

F₀ Characteristics of Newsreaders on Varied Emotional Texts in Tamil Language

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Summary: Objective. The objective of this study was to profile speaking F₀ and its variations in newsreaders on varied emotional texts.

Study design. This study has a prospective, case-control study design.

Methods. Fifteen professional newsreaders and 15 non-newsreaders were the participants. The participants read the news bulletin that conveyed different emotions (shock, neutral, happy, and sad) in a habitual and “newsreading” voice. Speaking fundamental frequency (SFF) and F₀ variations were extracted from 1620 tokens using *Praat* software (version 5.2.32) on the opening lines, headlines, news stories, and closing lines of each news item. Paired *t* test, independent *t* test, and Friedman test were used for statistical analysis.

Results. Both male and female newsreaders had significantly ($P \leq 0.05$) higher SFFs and standard deviations (SDs) of SFF in newsreading voice than speaking voice. Female non-newsreaders demonstrated significantly higher SFF and SD of SFF in newsreading voice, whereas no significant differences were noticed in the frequency parameters for male non-newsreaders. No significant difference was noted in the frequency parameters of speaking and newsreading voice between male newsreaders and male non-newsreaders. A significant difference in the SD of SFF was noticed between female newsreaders and female non-newsreaders in newsreading voice. Female newsreaders had a higher frequency range in both speaking voice and newsreading voice when compared with non-newsreaders.

Conclusions. F₀ characteristics and frequency range determine the amount of frequency changes exercised by newsreaders while reading bulletins. This information is highly pedagogic for training voices in this profession.

Key Words: Newsreaders–Speaking fundamental frequency–Standard deviation of speaking fundamental frequency–Frequency range–F₀ characteristics.

INTRODUCTION

Professional voice users are individuals who directly depend on vocal communication for their livelihood. They are highly dependent on their voices in their ability to perform their job and meet professional commitments. Most of them view vocal aberrations as occupational hazards and consider the loss of voice for even a short time as a major inconvenience.¹

Koufman and Blalock² classified professionals who require voice use into four levels, depending on the impact of job performance when vocal quality is affected (Table 1). Depending on the level of professional voice use, the vocal sophistication, voice needs, the style of voice use, and the overall amount of voice use vary. Elite voice users are considered as those in whom even the slightest vocal aberrations are considered as potential threats for their profession. Elite professional voice users require artistic use of voice, and hence, vocal quality becomes their major concern. Singers, actors, and TV and radio news broadcasters belong to this group of professional voice users. However, even within the group, vocal specifications vary according to the profession. Singers are generally required to have a strong and clear voice with a broad vocal range, whereas a newsreader must speak

fast with clear articulation and good diction. Level II professional voice users are individuals in whom only a moderate vocal difficulty affects job performance. These voice users include teachers, clergy, politicians, lawyers, public speakers, and telephone operators, who require extensive voice use, and therefore, vocal stamina is considered to be highly important for them.^{3,4} Level III voice users are known as nonvocal professionals in whom only a severe voice problem can affect their professional performance. Level IV nonvocal nonprofessionals require only minimal voice usage for their profession and are not affected by any degree of dysphonia.

Of all these levels of professional voice users, the elite voice users are considered as those in whom even the slightest vocal aberrations are serious. Among the elite voice users, the voice characteristics and voice needs of singers have been extensively researched, whereas only little information is available on the voice characteristics of other elite vocal performers such as television and radio newsreaders.^{5,6}

Type of voice suitable for broadcasters and newsreaders

Early radio and television broadcasters and newsreaders were expected to have a low-pitched voice, described as a “deep voice” or “bass voice.” A low-pitched voice was considered so much in vogue for elite voice users such as actors and newsreaders that the term “Bogart-Bacall syndrome” was coined after the personalities Humphrey Bogart and Lauren Bacall for their characteristic low-pitched voices.^{2,7,8} An artistic voice, such as a stringent, demanding, persistent, and powerful voice spoken in a controlled tone and at an optimal pitch level with good breath

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TABLE 1.
Classification of Professional Voice Users

