leads to vocal overuse and abuse. Muharram is a holy month for Shia Moslems, which is the month of mourning for Imam Hussein who was killed in 680 AD. Ramadan is the holy month for all Moslems, where they fast in the daytime, eat, and listen to religious preaching at night.

Most of the preachers and singers I have seen have tense and slouched body posture. Very few have relaxed posture and breathing. Nearly all the preachers and singers received no training in public speaking or singing, and none of them had a voice coach or a singing teacher.

The contributing factors for vocal abuse in these preachers and singers are:

1. The religious assembly and singing halls provide tobacco free and most of the attendants smoke, beside which the halls are not fitted with special smoke eaters.

2. The weather in Bahrain is hot, dusty and humid. The weather exposes the singers and preachers to frequent appearances in over-dry air conditioned assembly halls, which often leads to dryness in the pharynx and larynx. Air-conditioned halls with pleasant controlled temperature are in sharp contrast to the extremely hot climate outside, which sometimes reaches more than 100^{o} F and humidity approaching 100%. That environment exposes the professional voice user to sudden extremes of temperature and humidity.

3. Repeated performance in the same day and over consecutive days especially during the month of Muharram, where some preachers have sometimes up to 8 performances per day for ten days.

4. Recurrent upper respiratory infections are deleterious to professional voice users.

Therefore, prevention of upper respiratory infections is obviously of prime importance. Such subjects should be advised against the use or overuse of tobacco and alcohol, or working in dusty atmospheres[6]. Most of the preachers in Bahrain do not have a personal physician looking after them regularly.

5. Tension is a contributing factor as many of these religious leaders and singers are bound by a contract, which gives some of them a lucrative financial return. Therefore, they have to satisfy the audience and the owner of the assembly hall in order to have his/her contract renewed for the next year, that tension contributes to voice abuse.

6. All the preachers do not assume the recommended posture, where the head, neck, and shoulders should be in a neutral position. The shoulders should not be elevated, rolled forward, or held back, as these manoeuvers introduce unnecessary tension. Knees should be slightly bent and flexible, not locked, and weight should be centered over the metatarsal head (balls of the feet), not the heels. Therefore, establishing contact with the ground by planting the feet firmly and eliminating the lumbar lordosis by tilting the pelvis backwards which increases the distance between the insertions of the diaphragm and increases the range of contraction of that powerful muscle. The feet should be apart, but not more apart than the width of the shoulders[6]. The preachers in Bahrain simply do not assume the recommended posture because they deliver their sermon while sitting on a high chair.

In this study I have seen 49 cases (30.4%) of injected vocal cords and larynx. This indicates a chronic non-infective laryngitis where some degree of hoarseness and lowering of the pitch of the speaking voice is to be expected as a result of thickening and roughening of the vocal cords due to repeated haemorrhages. Chronic non infected laryngitis can result into posterior glottic erythema with bright red erythema over the vocal processes, hypervascularity of the entire supraglottic larynx and granular mucositis. Non infected laryngitis is seen in association with voice abuse and as result of mucosal irritation due to allergy, smoke inhalation, and other irritants.

On examination of the larynx of this group at rest, we can see that the normal smooth pearly glistening appearance of the vocal cords is replaced by dull rough looking thick vocal cords while the rest of the laryngeal mucosa is often being diffusely injected or reddened.

Smoking, alcohol intake, reflux of gastric acid and improper use of the voice can play an important role in the inception of a series of epithelial changes. Usually, the patient cannot phonate at a low level of intensity because of the thickening of the epithelium. A higher than normal air flow is needed to start vocal fold vibration, that is why some preachers and singers will complain that they have difficulty at low voice and their voice become clear at high notes [11, 12].

Twenty seven cases (16.8%) of submucosal haemorrhages were seen. This condition occurs due to extravasation of blood as a result of sudden severe vocal strain. The condition is characterized by a sudden onset of hoarseness and local pain. If vocal rest is not adhered to strictly, the haemorrhages may become organized into vocal nodules. Recurrent submucosal haemorrhages often leave the preacher and singer with dilated blood vessels of a rather prominent character seen on the upper surfaces of one or both vocal cords[13].

During this period 19 cases (11.8%) of vocal nodules or singers' nodules were seen. These affect mainly professional voice users (singers, preachers, teachers and actors) especially so in those preachers and singers who are attracted to roles which lie well above their normal vocal ranges. The nodule might be formed due to organization of the submucosal haemorrhage or due to excessive strain on the cord producing corns. They also occur in noisy children who have a tendency to shout.

In this study many of the nodules seen in preachers were in months of Muharram or Ramadan and these usually disappear afterward. This supports the contention that the influence of function is so strong on the form of the vocal cords, that the nodules can come and go in a matter of weeks[14, 15].

Vocal nodules are few millimeters in size, usually bilateral, with one often slightly larger than the other. They are usually seen at the junction of anterior and middle thirds of vocal cords, are fairly symmetrical and related to voice abuse. Nodules cause symptoms by interfering with glottic closure and impairing vibratory patterns. In most cases, nodules

result in hoarseness, breathiness, loss of range and vocal fatigue. An asymptomatic nodule that does not appear to interfere with voice production should be left alone[11,16,17,18,19]. Slight huskiness of the voice in some singers and actors might have been responsible for an immensely successful career such as Louis Armstrong[8].

