

**VOCAL PROBLEMS AND VOICE CHARACTERISTICS
IN THEYYAM ARTISTS**

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Register Number: P01II21S0035

A Dissertation submitted in Part Fulfillment of Degree of
Master of Science (Speech-Language Pathology)
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September 2023**

CERTIFICATE

This is to certify that this dissertation entitled “**Vocal Problems and Voice Characteristics in Theyyam Artists**” is a bonafide work submitted in part fulfillment for degree of Master of Science (Speech-Language Pathology) of the student Registration number: P01II21S0035. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other diploma or degree.

Mysuru
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DECLARATION

This is to Certify that this dissertation entitled-“**Vocal Problems and Voice Characteristics in Theyyam Artists**” is the result of my own study under the guidance of Dr. T. Jayakumar, (Associate Professor in Speech Sciences, Department of Speech-Language Sciences, All India Institute of Speech and Hearing, Mysuru) and has not been submitted to any other university for the award of any diploma and degree.

Mysuru
September, 2023

Register No:
P01II21S0035

Acknowledgment

*First and foremost, I would like to thank **God** for being able to complete this project with success.*

*Thank you **Acha & Amma** for your unconditional love and support which has brought me where I am today. Thank you would be a very small word to express how grateful I am to my parents, for always being there for me, always supporting me and encouraging me all along. I am blessed and extremely lucky to have you both in my life. Thank you for making my life so beautiful.*

*With my deepest sense of gratitude, I would like to thank my guide **Dr.T.Jayakumar**, for accepting me as his student and guiding me throughout this year. You are approachable and understanding. Thank you, Sir, for your patient listening, clearing even my silly doubts, and helping me correct my mistakes. Sir, you are so humble and down to earth as a person. I respect you from the bottom of my heart.*

*A special thanks to **Jesnu sir**, for his constant support and motivation from the beginning to the end. I would like to appreciate your positive attitude and your helping mentality.*

*My lifeline **Sarath**, you are my mood lifter, and I love you. Thank you for handling my mood swings, being with me all the time, bearing my madness, and refreshing my mind when there is a lot of mess. Thanks for always listening to me, supporting me, and encouraging me.*

*I would like to thank our beloved director **Dr. Pushpavathi**, for providing an opportunity and permitting me to carry out this study.*

*I extend my sincere thanks to **Mr. Srivivasa sir** for the timely help for and clearing all my doubts during the statistical analysis.*

*A special thanks to **Reuben Sir, Renjitha Ma'am and Anusmita Ma'am, Shyam Etan and Revathi Ma'am** for providing their valuable time and suggestions in content validating my questionnaire and perceptual evaluation of voice samples.*

*Thank you **Sinji, Kavya, Swathi, Himaja, Nimisha, Theresa, Divya, Reshu, Nivi, Swasu, Nithya and Nammu** for your encouragement and relentless motivation. Thank you for your never-ending love and support. Love you guys.*

*Thank you, **Adline, Aparna, Anirban, Kripa, Paathu, and Archana**, you people made my days at AIISH and the hostel life the most amazing. I'll never forget the days we spent together and I gonna miss you people.*

*My posting partners **Swalihh, Rhea, Shanky, Sneha and Musku**, you guys made the postings wonderful. I have always enjoyed your company and chitchats.*

*I sincerely thank **Vijeshetan, Shyjuetan and other Theyyam artists** who have participated in my study. I also extend my sincere thanks to all others who have participated in this study, without whom, this venture would not have been successful.*

*Thanks to my batchmates, **Resonators** for all their wholehearted support and motivation.*

I would like to thank all my teachers at AIISH for guiding and supporting me throughout.

I would also like to thank juniors, seniors and all involved directly or indirectly, who lent a hand in making this study a success.

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CHAPTER 1

INTRODUCTION

Voice plays a vital role in everyday life because it is the primary mode of human communication. It is because the speaker's social standing, character attributes, and emotional condition are all communicated through the voice (Zhang, 2016). Professional voice users (PVUs) are those who rely on their voice for income (Murry & Rosen, 2000). Actors, singers, lawyers, Anchors, cheerleaders, and other individuals who rely on vocal communication for their livelihood are on the rise. These individuals have a higher chance of experiencing voice problems (VPs) due to excessive voice use. Chances of voice problems are more in professional voice users who overuse their voices (Such as teachers and lawyers), those who abuse their voices in challenging situations (such as cheerleaders and street vendors), and in those who use their voices recreationally (such as singers and actors) when compared to individuals who do not use their voices professionally (typist, pharmacist, postman, etc. (Kalaiselvi, 2006).

Kerala's folk artists called Theyyam artists, are classified as professional voice users who abuse their voices in challenging situations. Kerala's folk arts can be broadly divided into two categories: ritualistic and non-ritualistic. Folk arts that involve rituals can be further separated into magical and religious categories. Folk arts that are performed in devotion are done so to honor a certain God or Goddess. Some of them are Theyyam, thirayattam, poothamthira, kanyarkali, kummatti, etc. According to Theyyam, the individual who assumes the position of divinity turns into God through a ritualistic procedure. In recent years, their primary focus has been on the

effects of vocal loading. Studies on the voice characteristics of priests (Hagelberg & Simberg, 2015), Imams (Abdelhamid & Al-Khoufi, 2017), teachers (Russell et al., 1998), customer service representatives (Rechenberg et al., 2011), Temple Purohits (Balasubramaniam et al., 2019), and stage actors (Manoj, 1998) have already been conducted. In the past, many studies have been conducted on various groups of professional voice users to determine voice problems and voice characteristics.