Level	Type of Vocal Professional	Degree of Voice Dysfunction That Affects Job Performance
Level I	Elite vocal performance (singers, actors, and TV and radio broadcasters)	Slight
Level II	Professional voice users (teachers, clergy, politicians, and lawyers)	Moderate
Level III	Nonvocal professionals	Severe
Level IV	Nonvocal nonprofessionals	Not affected at all

support and well-blended resonance, is well suited for the purpose of news reading.⁴ Majority of the broadcasters prefer a low-pitched voice because it arouses a greater sense of credibility, trust, and confidence.⁹ With respect to the voice quality, the voice that has resonance and clarity is preferred because it is perceived to be more important.⁹ However, this information comes predominantly from Western researches, and the same may not apply to Indian newsreaders, especially when they read news in vernacular languages. Systematic surveys and voice laboratory studies are warranted to validate this assumption. The investigators are not aware of any published literature in these aspects from the Indian subcontinent to date apart from their own study, which was a profile on voice needs, voice demands, and vocal and nonvocal habits of professional newsreaders.¹⁰

Today, a large range of voices are accepted for news broadcasting, with the minimum requirement being a pleasing voice or a voice that is not too difficult to listen to. A good broadcasting voice, however, is considered to be one that has an effect on the listeners, one that cannot be ignored but has to be listened to, compelling the listeners in some way and reflecting the personality of the broadcaster.¹¹ These characteristics may be true to a newsreader from any part of the globe.

It is more than perceived wisdom that the voice serves as an important element for newsreaders to communicate. It not only transmits the text but also reflects the affective meaning of the conveyed message. Despite its importance, most novice newsreaders do not train to acquire vocal specifications that are characteristic of a “newsreading voice.” Further, there is no literature confined to the type of voice used by professional newsreaders and voice characteristics of newsreaders in India. Hence, the present study compares the differences (if any) in the frequency characteristics of speaking and newsreading voices of newsreaders in Tamil language (language spoken in Tamil Nadu, South India) with those of non-newsreaders. The study also profiles the F_0 characteristics of newsreaders on varied emotional texts in Tamil. Tamil is the language that is spoken

worldwide and is considered as an official language in many parts of the world, such as the Indian states of Tamil Nadu, Sri Lanka, and Singapore.¹²

METHODS

Participants

Fifteen newsreaders (5 males and 10 females) and a matched control of 15 non-newsreading individuals who satisfied the inclusion and exclusion criteria were selected for voice analysis. Of the 15 newsreaders, 14 were working in television channels and 1 was in a radio station. Of the 15 newsreaders, only 2 newsreaders had a degree in mass communication or journalism. The participants were in the age range of 29–57 years, with a mean age of 38.4 years (standard deviation [SD] = 9.82) (Table 2). In the present study, newsreaders were individuals who read news in vernacular broadcasting stations and had no other occupation. Non-newsreaders were individuals who were not working or had not worked in the past in any broadcasting station in any capacity.

Inclusion criterion for professional newsreaders

For inclusion in the study, professional newsreaders should have a minimum experience of at least 1 year in reading news in Tamil.

Exclusion criteria for professional newsreaders

Exclusion criteria for professional newsreaders included the following:

1. presence of another job in addition to news reading that required extensive voice use,
2. complaint of or previous history of voice disorder that required medical or surgical intervention, and
3. complaint of or presence of upper respiratory tract infection or throat infection.

TABLE 2.
Age and Gender Information of Participants Who Participated in the Acoustic Analysis

Group	Total	Males	Females	Age Range (y)	Mean (y)	SD
Professional NR	15	5	10	29–57	38.42	9.82
Non-NR	15	5	10	29–57	39.01	10.01

Abbreviation: NR, newsreader.

TABLE 3.
News Stories in the News Bulletin

Emotion	Corresponding News Story
Shock	Mumbai terrorist attack in 2008
Neutral	Distribution of application forms for university degrees
Happy	Indian cricket team wins the world championship in 2011
Sad	Death of infants caused by a fire accident

Inclusion criteria for non-newsreaders

The inclusion criteria for non-newsreaders were the following:

1. age- and gender-matched individuals with professional newsreaders, and
2. proficiency in reading Tamil (declared by the individual and was verified by one of the investigators by asking them to read a passage in Tamil).

Exclusion criteria for non-newsreaders

The inclusion criteria for non-newsreaders were the following:

1. presence of a job that required extensive voice use,
2. complaint of or previous history of a voice disorder that required medical or surgical intervention, and
3. complaint of or presence of upper respiratory tract infection or throat infection.

