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ACOUSTIC ANALYSIS OF VOICE IN MU'ADHIN AND KHATIB

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ABSTRACT

Voice is the sound produced when air from the lungs passes through the larynx and is shaped by the vocal tract (Merriam-Webster, 2026). It is an important tool for professional voice users such as Khatibs and Muʾadhins, whose occupations require prolonged and frequent vocal use. The present study aimed to examine and compare the acoustic characteristics of voice between Khatibs and Muʾadhins using parameters such as fundamental frequency (F0), jitter, shimmer and harmonics-to-noise ratio (HNR). Thirty Malayalam-speaking male participants aged 35-55 years including 15 Khatibs and 15 Muʾadhins from different districts of Kerala were participated in the study. Voice samples were recorded using sustained phonation and analysed using PRAAT. Results revealed significant differences for all acoustic parameters between the two groups ($p < 0.001$). Khatibs showed higher jitter and shimmer values and lower HNR values indicating greater vocal strain, whereas Muʾadhins demonstrated higher F0 and HNR values reflecting better vocal quality. The findings highlight the impact of occupational vocal demands on voice characteristics and emphasise the importance of awareness of vocal hygiene among professional religious voice users.

KEYWORDS: Voice samples were recorded using sustained phonation and analysed using PRAAT.

INTRODUCTION

Voice is a fundamental component of human speech and a distinctive human capability. It functions as an effective means of communication not only transmitting linguistic content but also conveying emotional, contextual and social information (Colton & Casper, 1996). Speech and singing require the coordinated activity of numerous muscles, particularly those of the respiratory system, larynx and vocal tract. The muscles involved in voice production are susceptible to tension, fatigue, injury and long-term wear. Improper vocal techniques or excessive vocal demand can lead to voice problems such as hoarseness and vocal discomfort.

Individuals who rely on their voice as a primary tool for their occupation are commonly referred to as professional voice users. Overuse, misuse or abuse of the voice is frequently associated with functional voice disorders. Such disorders may arise due to physiological changes caused by environmental factors such as allergies, hormonal variations or systemic medical conditions including gastroesophageal reflux disease (GERD), acute laryngitis and benign vocal fold lesions.

Khatib is a religious speaker who delivers the sermon (Khutbah) during Friday and Eid prayers in Islam and frequently leads congregational prayers. The role requires both sustained speaking and vocal projection, often in large prayer halls. In daily prayers, the Khatib or Imam recites verses from the Holy Qur'an aloud in several prayer sessions, placing repeated vocal demands on the speaker. Khatibs also conduct religious teaching sessions for children and adults further increasing their vocal load (Farahat & Mesallam, 2016).

Muʾadhin is responsible for performing the Adhan, the call to prayer which is announced five times daily. Each Adhan typically lasts between 10 and 15 minutes and is

delivered loudly often through loudspeaker systems to inform the surrounding community of prayer times. Adhan requires sustained phonation, controlled breath support, pitch modulation and vocal intensity all of which place considerable physiological demands on the voice.

Vocal strain may result from both internal and external factors including speaking volume, pitch, intensity, environmental noise and speaking duration. A comprehensive understanding of voice production mechanisms is essential for recognising the effects of vocal overuse and for promoting vocal health among professional voice users such as Khatibs and Muʾadhins.

Natour, Marie, Saleem and Tadros (2011) studied the formant frequency characteristics of normal Arabic-speaking Jordanians. The findings revealed significant differences in F0, F1, F2, and F3 between males, females, and children, and recommended Arabic-specific formant norms for speech-language assessment.

Farahat and Mesallam (2016) conducted a psychosocial assessment of voice problems among Saudi imams and reported that 65% of the imams experienced significant voice-related issues.

Pestana, Freitas and Manso (2017) compared the relevance of voice disorders in singers and discovered a considerably greater prevalence of self-perceived dysphonia among traditional and popular music singers as well as singing instructors.

Sarıca (2018) investigated the prevalence and risk factors of voice problems among imams and reported that 36.6% of participants experienced occupational voice disorders with reflux, upper respiratory tract infections, lack of proper breathing techniques and frequent throat clearing identified as major contributing factors. The study also emphasised that absence of vocal hygiene and voice training during religious education increases the risk of voice problems among imams.

Buyukatalay, Gökmen and Dursun (2020) compared teachers with Islamic religious officials and reported that both groups exhibit a high risk of developing voice disorders. Similar to teachers, religious officials regularly engage in prolonged voice use often in acoustically challenging environments.