Theyyam is a form of Hindu ritualistic dance practiced in the Malabar region of Kerala (North side of Kerala) where the art form is revered as a regional cultural icon. Theyyam is also known by the names Kaliyattam and Tira. Theyyam is a collection of customs, ceremonies, ideologies, and traditions related to Malabar's temples and sacred groves and it incorporates local politics of the villages. In the Malabar area people consider Theyyam itself as a conduit to God and they thus pray for blessing from Theyyam. Theyyam performance combines instruments and vocals performance. Generally, their dance and singing performance lasts for 40-60 minutes which is entirely devotional in both spirit and performance. Due to the fact that the entire dance program is a commitment to God, performers must fast and prepare before performing (John & Jacob, 2015). The performer dances and invokes the deity, while the singer or artist also recite poems to the deity or tells a tale about the deity.

The men behind the Gods of Theyyam are mere mortals outside of performances. This ritual art is predominantly performed at the kavu*¹

*Kavu, the ancient term for sacred groves found along Kerala's Malabar Coast. Theyyam is a centuries-old ritual dance, is famous in Kavus.

(temples) or ancestral residences of the Nambiar, Thiyyar, Vaniyar, and Maniyani communities in the Kasaragod, Kozhikode, and Kannur districts of Kerala (Kusuman, 1990). Theyyam is only performed by men, though occasionally, girls under ten and older ladies will perform. There are a variety of dance rites associated with them, including the worship of spirits, ancestors, heroes, trees, animals, serpents, Goddesses of sickness, and the regional deity. The performer in Theyyam, which is based on folklorist traditional myths and performed in a ritualistic way, is literally seen as a manifestation of the divine monstrous who, via his or her performance, invokes ancient spirits and gods. The Theyyam professionals begin training for their divine roles at a young age, frequently in their early teens, according to a tradition that has been passed down through familial lines. Years are spent mastering the techniques needed for every aspect of the tradition (John & Jacob, 2015). After the harvest in October, the Theyyam season starts and lasts until April or May.

The performers vocalize with great effort while performing robust dances in heavy and colorful costumes. Theyyam performance can be longer than 12 or even 24 hours and during that time, he will not be able to eat or drink anything, which would lead to strain on his body. The performer works day and night for several weeks throughout the season, which puts a lot of pressure on him (John & Jacob, 2015).

The majority of artists (95%) have been required to work long hours without adequate food and rest as a critical health issue. Dancers work part-time jobs to augment their income to support their families because, according to 62 percent of dancers, their income from dance is very insufficient. This has demanded ongoing work and day and night activities, which has led to various

health issues. Over 42% of dancers report having hypertension on a regular basis. It is important to realize that eye makeup has contributed to eye illness in roughly 32% of dancers. Dancers report having rheumatic conditions (28%), as well as alcohol addiction (22%). It has been discovered that roughly 22% of dancers who regularly used alcohol to cope with the strain eventually developed an alcohol addiction. 33 percent of respondents identified arthritis as a prevalent disease among artists. It should be mentioned that because the Theyyam frame is attached to various bodily areas, blood circulation is disturbed. It is obvious that a number of factors have an impact on the performers' health (John & Jacob, 2015). Emotional outbursts in permanence coupled with high levels of physical exertion and different speaking style are typical features of the Theyyam. These can be expected to result in the vocal abuse of Theyyam performers. Due to the fact that the voice is often the primary tool of trade in many professions, voice/speech science has become increasingly interested in occupational voice research.

Need for the study

Even though few studies have focussed on the voice characteristics of traditional artists in India like Yakshagana artists (Devadas et al., 2019a), Temple Purohits (Balasubramaniam et al., 2019), Imams (Yasin, 2018), etc., no studies have explored the vocal problems and voice characteristics of Theyyam artists. So, there is a need to explore the voice and speech characteristics of Theyyam artists.

Aim of the study

To explore the vocal problems and voice characteristics of individuals who perform Theyyam as their traditional performance.

Objectives of the study

1. Adaptation of a self-reported vocal problem questionnaire for Theyyam artists from the existing questionnaire developed for Yakshagana artists (Devadas et al., 2019a).
2. Determining the vocal problems of Theyyam artists through an adapted questionnaire.
3. Measurement of the voice parameters of Theyyam artists through MDVP (Multi-Dimensional Voice Programme) analysis tool and perceptual evaluation of the voices using CAPE-V.

CHAPTER 2

REVIEW OF LITERATURE

The movement of vocal folds in the larynx produces human sound. This sound is utilized for a variety of purposes, including speaking, singing, and laughing. In addition to the control from the higher neural centers, major physiological variables involved in voice production include lung power, contraction of the crico-arytenoids and inter-arytenoids, tension in the vocal folds, and vocal fold thickness (Zhang, 2016). Because of these variables, the human voice is a very sensitive indicator of both our mental and physical health (Alva et al., 2017) Due to an individual's natural and distinctive tone, voice functions not only as a powerful indicator of identity but also as a useful tool for employment.