The study was carried out in three steps:

1. development of speech material (news bulletin),
2. recording of speech material, and
3. acoustic analysis.

Development of speech material

The speech material was a 2- to 3-minute news bulletin that comprised four stories and four corresponding headlines conveying four different emotions. The news stories conveyed the following emotions, viz, shock, neutrality, happiness, and sadness (Table 3).

During the process of development of the news bulletin, five news stories belonging to each emotional category were listed down. These news stories were obtained from old archives in the websites of news broadcasting stations. A general consensus of the news story that best conveyed the particular emotion was obtained from 20 individuals who were working in broadcasting stations. The individuals were asked to choose from the list, a single story that best expressed the particular emotion. The news story that received the highest vote in each emotional category was selected to prepare the final news bulletin. The final news bulletin comprised an opening statement, four news stories with four corresponding headlines, and a closing statement.

Recording procedure of speech material

Instrumentation. The voice recording from the newsreaders was performed in the clinical voice laboratory at Sri Ramachandra University or in a soundproof booth in a recording studio of the broadcasting station, depending on the convenience of the newsreaders. Voice recording was always performed in the clinical voice laboratory at Sri Ramachandra University in the case of non-newsreaders. Speech samples were recorded using a Sony digital voice recorder (Model UX523, Sony, Las Vegas, Nevada). The recorder consisted of an inbuilt condenser microphone and a sampling rate of 44,100 Hz was used. Microphone-to-mouth signals were kept at a distance of 5 cm and at an off-angle position to the corner of the mouth of the speaker.

Recording of speech sample. The participants were seated comfortably in a quiet room and were instructed to read the news bulletin twice, each time in a different manner. The instructions were as follows:

1. Read the news in a comfortable pitch and loudness using the habitual voice or the voice used in everyday speaking situations (speaking voice).
2. Read the news as if on air and manage or handle mistakes (if any) in an appropriate manner (newsreading voice). Coping

Acoustic analysis

Acoustic analysis was performed using the *Praat* software (version 5.2.32, Praat, Amsterdam, Netherlands). The samples were displayed as a waveform. Each news bulletin comprised two opening lines, four news headlines, four news stories (each consisting of four to five sentences), and three closing lines. Cumulatively, the entire news bulletin comprised 27 sentences. Each sentence from the news bulletin was separated and selected for analysis. A total of 1620 sentences and tokens (read by 15 newsreaders and 15 non-newsreaders) were analyzed. The edit menu was used to extract individual tokens from the sample. Each sample lasted for approximately 3–8 seconds in duration. These tokens were verified for completeness of sentence and acoustic information through auditory feedback. *Praat* software was used to assess three frequency parameters of voice in the speaking voice (810 tokens) and the newsreading voice (810 tokens). The frequency parameters were

The **speaking fundamental frequency (SFF)**, measured in hertz, is the mean of the fundamental frequencies used during speech. It provides a useful comparison between the voices of different speakers.¹³

The **SD of SFF**, measured in hertz, is the average distance of measures from the SFF.

The **frequency range**, measured in semitones, is the difference between the maximum and the minimum fundamental frequencies used during speech.

The SD of SFF and the frequency range act as good indicators of F₀ variability in speech.¹³

TABLE 4.
Comparison of SFF (Hz) Between the Speaking Voice and the Newsreading Voice in Male and Female Newsreaders

Items	Male					Female				
	Speaking Voice (Hz)		Newsreading Voice (Hz)		P Value	Speaking Voice (Hz)		Newsreading Voice (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	105	5.1	122	20.2	0.106	201	22.5	217	23.5	0.002†
Headlines	115	10.9	139	27.9	0.036*	209	24.4	241	20.6	0.007†
Shock news	114	10.2	133	18.2	0.021*	201	20.0	231	19.6	0.000†
Neutral news	116	10.4	136	17.8	0.014*	202	20.4	232	19.9	0.000†
Happy news	117	11.2	135	20.6	0.026*	203	19.6	232	22.01	0.001†
Sad news	115	12.3	136	24.2	0.043*	202	19.5	228	21.02	0.000†
Closing line	110	16.3	132	24.2	0.034*	197	27.1	229	22.41	0.003†

* $P \leq 0.05$.

† $P \leq 0.001$.

Abbreviation: M, mean.

The values obtained for each parameter were averaged separately for each emotion, headlines, opening lines, and closing lines.