Aswathy and Shetty (2022) investigated the acoustic characteristics of voice among 22 male Khatibs using PRAAT software. Parameters such as fundamental frequency, jitter, shimmer and HNR were analysed, and the findings highlighted slight variations in vocal parameters and the importance of vocal hygiene among professional voice users.

AlBustan, Marie, Darawsheh and Natour (2022) studied voice handicap and acoustic measures among Arab Kuwaiti prospective professional singers and found no significant relationship between perceived voice handicap and acoustic measurements.

Elsherbeny, Baz and Afsah (2022) compared the acoustic characteristics of voice and speech in Arabic-speaking children with stuttering and found noticeable differences when compared to typically developing children.

Krishna, Swalih, Das and Priyadharshini (2023) studied acoustic voice measures and the Voice Handicap Index-10 among Imam trainees using PRAAT software. The findings showed significant differences in the noise-to-harmonic ratio, jitter and shimmer between beginner and experienced trainees, although no significant self-perceived voice problems were reported.

Jaber and Ibrahim (2025) examined the acoustic characteristics of long vowels among Jordanian Arabic speakers with Class III malocclusion using PRAAT software. The findings showed significant differences in formant frequencies (F1, F2 and F3) between speakers with malocclusion and those with normal occlusion.

Ahmed, Aly, Ahmed and Gelaney (2026) investigated the acoustic voice characteristics of Arabic-speaking dysphonic adults using PRAAT. The findings showed that PRAAT-derived acoustic measures effectively differentiated dysphonic from normal voices and confirmed the reliability of PRAAT-based acoustic analysis for assessing dysphonia.

Need of the Study

Khatibs and Muʾadhins are professional religious voice users who depend on prolonged and frequent voice use for sermons and Adhan. Continuous vocal demand may lead to vocal strain and changes in voice quality. However, limited research has objectively analysed and compared the acoustic characteristics of their voices using parameters such as F0, jitter, shimmer and HNR. Therefore, the present study was conducted to evaluate the impact of occupational vocal demand on voice characteristics and to create awareness about vocal hygiene among professional religious voice users.

METHODOLOGY

Aim

The aim of the study was to examine the acoustic characteristics of Khatibs and Mu'adins by comparing vocal parameters including fundamental frequency, jitter, shimmer and harmonic-to-noise ratio.

Subjects

30 Malayalam-speaking individuals from various districts of Kerala, including 15 Khatibs and 15 mu'addins in the age range of 35- 55 years. All participants were native speakers of Malayalam and actively deliver the Khutbah or perform the Adhan in mosques within their respective districts.

Inclusion criteria,

- Male Khatibs and Muʾaddins actively working in mosques.
- Minimum of 10 years of work experience.
- Individuals with regular vocal duties.

Exclusion Criteria

- History of diagnosed voice disorders.
- History of speech, language, hearing and other medical problems.

Procedure

Subjects were seated comfortably in a quiet room and instructed to produce a sustained phonation at a comfortable pitch and loudness level. The voice samples were recorded using a laptop and analysed using PRAAT software. From each recording, acoustic parameters including fundamental frequency (F0), jitter, shimmer and harmonics-to-noise ratio (HNR) were extracted for analysis and ensuring consistent recording conditions across all subjects.

Statistical analysis

Data were analysed using Jamovi (2.7.30) software. The Shapiro-Wilk test showed normal distribution ($p > 0.05$) for all acoustic characteristics. Therefore, an independent samples t-test was used to compare the Khatib and Mu'addin groups.

RESULT

The study aimed to assess the acoustic analysis of voice in Mu'addin and Khatib and to compare the voice characteristics, F0, JITTER, SHIMMER and HNR. The obtained data were statistically analysed and the results are discussed below.

Table 1: ***Shows the comparison of Khatib and Mu'addin.***

Acoustic Characteristics	Group	N	Mean	SD	Test Statistic	df	p-value	Significance
F0 (Hz)	Khatib	15	178.33	3.3947	6.33	28	<0.001	S
	Mu'adhin	15	188.33	5.0943				
Jitter %	Khatib	15	2	0.071	11.54	28	<0.001	S
	Mu'adhin	15	1.76	0.0371				
Shimmer %	Khatib	15	4.92	0.2333	10.76	28	<0.001	S
	Mu'adhin	15	4.17	0.1384				
HNR(dB)	Khatib	15	15.6	0.391	-18.28	28	<0.001	S
	Mu'adhin	15	17.64	0.1844				

S: Significance

Table 1 indicates significant differences in all acoustic characteristics between Khatib and Mu'addin groups ($p < 0.001$). Khatibs showed higher Jitter and Shimmer values, while Mu'addins showed higher F0 and HNR values, indicating greater vocal strain in Khatibs.