Professional Voice Users

According to Vilkmán (2000), one-third of the workforce are employed in professions where voice is the main and most important tool. Among these occupations were actors, singers, teachers, lawyers, call centre agents, broadcasters, preachers, tour guides, and business executives. Professional voice users are a growing part of the population who rely on their voice for their income (Murry & Rosen, 2000). Among professional voice users, distinctive vocal abilities are frequently a crucial component in the careers of singers, actors, politicians, broadcast personalities, and teachers. Artists, teachers, lawyers, telemarketers, and receptionists are just a few examples of occupations that rely heavily on communication through speech. There are countless other careers that strongly rely on vocal abilities. When compared to the others, these groups of people place far greater stress on their larynx

or vocal apparatus. Because of this reason, professional voice users are more likely to experience and develop voice problems than other individuals (Epstein et al., 2011).

Professional voice users (PVUs) were classified into four categories by Koufman and Isaacson (1991). This categorization of professional voice users at various levels enables us to determine how voice problems have an impact on various professionals' abilities to execute their jobs.

- 1) **The Elite Vocal Performer, Level I**, is a person for whom even a small vocal deviation could have disastrous effects. The opera singer is a classic example of a level I performer, as are many singers and actors.
- 2) **The Professional Voice User, Level II**, is a person whose moderate vocal issue could make it difficult for them to execute their work well. Most clergy, educators, lecturers, receptionists, etc. are included in this group.
- 3) **The Non-Vocal Professional, Level III**, is a person whose severe vocal issues would make it impossible for them to execute their work well. This category consists of professionals including lawyers, doctors, and businessman.
- 4) **The Non-Vocal Non-Professional, Level IV**, is somebody for whom proper job performance does not depend on vocal quality. This group consists of office workers, laborers, and others like them. Despite the very real social liability that people in this group may experience due to vocal disorders, they are nonetheless able to carry out their jobs.

Voice Disorders in Professional Voice Users

Voice disorders result in abnormal quality, pitch, loudness, or flexibility of vocal usage compared to people of the same age, sex, or cultural background

(Sathyarayan et al., 2019). Professional voice users can also experience vocal issues just like anybody else, but what sets them apart is the set of issues they experience because of overusing their voices (Mathieson, 2013). The most frequent symptoms among professional voice users are, a change in voice quality, voice fatigue, throat discomfort, hoarse voice quality, loss of voice, loss of intelligibility/clarity of speech/song, dry throat, shortness of breath, frequent throat clearing, itchy throat, voice tightness, loss of voice control, and inability to retain pitch range (Boominathan et al., 2008). For those who use their voices professionally, vocal issues can have very negative implications on their quality of life. However, in the case of other vocal professionals, these impacts could be less noticeable (Prebil et al., 2020)

Causes of work-related dysphonia

Work-related dysphonia has multiple causes. In this regard, the contributing factors for dysphonia can be classified into two categories (Ferracciu et al., 2014; Oliveira et al., 2023). Firstly, those associated with the characteristics and arrangement of the process of work. These include prolonged hours of labor, accumulation of duties or activities, excess vocal demand, lack of rest periods, stress or dissatisfaction with employment and/or remuneration. Secondly, those associated with the working environment, including as adverse acoustics, bad quality air, low humidity levels, and exposure to chemicals etc.

The most common causes of voice issues in those who put an excessive amount of load on their vocal mechanism are vocal overuse and abuse (Sapir, 1993). Misuse and abuse (inappropriate singing style, among others), persistent medical conditions (esophageal reflux, allergies, etc.), environmental issues (performing in dry, smoky venues), and emotional aspects (stage fear anxiety, etc.)

are some of the explanations for voice issues among PVUs that are cited in the literature (Spiegel et al., 1997).

As mentioned earlier, level I and II PVUs primarily depend on their voices for their living. Level I PVUs or elite vocal performers are a population of significant interest to the Speech-Language Pathologists. Several studies in the past have examined their vocal characteristics and profiled their voices. These studies have revealed that elite performers are often aware of their vocal function and practice vocally hygienic behaviours which are beneficial to their voices in the long run (Broaddus-Lawrence et al., 2000). Moreover, studies have also reported that elite performers do not hesitate to seek attention from service providers when encountered with a voice problem.

However, in the recent past, there has been a shift of focus to level II PVUs. This group includes professionals such as clergy, teachers, etc. who are in part unaware of vocal function and voice care. Survey research conducted among several PVUs (singers, teachers, politicians, vendors, etc.) have identified that vocal problems are prevalent in level II PVUs. Vocal tiredness, sore throat, voice strain, neck muscular tension, and difficulties projecting voice were among the vocal complaints that have been described among level II PVUs (Boominathan et al., 2008; Devadas et al., 2017).

Studies examining vocal difficulties of Professional Voice Users

Researchers have carried out numerous studies involving several groups of Professional Voice Users. Some of the studies which have reported vocal difficulties of Level II PVUs (specifically priests and theatre artists) are summarized in this section.

Hočevār-Boltežar (2009) carried out an investigation among Catholic priests in Slovenia to evaluate the prevalence of vocal issues and to discover a couple of potential risk factors that cause voice disorders. Survey questionnaires were given to 600 randomly chosen Catholic priests in Slovenia. Among the responses, 85.6% of priests reported of having vocal issues at a certain point in their employment, with 15.9% reporting ongoing speech issues. Respiratory tract illness was the main reason for vocal problems. Significant risk factors for regular voice problems included frequent clearing of throat, vocal load during leisure time, voice disorders during training, and a lack of education on the use of proper vocal technique.