Scoring and analysis

The following comparisons for the SFF, the SD of SFF, and the frequency range were made (separately for males and females) to determine the extent of variation in the voice between the following groups:

- i. Comparison between the speaking voice and the newsreading voice (SFF and SD of SFF) in male and female newsreaders
- ii. Comparison between the speaking voice and the newsreading voice (SFF and SD of SFF) in male and female non-newsreaders
- iii. Comparison of the speaking voice (SFF and SD of SFF) between newsreaders and non-newsreaders (male and female)
- iv. Comparison of the newsreading voice (SFF and SD of SFF) between newsreaders and non-newsreaders (male and female).
- v. Comparison of speaking voice (frequency range) between newsreaders and non-newsreaders (male)
- vi. Comparison of speaking voice (frequency range) between newsreaders and non-newsreaders (female)
- vii. Comparison of newsreading voice (frequency range) between newsreaders and non-newsreaders (male)
- viii. Comparison of newsreading voice (frequency range) between newsreaders and non-newsreaders (female)

Paired *t* test was used to compare the speaking and newsreading voices in newsreaders and in non-newsreaders. Independent *t* test was used to compare the speaking voice and the newsreading voice between newsreaders and non-newsreaders. Friedman test was used to compare emotions across each type of voice for newsreaders and non-newsreaders.

RESULTS

Differences in the voice parameters during news reading and habitual speaking were used to determine the amount of change in the frequency of voice adopted for news reading.

- i. Comparison between the speaking voice and the newsreading voice (SFF and SD of SFF) in male and female newsreaders

On comparing the speaking and the newsreading voices in male newsreaders, the SFF was significantly higher in newsreading voice in all news items except for the opening line. The SD of SFF was significantly higher in newsreading voice for headlines, shock news, and closing line. In female newsreaders, the SFF and the SD of SFF of newsreading voice were significantly higher in all the news items than in speaking voice (Tables 4 and 5).

- ii. Comparison between the speaking voice and newsreading voice (SFF and SD of SFF) in male and female non-newsreaders

No significant difference in SFF was noticed between the speaking voice and the newsreading voice in male non-newsreaders. Only for happy and sad news was the SD of SFF significantly higher in newsreading voice. However, in female non-newsreaders, the SFF was significantly higher in all news items in newsreading voice except for the opening line. The SD of SFF was significantly higher in newsreading voice only for shock news, neutral news, happy news, and sad news (Tables 6 and 7).

- iii. Comparison of the speaking voice (SFF and SD of SFF) between newsreaders and non-newsreaders (male and female)

No significant difference was found in the frequency parameters of speaking voice across both genders between newsreaders and non-newsreaders (Tables 8 and 9).

TABLE 5.
Comparison of SD of SFF (Hz) Between the Speaking Voice and the Newsreading Voice in Male and Female Newsreaders

Items	Male					Female				
	Speaking Voice (Hz)		Newsreading Voice (Hz)		P Value	Speaking Voice (Hz)		Newsreading Voice (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	11.9	8.9	21.1	11	0.212	27	10.9	32.3	10.8	0.040*
Headlines	17.6	3.1	26.2	7.9	0.040*	33.6	8.7	40.5	9.3	0.010†
Shock news	23.7	3.9	31.5	5.5	0.011*	33.3	7.6	42.7	6.9	0.000†
Neutral news	25	7.7	32	3.8	0.145	34.6	7.5	45	6.9	0.000†
Happy news	23.7	5.2	27.6	7.8	0.050*	35.6	9.5	47.2	6.9	0.001†
Sad news	22.3	5.3	30.7	9.3	0.054	33.4	6.6	45.4	5.9	0.000†
Closing line	17.4	6.4	24.7	7.9	0.009†	33.5	7.7	47.3	8.6	0.001†

* $P \leq 0.05$.

† $P \leq 0.001$.

Abbreviation: M, mean.