Gastric reflux laryngitis is extremely common among voice users. Gastro-esophageal reflux is endemic among singers but is rare among preachers. During this period I have seen 8 patients (4.97%) with reflux laryngitis and/or pharyngitis. The patient usually complains of hoarseness, a bitter taste in the morning, halitosis and feeling of a "lump in a throat", frequent throat clearing, chronic irritative cough and frequent tracheitis or tracheobronchitis. Any or all of these symptoms may be present. The first sign of reflux is posterior erythema accompanying the previous symptoms.

The treatment of reflux laryngitis is by raising the head during sleep, antacids and avoidance of eating 3 to 4 hours before going to sleep[20, 21, 22.].

Five cases (3.11%) of laryngeal polyps were seen. These are due to edema of the vocal cords, which usually affects both sides symmetrically. Polyp is due to edema concentrated at one point which balloons the epithelium out in front of it. The edema can be due to inflammation coupled with smoking[1,3]. One patient used to smoke 40 cigarettes a day, the upper half of his left vocal cord was completely ballooned out as polyp.

Four cases (2.5%) of severe tension were diagnosed during this study period; two of them needed psychiatric treatment. Stress affects the psychomotor system, which in turn affects posture, respiration and voice control. This in turn gives rise to organic changes of the folds due to faulty use or overloading of the vocal folds. Some tension, however, will always be seen in this group of people because of the nature of their work[4, 5].

Sometimes, pseudoparalysis or incomplete closure of the glottis is also seen when the intrinsic laryngeal musculature is in a state of excessive tension that is inappropriate for effective function, this might be a sequence of lack of assertiveness. A person who knows how to hold his own emotions in difficult circumstances is less vulnerable to psychogenic dysfunction than a person who lacks self-reliance. A course in assertiveness training can provide support in episodes of aphonia and prevent recurrences[1].

Two cases (1.24%) of superior laryngeal nerve paralysis which resulted into slack wavy cords were seen. Both cases were unilateral and both followed thyroidectomy. The voice is rough and tires quickly but respiration is unaffected. Incomplete glottic closure with minimal posterior chink is considered normal[23].

In this study I have seen two cases (1.24%) of Mogiphonia, which is psychoneurotic in origin causing phonic spasm in the voice users, particularly when they have to appear in public. At the inception of speech the voice appears to be normal but the vocal cords soon become firmly pressed together and no further sound can be emitted.

Surprisingly, during this study period only one case (0.6%) of carcinoma of the left vocal cord extending to the subglottic region was seen. That patient was a heavy smoker 30-40 cigarettes a day for 40 years. He received radiotherapy and chemotherapy in one of the hospitals in London. He had no recurrence for 10 years then he died of heart failure. Two cases (1.24%) of cancer phobia were seen during this period.

One case (0.6%) of myasthenia gravis was diagnosed in this study. These cases should always be suspected when the voice actually sounds worse than the appearance of the vocal cords would suggest or if there are other symptoms and signs of myasthenia (ptosis, diplopia, dysarthria, dysphagia and fatigability of muscles following exercise). The diagnosis can be confirmed by the use of Mestinon[24].

During this period one case (0.6%) of pachydermia was seen. It is a variant of chronic hypertrophic laryngitis affecting the epithelium and subepithelium of the posterior halves of the cords, the vocal processes, and the interarytenoid region. The ventricular bands may occasionally be affected. The mucosa might be granular or papilliferous in appearance, which is mainly due to excessive smoking with or without alcohol consumption[25, 26].

No case of dysphonia plicae ventricularis or psychogenic ventricular dysphonia was diagnosed during the study period. This condition is rarely seen in trained professional voice users. It can be seen in fish market vendors and fruit vendors. The opposition of the ventricular folds produces ventricular band voice during the attempt to produce a voice. Surprisingly, no case of contact ulcer has been seen in this study, which is due to vocal abuse, particularly the 'coup de glotte'[12].

During this period I have not seen any case of voice virilisation as no woman preacher or singer was prescribed testosterone for her disagreeable climacteric symptoms[27-29].

Seventy percent of the preachers in this study suffered at some point from phonasthenia particularly on the ninth day of Muharram and the last 10 days of Ramadan. In this condition the voice is very easily tired and the voice user cannot maintain a constant pitch, particularly in the higher notes.

There is tremendous competition among preachers in Bahrain. The preacher has to please the owners of the assembly hall (Maatam) and the audience. Many fear they will lose their jobs if they refuse to cry or scream or sometimes beat themselves during preaching. They have an extremely difficult job, as they are expected to re-enact the tragedy of the massacre of Imam Hussein (the grandson of Prophet Mohammed) and to motivate the audience to grieve, cry and beat themselves.

Many preachers and singers suffer from inadequate air flow to drive the voice. This might be due to a minor respiration malady as a result of smoking, thus, causing cough, vocal fatigue, loss of range and hyper functional abusive compensation[9].

CONCLUSION

The majority of preachers and singers (59%) in this study group suffered from injected vocal cords, haemorrhage, and vocal cord nodule due to voice abuse and overuse, because most of them have not received any formal training and many of them sing or deliver their speech outside their own capability. Many of these preachers do smoke but do not consume alcohol. However, singers in this group did consume alcohol, cigarettes, caffeine and some even used drugs. Reflux laryngitis was more common among singers than preachers because of the previous factors and late night meals.

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