A similar study was conducted in Finland, to explore the prevalence of voice difficulties in evangelical Lutheran priests and possible risk factors for voice issues in them (Hagelberg & Simberg, 2015). The findings revealed a high prevalence of vocal difficulties in priests. It was found that 24.5% of the participants had sought care for vocal difficulties. Further, 18% had been identified as having a voice condition by a physician. Females reported significantly more voice difficulties than males. There were notable links found between commonly recurrent voice complaints and a variety of environmental and health risk factors.

Malki & Mesallam (2012) studied the voice related complaints of Imams in Saudi Arabia. They utilized the Arabic Voice Handicap Index-10 (VHI-10) and a general voice questionnaire to collect data from 93 Imams and 82 controls. Their results suggested that 65% of Imams reported voice-related problems. Further, the Arabic version of VHI-10 showed significant difference between Imams and the control group for both total score and the three VHI domains. Change in voice, vocal

fatigue, frequent throat clearing, sore throat and throat dryness were the frequent complaints reported by the Saudi Imams.

Devadas et al. (2016) attempted to investigate the prevalence of voice disorders in Mar Thoma priests in Kerala and to identify potential risk factors for voice problems. A self-reported questionnaire was utilized to gather the data from the 270 Mar Thoma priests. The prevalence of voice problems in Mar Thoma priests were found to be higher during their careers and experienced recurrent voice problems throughout their careers. It was discovered that priests who frequently reported voice issues were significantly more likely to have allergies, asthma, and regular clearing of throat. Significantly larger percentage of priests who frequently experienced vocal issues missed work.

On similar lines, Devadas et al. (2019b) investigated the prevalence, probable risk elements, and effects of voice issues in Hindu temple priests. One hundred and forty temple priests from Udupi and Mangalore districts were given self-reporting questionnaires in the Udupi and Mangaluru districts as part of a cross-sectional survey. The prevalence of vocal problems was found to be high among Hindu temple priests' career (43%) and at the point (19%). The length of time a priest has served (>10 years), voice changes while chanting, speaking or reciting while suffering from a throat infection, and having a dry mouth and throat were some of the contributing factors that have been found to have a significant connection with the high prevalence of self-reported vocal issues. About 43 percent of priests missed more than two to three days of duties due to vocal issues.

Another study was conducted to explore the quality of voice, vocal issues, and associated risk elements that can cause voice problems in performers (D'haeseleer et al., 2017). Questionnaires were utilized to collect data on vocal

symptoms and affecting factors. About 50 percent of theater actors complained of (sometimes or on a frequent basis) vocal issues following a performance. The results of their survey found a significant prevalence of vocally abusive conduct as well as poor vocal hygiene behaviors such as vocally abusive behaviors, vocal misuse, smoking, consumption of alcohol etc.

Another study was conducted in Slovenia (Prebil et al., 2020) to determine the prevalence of voice problems in a group of actors and compare them with those of professional singers. Participants were 63 vocalists and 65 actors. Information on voice issues, potential causes, and variables impacting voice quality was obtained using a questionnaire. Compared to singers, actors were found to have more unhygienic vocal practices and lifestyles. Major risk factors for voice issues in singers were shown to include speaking aloud and allergies. However, there were no such significant risk factors found among actors.

D'haeseleer et al. (2022), conducted a study to report the vocal issues, and vocal behaviors of thirty theater performers. All participants completed the Voice Handicap Index (VHI), the VHI adapted for the singing voice, the Vocal Tract Discomfort (VTD) Scale, and the Corporal Pain Scale. Although most of participants scored below the cut-off value of VHI, scores were higher than cut-off on VHI adapted to singing voice. Further, participants reported of several vocal tract discomfort symptoms as well as pain in their vocal tracts. There was evidence for misuse of vocal system and tension among the participants. Several influencing factors for voice problems were identified such as, vocal misuse during and outside performance, smoking, upper airway infections, allergy, stress etc.

Recently, Jayakumar et al. (in press) explored the voice issues and its associated risk factors among Tamil speaking Imams. This questionnaire survey

was completed by 100 Tamil-speaking Imams in Tamil Nadu who actively participated in religious activity. The researchers additionally looked at how the age influences prevalence of issues with voice and the risk elements linked with them. The Imams' general health was good. However, voice health was poor. This study also revealed multiple factors which lead to voice difficulties, including excessive loudness, acid reflux, poor vocal practices, and dehydration. However, it was revealed that the lack of smoking and alcohol consumption by Imams had restrained their voice problems. Further, it was also revealed that differences in age have no bearing on risk factors for vocal problems among Imams.

To summarize, majority of the studies carried out among priests and theatre artists have identified several vocal difficulties among these professional voice users. These vocal difficulties were often result due to vocally unhygienic behaviours (such as frequent throat clearing, lack of hydration etc.), vocal loading, exposure to environmental risk factors, and prolonged performance durations.

Perceptual and Acoustic studies of Professional Voice Users

Perceptually, the quality of voice in PVUs have been assessed by subjective methods. Acoustic measures of voice quality among PVUs are assessed objectively using voice metrics such as fundamental-related measures, amplitude-related measures, perturbation-related measures, and noise-associated measures.