TABLE 6.
Comparison of SFF and SD of SFF Between the Speaking Voice and Newsreading Voice in Male Non-newsreaders

Items	SFF					SD of SFF				
	Speaking Voice (Hz)		Newsreading Voice (Hz)		P Value	Speaking Voice (Hz)		Newsreading Voice (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	121	24.5	136	34	0.078	19	13	17	8.8	0.799
Headlines	125	30.5	141	34.7	0.064	15	5.2	19	7	0.144
Shock news	129	32.7	144	35.7	0.103	21	2.5	27.2	7.6	0.075
Neutral news	127	29.5	143	37.3	0.178	19	5.6	25	6.3	0.142
Happy news	128	27.9	145	36.7	0.147	19	3.7	26	4.4	0.035*
Sad news	129	28.7	146	35.9	0.080	20	3	27	1.2	0.010†
Closing line	126	30.3	142	39.5	0.1040	15	7.5	18	7.1	0.404

* $P \leq 0.05$.

† $P \leq 0.001$.

Abbreviation: M, mean.

TABLE 7.
Comparison of SFF and SD of SFF Between the Speaking Voice and Newsreading Voice in Female Non-newsreaders

Items	SFF					SD of SFF				
	Speaking Voice (Hz)		Newsreading Voice (Hz)		P Value	Speaking Voice (Hz)		Newsreading Voice (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	196	24.4	207	23	0.051	23	5.3	27	11.3	0.287
Headlines	201	20.6	216	24.3	0.004†	27	6.5	30	8.8	0.076
Shock news	203	26.4	213	23	0.017*	27	6	31	7.1	0.010†
Neutral news	203	26.8	217	25	0.007†	26	6	34	6.6	0.000†
Happy news	206	27.7	215	26	0.047*	30	7.8	34	7.5	0.016†
Sad news	209	28	218	27	0.050*	28	6.7	34	8.1	0.002†
Closing line	199	29	211	27	0.019*	24	6.7	29	8.8	0.056

* $P \leq 0.05$.

† $P \leq 0.001$.

Abbreviation: M, mean.

TABLE 8.
Comparison of SFF of Speaking Voice Between Newsreaders and Non-newsreaders (Male and Female)*†

Items	Male					Female				
	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	105	5.1	121	24.5	0.197	201	22.5	196	24.4	0.590
Headlines	115	10.9	125	30.5	0.538	210	24.4	201	20.4	0.373
Shock news	114	10.2	130	32.7	0.360	201	20	203	26.4	0.919
Neutral news	117	10.4	128	29.5	0.464	202	20.4	203	26.8	0.910
Happy news	117	11.2	128	27.9	0.430	203	19.6	206	27.7	0.761
Sad news	116	12.3	130	28.7	0.363	202	19.5	210	28	0.524
Closing line	110	16.3	126	30.3	0.344	198	27.1	199	29	0.923

* $P \leq 0.05$.† $P \leq 0.001$.

Abbreviation: M, mean.

- iv. Comparison of the newsreading voice (SFF and SD of SFF) between newsreaders and non-newsreaders (male and female)

No significant difference was found in the frequency parameters in newsreading voice between male newsreaders and male non-newsreaders. A significant difference was noticed in the SFF of newsreading voice between female newsreaders and female non-newsreaders only while reading headlines. However, the SD of SFF was significant in all news items except for the opening line (Tables 10 and 11).

- v. Comparison of speaking voice (frequency range) between newsreaders and non-newsreaders (male)

Comparison of the frequency ranges (in semitones) between male newsreaders and male non-newsreaders revealed no significant differences except for the shock news and the closing line ($P < 0.05$) (Table 12).

- vi. Comparison of speaking voice (frequency range) between newsreaders and non-newsreaders (female)

The frequency range was compared between female newsreaders and non-newsreaders. Results revealed significant differences in the frequency range (in semitones) across all news items except for the opening and the closing lines ($P < 0.05$). As with female newsreaders, the frequency range was consistently higher in newsreaders when compared with non-newsreaders across all items of the news bulletin except for the opening and the closing lines (Table 12).

- vii. Comparison of newsreading voice (frequency range) between newsreaders and non-newsreaders (male)

Comparison of the frequency ranges (in semitones) of newsreading voice between male newsreaders and male non-newsreaders revealed no significant differences (Table 13).

TABLE 9.
Comparison of SD of SFF of Speaking Voice Between Newsreaders and Non-newsreaders (Male and Female)*†

Items	Male					Female				
	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	12	8.9	19	13	0.379	27	10.9	23	5.3	0.590
Headlines	18	3.1	15	5	0.309	34	8.7	27	6.5	0.373
Shock news	24	3.9	21	2.5	0.228	33	7.6	27	6	0.919
Neutral news	25	7.7	19	5.6	0.209	35	7.5	26	6	0.910
Happy news	24	5.2	19	3.7	0.171	36	9.5	30	7.8	0.761
Sad news	22	5.3	20	3	0.384	33	6.6	28	6.7	0.520
Closing line	17	6.4	15	7.5	0.618	34	7.7	24	6.7	0.923

* $P \leq 0.05$.† $P \leq 0.01$.