DISCUSSION

The present study revealed significant differences in acoustic characteristics between Khatibs and Muʾaddins. Khatibs showed higher jitter and shimmer values and lower HNR values, indicating greater vocal strain due to prolonged vocal use. Muʾaddins showed higher F0 and HNR values, reflecting better vocal quality. Findings correlate with the study by Aswathy and Shetty (2022), which also reported variations in F0, jitter, shimmer and HNR among Khatibs and emphasised the importance of vocal hygiene among professional voice users.

SUMMARY AND CONCLUSION

Voice is an essential component of human communication and plays an important role in professional voice users such as Khatibs and Muʾadhins. The present study aimed to examine and compare the acoustic characteristics of voice between Khatibs and Muʾadhins using parameters such as fundamental frequency (F0), jitter, shimmer and harmonics-to-noise ratio (HNR). Thirty Malayalam-speaking male participants including 15 Khatibs and 15 Muʾadhins aged 35-55 years were selected from different districts of Kerala. The results revealed significant differences in all acoustic parameters between the two groups ($p < 0.001$). Khatibs showed higher jitter and shimmer values and lower HNR values indicating greater vocal strain due to prolonged vocal use whereas Muʾadhins demonstrated better vocal quality. The study concludes that occupational vocal demands significantly influence vocal characteristics and highlights the importance of vocal hygiene awareness among professional religious voice users.

Limitation

- Sample size is limited
- Selection of participants was random

Future direction

- Can be done in different populations
- Can be done more sample size

REFERENCE

1. Ahmed, M., Aly, H., Ahmed, S., & Gelaney, M. (2026). Acoustic voice characteristics of Arabic-speaking dysphonic adults using PRAAT software. *Journal of Voice*. Advance online publication.
2. AlBustan, S. A., Marie, B. S., Darawsheh, W. B., & Natour, Y. S. (2022). Voice handicap and acoustic measures among Arab Kuwaiti prospective professional singers. *Journal of Voice*. Advance online publication.
3. Aswathy, K., & Shetty, S. Acoustic characteristics of voice among male khatibs using PRAAT software. *International Journal of Health Sciences*, 2022; *6*(S4): 11234–11241.
4. Büyükatalay, Z., Gökmen, Z., & Dursun, G. Comparison of voice disorder risk between teachers and Islamic religious officials. *Journal of Voice*, 2020; *34*(5): 812.e1–812.e7.
5. Colton, R. H., & Casper, J. K. *Understanding voice problems: A physiological perspective for diagnosis and treatment* (3rd ed.). Williams & Wilkins, 1996.
6. Elsherbeny, M., Baz, H., & Afsah, O. Acoustic characteristics of voice and speech in Arabic-speaking children with stuttering. *Folia Phoniatrica et Logopaedica*, 2022; *74*(4): 256–264.
7. Farahat, M., & Mesallam, T. A. Psychosocial assessment of voice problems among Saudi imams. *Journal of Advances in Medicine and Medical Research*, 2016; *11*(12): 1–7. https://doi.org/10.9734/BJMMR/2016/22041
8. Jaber, A., & Ibrahim, A. (2025). Acoustic analysis of long vowels in Jordanian Arabic with Class III malocclusion. *Journal of Speech, Language, and Hearing Research*. https://doi.org/10.1044/2025_JSLHR-25-00165
9. Krishna, Y., Swalih, M. N. A., Das, D., & Priyadharshini, V. Correlation between some vocal acoustic measures and Voice Handicap Index-10 in imam trainees. *Archives of Otolaryngology and Rhinology*, 2023; *7*(1): 1–6. https://doi.org/10.47739/2475-9473/1050
10. Natour, Y. S., Marie, B. S., Saleem, M. A., & Tadros, Y. K. Formant frequency characteristics in normal Arabic-speaking Jordanians. *Journal of Voice*, 2011; *25*(2): e75–e84. https://doi.org/10.1016/j.jvoice.2010.10.018
11. Pestana, P. M., Freitas, S. V., & Manso, M. C. The relevance of voice disorders in singers. *Journal of Voice*, 2017; *31*(6): 773.e1–773.e9.
12. Sarıca, S. (2018). Prevalence and risk factors for voice problems in imams. *Turkish Journal of Family Medicine and Primary Care* https://doi.org/10.21763/tjfmpc.462896