A study was conducted on high-risk vocal performers, a group of people who exert the most vocal effort and are frequently subjected to certain vocal abuse traits (Hoffman-Ruddy et al., 2001). Musical theater, choral ensembles, and street theater were evaluated as three different types of high-risk performers. The analysis of sustained /i/ and /a/ vocal production tasks was done for each of the groups. Acoustical parameters included fundamental frequency, fundamental frequency

standard deviation, jitter percentage, shimmer percentage, and noise-to-harmonic ratio. The results showed that the street theater troupe generated the greatest amount of variation in F0. The street theater troupe had frequency variability outside of the typical range for jitter percent. Shimmer percent revealed that the street theater group displayed frequency variations. The NHR revealed that the street theater group's spectrum had an abnormally high amount of noise in terms of the relationship between the source spectra and its noise components.

Balasubramaniam et al., (2019), conducted a study to examine the voice of Hindu purohits (priests) utilizing perceptual and acoustic analysis. The study included 44 men (age range 18 to 30). Two groups were formed for the purpose of their study. Group 1 was formed by purohits who had grown up learning through the conventional gurukul system, and Group 2 was made up of normal controls. Phonation and spontaneous speech samples were collected, and the traditional acoustic and cepstral characteristics were analyzed using the Praat software and the Speech tool, respectively, while the voice was perceptually assessed using GRBAS. The analysis of vocal aberrations in purohits using perceptual and auditory criteria showed that they did not occur. Comparing Indian Hindu purohits to normal controls, cepstral measurements were greater in purohits, suggesting a greater degree of harmonic organization.

D'haeseleer et al., (2022), reported on acoustic and perceptual measures on theatre artists (n = 30). Acoustic measures included multiparametric measures of Dysphonia Severity Index (DSI) and Acoustic Voice Quality Index (AVQI). The GRBASI scale was used to document the perceived quality of voice. The values of DSI and AVQI were within the normal range (or even better) for the theatre artists.

Perceptually, the authors reported of mild roughness and breathiness as being present in the voices of theatre artists.

Another study investigated the acoustic parameters needed to perform classical music in outdoor settings without using electrical amplification (Melton et al., 2022). Eight professional actors (four men and four women) in a traditional theatre delivered one-minute monologues that were first stationary and then moving for audio recording. The fundamental frequency (F0), sound pressure level (SPL), and long-term average spectrum (LTAS) of the data were all examined. According to the findings, actors seem to use a consistent F0 range regardless of gender or the type of performance. Average F0 was higher when changed from stationary to moving. SPL values were higher for male voices than for female voices, and the amplitude of peaks at the Actor's Formant of LTAS curves was larger for male voices.

Further, a study looked at how the voice characteristics of Iranian theater players related to auditory-perceptual and acoustic parameters (Arabi et al., 2023). 45 Iranian theater players with an average age of 30.8 years participated in this descriptive-analytical study, 22 of whom were female and 23 of whom were male. Using the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V) in Persian, the auditory-perceptual evaluation was conducted. From the phonation samples of the participants, acoustic parameters were retrieved in the program Praat. The findings showed that acoustic parameters of voice quality in Iranian theater actors, such as F0, HNR, and jitter, correlated with auditory perceptual findings from CAPE-V.

To summarize, studies examining the perceptual and acoustic characteristics of voices of PVUs reported above have suggested that there could be differences between the PVUs and other populations. Perceptual quality of voice, have often been reported as mildly breathy or rough.

Performing Folk Artists as Professional Voice Users

Among PVUs, folk artists are one of the largest groups who experience voice disorders because of abusive speaking or singing practices, particularly hyper-functional voice techniques. Vocal production for acting frequently requires a larger range of loudness, pitch, rhythm, and vocal quality than is typical (Kalaiselvi, 2006). These voice projection abilities are attributed to the changes in the vocal tract's general structure, which increases the spectral energy in the higher portions of the spectrum (Pinczower & Oates, 2005; Smith et al., 2005). The intelligibility of the language and the breathing mechanism are related to optimal voice projection. An individual tends to acquire these qualities through professional vocal training. In contrast, the absence of vocal training may cause improper projection by causing vocal strain and an increase in laryngeal muscle tension and tightness (Benninger et al., 1994). Their risk of acquiring voice problems may be higher than that of other professional voice users due to the limited mastery of the vocal mechanism.

Aside from portraying a wide range of emotions, folk actors are also expected to conform to the situations presented in the plays they appear in. Some of these emotions can be vocally conveyed in ways that might be viewed as abusive. These actions include raising the volume and pitch, tensing the muscles, and attempting to force air over partially closed vocal cords (Roy & Bless, 2000).

Using the Singing Voice Handicap Index-10 (SVHI-10) Gunjawate et al., (2017) explored vocal well-being of Yakshagana singers. They also compared the scores of SVHI-10 of those who reported voice issues to those who do not. Yakshagana is one of the folk performances of Southern India. Using a unique style and form, it combines music, acting, dancing, costumes, conversation, and

stagecraft (Kalaiselvi, 2006). Twenty-six Yakshagana artists were the subjects of their cross-sectional study. Their results revealed that 38% of the participants said that their singing was hampered by voice issues. These Yakshagana artists also had higher SVHI-10 scores compared to those who did not have vocal complaints. They suggested that Yakshagana singers need a strong singing voice, and vocal issues can significantly affect both their performance and financial success.