Abbreviation: M, mean.

TABLE 10.
Comparison of SFF of Newsreading Voice Between Newsreaders and Non-newsreaders (Male and Female)[†]

Items	Male					Female				
	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	122	20.2	136	34	0.446	217	23.5	207	23	0.348
Headlines	139	27.9	141	34.7	0.929	242	20.6	216	24.3	0.022*
Shock news	133	18.2	144	35.7	0.579	232	19.6	213	23	0.066
Neutral news	137	17.8	143	37.3	0.763	232	19.9	217	24.5	0.14
Happy news	136	20.6	145	36.7	0.634	233	22	215	25.9	0.124
Sad news	137	24.2	146	35.9	0.629	229	21	218	27.2	0.343
Closing line	132	24.2	142	39.5	0.651	230	22.4	211	27.1	0.11

* $P \leq 0.05$.

[†] $P \leq 0.01$.

Abbreviation: M, mean.

TABLE 11.
Comparison of SD of SFF of Newsreading Voice Between Newsreaders and Non-newsreaders (Male and Female)

Items	Male					Female				
	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	21	11	17	8.8	0.500	217	23.5	207	23	0.322
Headlines	26	7.9	19	7	0.182	242	20.6	216	24.3	0.024*
Shock news	32	5.5	27	7.5	0.333	231	19.6	213	23	0.001 [†]
Neutral news	32	3.8	25	6.3	0.055	232	19.9	217	24.5	0.002 [†]
Happy news	28	7.8	26	4.4	0.756	233	22	215	25.9	0.001 [†]
Sad news	30	9.3	27	1.2	0.404	229	21	218	27.2	0.001 [†]
Closing line	25	7.9	18	7.1	0.207	230	22.4	211	27.1	0.000 [†]

* $P \leq 0.05$.

[†] $P \leq 0.01$.

Abbreviation: M, mean.

TABLE 12.
Comparison of Frequency Range (Semitones) Between Newsreaders and Non-newsreaders in the Speaking Voice (Males and Females)

Items	Male					Female				
	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	3.8	1.6	3.5	1.0	0.84	5.0	2.5	3.8	1.6	0.28
Headlines	7.0	2.0	5.1	0.9	0.31	8.3	2.6	5.5	2	0.02*
Shock news	8.6	1.2	5.6	1.6	0.03*	7.9	2.5	5.9	1.6	0.05*
Neutral news	9.6	1.9	6.1	2.2	0.09	9.2	2.4	6.1	1.6	0.01 [†]
Happy news	8.9	1.7	5.6	2.1	0.09	8.9	2.1	6.9	2.0	0.05*
Sad news	8.5	1.5	5.4	1.9	0.09	8.3	2.5	5.9	1.4	0.02*
Closing line	6.1	1.7	4.0	0.8	0.03*	5.6	1.8	4.8	1.2	0.22

* $P < 0.05$.

[†] $P < 0.01$.

Abbreviation: M, mean.

TABLE 13.
Comparison of Frequency Range (Semitones) Between Male Newsreaders and Male Non-newsreaders in the Newsreading Voice

Items	Male					Female				
	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value	Newsreaders (Hz)		Non-newsreaders (Hz)		P Value
	M	SD	M	SD		M	SD	M	SD	
Opening line	3.7	0.8	4.2	1.9	0.55	5.0	2.5	3.8	1.6	0.28
Headlines	8.6	2.4	6.0	2.1	0.09	8.3	2.6	5.5	2	0.02*
Shock news	10.4	1.3	6.7	2.4	0.09	7.9	2.5	5.9	1.6	0.05*
Neutral news	9.7	1.7	6.8	2.4	0.09	9.2	2.4	6.1	1.6	0.01†
Happy news	10.1	2.3	7.5	3.0	0.15	8.9	2.1	6.9	2.0	0.05*
Sad news	10.2	1.8	7.0	3.1	0.09	8.3	2.5	5.9	1.4	0.02*
Closing line	7.7	2.4	5.3	1.0	0.42	5.6	1.8	4.8	1.2	0.22

* $P < 0.05$.

† $P < 0.01$.

viii. Comparison of newsreading voice (frequency range) between newsreaders and non-newsreaders (female)

The frequency range was compared between female newsreaders and non-newsreaders for significant differences. Results revealed significant differences in the frequency range across all news items ($P < 0.05$) (Table 13).

DISCUSSION

According to Benninger et al¹⁴ the SFF of the newsreading voice was consistently higher in both male and female newsreaders. The natural pitch level for speaking is in the lower part of the modal register, around 128 Hz in males and 225 Hz in females and is consistent with the findings in the present study. However, the increase in the SFF can be attributed to the increase in vocal pitch that accompanies increased loudness levels especially while reading news. The SD of SFF was significantly higher in the newsreading voice than the speaking voice in both male and female newsreaders for a majority of news items. Professional newsreaders are artistic voice users whose voices have more inflection or variability in pitch, adequate loudness levels, and increased variability in loudness to mark meaning.¹⁵ In female non-newsreaders, the SFF of newsreading voice was significantly higher than their speaking voice. However, the SFF of newsreading voice was not significant in male non-newsreaders. This finding could possibly be due to the reason that most non-newsreaders associated increased loudness in voice as a characteristic component of the newsreading voice. This finding could have yielded similar results between newsreaders and non-newsreaders in terms of SFF, especially in females in the present study (for reasons unknown).

Again, like newsreaders, significant differences in the SD of SFF in newsreading voice were noticed in non-newsreaders but only for few of the emotional items and not for the opening and the closing lines or the headlines. The reason could be that although non-newsreaders attempted to imitate the newsreading voice in terms of increased loudness, nuances of using an artistic voice that contributed to significant pitch variability,

especially for the opening lines, the closing lines, and the headlines that are inherent to the newsreading profession, may not be as easy to mimic by non-newsreaders. Usually, the commencement and the termination of news are always accompanied by background music. The newsreader requires raising his or her voice above this while reading the opening lines, the closing lines, and the headlines. Males inherently possess a louder voice than females.^{16,17} As a result, newsreaders may alter loudness and pitch to be heard differently over the background noise. These expectations on voice and voice needs of news broadcasters explain the difference in findings obtained for the SD of SFF in the male and female newsreaders.

Comparison of the SFF in the newsreading voice and the speaking voice between newsreaders and non-newsreaders did not reveal significant differences in both males and females. This is possibly due to an attempt by the non-newsreaders to produce the newsreading task in a manner similar to a (typical) newsreader. Although newsreaders are considered to be artistic voice users, their habitual voices or speaking voices were comparable with the speaking voices of non-newsreaders. In newsreading and speaking tasks, male newsreaders used a lower pitch, whereas female newsreaders used a higher pitch compared with their control. These findings on newsreaders are similar to that reported by Koufman and Blalock² (in males) and Neil et al (in females).¹⁷

No significant difference in the SD of SFF was noticed between the newsreading voice of male newsreaders and male non-newsreaders. However, there was a significant difference in the SD of SFF in female newsreaders in all news items except for the opening line. This finding was in agreement with Neil et al,¹⁷ who reported significant differences in the SD of SFF between female newsreaders and non-newsreaders.

Borrego et al¹⁸ investigated the influence of a radio announcing course on speech and voice parameters while reading. Borrego et al reported a higher frequency range on a reading task attributed to the use of greater and higher modulation after training. In the current study, although only a minority of the newsreaders (30%) reported to have undergone formal voice training, they all reported to have learned the nuances of news reading through

observation and trial-and-error methods, enabling artistic and wide range of voice use (higher frequency range) for news reading.

CONCLUSIONS

F₀ characteristics possibly depict the amount of vocal changes exercised by newsreaders during news reading. Comparisons with non-newsreaders have led to the identification of unique aspects of F₀ variation in newsreaders. This is the first study conducted in India focusing on frequency characteristics of such elite voice professionals. It was interesting to know that the study findings were not different from that published earlier predominantly from western countries. This finding is convincing as there are no formal indigenous training programs or methods that specifically captures and addresses vernacular nuances. The influence of globalization and the rapid progress of the media and communication industry cannot be undermined while considering the findings from the present study.

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