Further a large scale study done by Devadas et al. (2019a) looked at the prevalence of voice issues among Yakshagana folk artists. They also examined the various risk factors linked to the occurrence of vocal problems, vocal well-being reported by the participants, and the impact of vocal problems on this population. A self-reported questionnaire was used to conduct this cross-sectional survey. A total of 160 questionnaires were distributed to Yakshagana artists in and near Karnataka state, India. High career prevalence of vocal problems with numerous vocal attrition symptoms was discovered in both Yakshagana singers (91.2%) and Yakshagana actors (74%). It was found that performers who complained about vocal problems were noticeably more likely to frequent clearing of their throats. With an average absence of 2.12 days (ranging from a minimum of 1 day to a maximum of 5 days), about 55% of performers missed work for two to three days or more. Overall, the findings implied that Yakshagana artists are more likely to experience vocal problems.

Risk factors involved in developing dysphonia with folk performances

As seen above, folk artists are likely to develop dysphonia due to the very nature of their work. Several risk factors can be thought about as leading to dysphonia among folk artists. Some of these are discussed below.

Environmental Factors

Performers are put in a high-risk situation due to a variety of vocal difficulties. The fact that the setting for the stage is typically outdoors and was overlapped by the background noise from people, vehicles, or construction is one of those obstacles (Doherty et al., 1988). As many as seven to eight half hour performances were required daily, which presents another performance issue (Hoffman-Ruddy et al., 2001).

Another environmental restriction is provided by costumes. Some costumes were so heavy or constricting that the actor may end up with bad posture in order to authentically portray the role. Additionally, certain costumes may be uncomfortable to wear due to intense heat, which causes physical exhaustion (Hoffman-Ruddy et al., 2001). Others may be dirty or dusty, contain feathers or hair, or both, which can cause persistent allergic reactions or sinusitis. Similar to how heavy smoke onstage can influence a performer's voice, heavy smoke can also impact a performer's voice before and after a performance. Chronic laryngitis, dehydration, and chronic laryngeal muscular tension were all effects of these environmental circumstances that might affect the laryngeal system (Hoffman-Ruddy et al., 2001).

Physical factors

According to Johnson (1994) there were several vocal habits that might affect one's voice, including yelling, screaming, forceful glottal attacks, and speaking outside of one's physiological comfort zone. Many of these actions are frequently seen in performers, who use their voices in a variety of ways when performing. These actions were typically considered to be vocally abusive and may cause voice changes and damage to the vocal fold mucosa.

The physical characteristics of a person greatly influence their overall voice. The sounds that a person makes are partially influenced by the size and shape of their articulators such as lips, tongue, and jaw. A person's ability to speak can be impacted by illness. Yelling, screaming, smoking, and other forms of repeated vocal abuse can damage a person's voice momentarily or even permanently. One of the frequently observed conditions affecting the voice among singers, actors, instructors, sports coaches, cheerleaders, and other professional voice users who overuse their voices is vocal nodule (Schutte, 1980).

Personal factors

Intake of non-prescription drugs, cigarette smoking, use of marijuana, chewing tobacco, recurrent coughing and throat clearing, alcohol, and caffeine use, lack of sleep, vocal demand, vocal tiredness, talking overly loudly, poor nutrition, obesity, dehydration, allergies, acute sinusitis, etc. are some factors that contribute to poor vocal health and cause voice problems. Additionally, misuse or abuse of the voice might result in organic pathology of the larynx that affects the quality of the voice. The collision of one vocal fold against another is caused by the vocal cords vibrating too much or too quickly. This misuse or incorrect use may result in vocal cord lesions that alter the usual rhythm of vibration and cause the voice to sound breathy, hoarse, or harsh. Voice problems can result in employment loss or the fear of it, frustration and emotional setbacks, financial burdens, lowered professional competency, etc.

The issues that professional voice users encounter while using their voices have been variously described. Some of the descriptions given include throat or vocal fatigue, general physical exhaustion, throat tightness, strained or tense throat,

problems in producing and sustaining voice, reduction in pitch range, and greater difficulty producing higher pitches (Raphael & Scherer, 1987)

Acoustic findings from folk artists

Studies reporting on the acoustic parameters of voice quality of folk artists are very minimal. One pioneer study was carried out by Kalaiselvi, (2006) on Yakshagana artists. Their study investigated the short- as well as long-term effects of Yakshagana performance on the voice of Yakshagana artists. A comparative analysis of the acoustic and respiratory-related parameters of the voice of normal speakers and Yakshagana artists was carried out in their study. The findings showed that, when compared to normal participants, mean speaking fundamental frequency, average speaking frequency range, average jitter, average speed, and average degree of frequency fluctuations, mean intensity, mean intensity range, and mean shimmer were all much higher in Yakshagana artists. However, Yakshagana artists had a mean harmonic-to-noise ratio that was substantially lower than that of normal participants.

Theyyam artists

Theyyam is a one of the Hindu ritualistic dance practiced in the Malabar region of Kerala (North side of Kerala) where the art form is revered as a regional cultural icon. Theyyam artists are almost always males. Theyyam performance is a combination of instrumental and vocal performance together with ritualistic dance. Theyyam artists is often adorned with bulky costumes and garlands. Generally, each session of Theyyam performance last for 40-60 minutes and often continues throughout the night. Once dressed up for Theyyam, these artists often spend up to 24 hours in the costume. Due to the fact that the entire dance program is a commitment to God, performers must fast and prepare before performing (John & Jacob, 2015). The performer

dances and invokes the deity, while the singer or artist also recite poems to the deity or tells a tale about the deity.

While performing vigorous performances in heavy costumes, Theyyam artists vocalize with considerable effort. Theyyam performances can last for a maximum of twelve or even 24 hours, during performance days they will be unable to drink or eat anything, putting strain on their body (John & Jacob, 2015). Throughout the season, the artist performs day and night for a couple of weeks, which exerts a lot of stress on him. Altogether, these habits and practices can be detrimental to the health of the Theyyam artists. Theyyam is characterized by persistent emotional outbursts, a great deal of physical activity, and a unique speaking style. These are also likely to result in vocal abuse for Theyyam performers. Theyyam artists are considered level 2 professional voice users that is professionals whose moderate vocal issues could make it difficult for them to execute their work well.

To date, only one study has been carried out among Theyyam performers documenting their voice characteristics (Sabu et al., 2019). They considered 30 Theyyam artists with a mean age of 33.06 years (age range between 18 to 40). Phonation samples were obtained from these participants. Jitter and shimmer values were extracted from the phonation samples using Praat software. These measures were compared with an age and gender matched control group. However, these authors did not find a statistically significant difference between the jitter and shimmer values obtained from the Theyyam artists and the age and gender matched controls.

However, the study done by Sabu et al. (2019) was not methodologically well described. Details about participant selection, procedures of sound signal recording,

rationale for choosing the specific outcome measures etc. were unclear. Moreover, only two perturbation measures (Jitter and Shimmer) were only examined. Hence, there is a need to document the acoustic findings involving multiple acoustic and auditory perceptual measures of Theyyam artists. Another study (John & Jacob, 2015) has reported health concerns (such as hypertension, allergies, respiratory and rheumatic conditions) and lifestyles of Theyyam artists. However, to date no study has specifically focused on examining the voice problems and vocal difficulties of Theyyam artists. Hence, there is a need to document the voice characteristics and vocal problems of Theyyam artists in detail, which is the rationale behind this study.

CHAPTER 3

METHOD

Research Design

The current study used a survey-based research and standard group comparison method.

Participants

A total of 40 participants were involved in the present study. Participants were divided into two groups. Group I consisted of 20 Theyyam artists who perform in temples and *kavu*, from the Malabar region of Kerala (specifically from Kannur and Kozhikode districts), and Group II consisted of 20 age and gender-matched non-professional voice users from the same region. All the participants of this study were males in the age range of 25 to 60 years. All of them had a minimum of five years of experience as professional Theyyam artists. The demographic details of participants are tabulated in Table 3.1.

Participant's Exclusionary Criteria

- 1) Participants who were suffering from upper respiratory tract infections or ear infections during recording were excluded from the study.
- 2) In Group I, participants who perform non-vocal Theyyam were excluded
- 3) Participants with a history of chronic smoking, and chronic tobacco users were excluded from the study.
- 4) Participants who are working for other part-time jobs with greater vocal effort (bus conductors, teachers, receptionists, call centre representatives, etc.) were excluded from Group I and Group II.

Table 3.1 Demographic details of participants

Group I (Theyyam Artists)			Group II (Control Group)		
Participant	Age	Occupation*	Participant	Age	Occupation
T1	40	Business	N1	50	Plumber
T2	32	Farmer	N2	27	Salesman
T3	31	Auto Driver	N3	38	Shopkeeper
T4	35	Clerk	N4	49	Daily wage
T5	34	Daily wage	N5	30	Daily wage
T6	56	Farmer	N6	52	Librarian
T7	28	Attender	N7	37	IT professional
T8	46	Daily wage	N8	26	PG student
T9	41	Farmer	N9	54	Business
T10	28	Engineer	N10	50	Business
T11	27	Daily wage	N11	38	Delivery boy
T12	30	Auto driver	N12	42	Daily wage
T13	35	Daily wage	N13	50	Clerk
T14	28	Daily wage	N14	31	Electrician
T15	49	Daily wage	N15	29	Business
T16	47	Daily wage	N16	42	Plumber
T17	29	Daily wage	N17	42	Daily wage
T18	35	Business	N18	49	Daily wage
T19	27	Daily wage	N19	40	Shopkeeper
T20	26	Daily wage	N20	45	Police
Mean Age	41.05		Mean Age	35.20	
(SD)	(8.88)		(SD)	(8.59)	

*In addition to Theyyam performance

An adapted self-reporting questionnaire was used for the study. Along with that voice recordings of phonation samples of vowels (/a/, /i/, and /u/), and standardized Malayalam reading passage were used.

Procedure

The study was carried out in two phases. In the first phase, the vocal problems of Theyyam artists were explored using an Adapted self-reporting questionnaire and in the second phase involved determining the voice characteristics of Theyyam artists and compared them with the control group.

Adaptation of the questionnaire and its validation

The first phase included the adaptation of the self-reporting questionnaire. A questionnaire was adapted for the Theyyam artists, from the already existing

questionnaire developed for Yakshagana artists (Devadas et al., 2019a), questionnaire was designed to investigate the prevalence of self-reported voice problems, different risk factors associated with vocal problems, self-reported vocal health, and the effect of vocal problems on Theyyam artists.

The questionnaire was initially adapted into English and translated into Malayalam. The questionnaire contains binary choice questions and a few questions with descriptive answers. It consists of 85 questions under nine sections as detailed in Table 3.2

Table 3.2. Sections of the questionnaire

Section	Contents of section -Questions related to:
Section I	Occupation and training details
Section II	Voice and Speech Characteristics
Section III	Prevalence of voice problems and awareness
Section IV	Voice problems that they often experience while or after performing
Section V	Phono-traumatic behaviors
Section VI	Lifestyle factors
Section VII	Health-related factors
Section VIII	Effect of voice problem
Section IX	Voice care

Three qualified Speech-Language Pathologists (SLPs) with at least three years of experience carried out the verification of the content of the modified questionnaire. The corrections/suggestions given by the experts were included in the questionnaire. The questionnaire is provided in Appendix A. The voice questionnaire was administered only on Theyyam artists (Group I). Although it was self-reported questionnaire, clarification on the question was given to Theyyam artists on their request.

Data collection procedure

First, informed consent was taken from the participants, and they were informed beforehand about the purpose of the study, the nature of the questions, and the amount of time required for the recording and interview. Audio recordings were obtained from both the groups of participants in a noise free environment and in comfortable seated position.

Administration of the questionnaire

The validated questionnaire was administered to the participants of Group I. The researcher approached them in person, and followed by that explained the procedure, they were handed over the validated questionnaire. The participants were instructed to complete the questionnaire, and assistance was provided by the researcher for clarification. Completed forms were collected back and analyzed descriptively.

Recording of voice samples

Audio recordings of voice samples were performed for both the groups in a quiet environment using a digital voice recorder (Olympus LS 100). Throughout the recording, a 10 cm gap between mouth and microphone was kept constant. Voice samples were obtained in .wav format at 44.1 kHz 16-bit resolution. The following voice samples were obtained from participants.

1. Three trials of maximum phonation duration of the vowels /a/, /i/, and /u/.
2. Two trials of reading the standard reading passage in Malayalam (Thengu Passage) (Appendix II).

Recording procedure used for both the groups were the same. Participants were asked to phonate vowel /a/, /i/ and /u/ as long as possible at comfortable pitch and loudness followed by being asked to read the standard Malayalam passage.

Analysis of voice samples

The obtained voice samples from both groups were subjected to the following analysis.

- 1) Acoustic analysis- A stable portion of the phonation sample of vowel /a/ was used to derive various voice-related parameters from the Multi-Dimensional Voice Profile MDVP program module from the computerized speech lab (CSL-4500, Kay elemetrics).
- 2) Perceptual Analysis- Phonation samples as well as the standard reading passage in Malayalam were used to perceptually judge the samples on the CAPE-V (Kemspter et al., 2009) scale by five experienced SLPs.

Statistical Analysis

The software program Statistical Package for the Social Sciences (SPSS) (version 26) was used to tabulate and statistically analyze the collected data. The voice questionnaire data was analyzed for frequency count and percentage for each question. For the objective data obtained from acoustic and perceptual analysis, descriptive statistics were carried out to calculate the mean, median, standard deviation, and interquartile range for both groups. Based on distribution of the data, Independent sample t- test and Mann-Whitney U test were done for between-group comparison of the data.

CHAPTER 4

RESULTS

The present study aimed to investigate the vocal problems and voice characteristics of individuals who are involved in traditional performance of the folk art of Theyyam. This study primarily involved two groups, wherein, participants who perform Theyyam constituted the Theyyam group (Group I), which was matched to a Control group (Group II) with participants who were age and gender matched with the Theyyam group.

An adapted voice survey questionnaire (consisting of 85 questions under nine sections) was used to explore the vocal problems of individuals who perform Theyyam (Group I). In addition, acoustic analysis, and perceptual measures (derived from phonation and reading samples) were used to investigate voice characteristics of Theyyam artists and to compare with the control group. Obtained data was analyzed statistically using the SPSS software, version 26. The results of voice questionnaire data are presented first. Following this, the results of statistical analysis done for objective data obtained from acoustic analysis and perceptual measures are reported.

Vocal habits and voice problems of Theyyam artists

Outcome/frequency counts of voice questionnaire data

Frequency count was calculated for each response of the questionnaire. In general, the findings suggested that all the participants of Group-I were involved in delivering dialogues for a long time and reciting ritual song along with drummers in an open theatre in presence of background noise. Findings from the present study showed that all the participants experienced voice problem at least once during their career. Most of the Theyyam artists had poor vocal and non-vocal

habits such as shouting, speaking loudly, throat clearing and consumption of alcohol. In specific, results from each section of the questionnaire are reported further.

Section I. Occupation and Training related details

Responses of the Theyyam artists to the first section of the questionnaire (occupation and training related details) are tabulated in Table 4.1. Majority of the participants (~45%) were involved in Theyyam performance for over 21 years and more. Theyyam performance was often carried out for 5-6 months in a year, for 5-6 days a week. Majority of them (~60%) reported that, each performance lasted more than 11 hours a day. It was also found that almost all the Theyyam artists were trained for Theyyam from a young age (11-15 years).

Table 4.1. Frequency counts and percentages of occupation and training related details

Q. No.	Question	Response	Frequency (out of 20)	Percentage
Q1	Since how many years are you performing as Theyyam artist?	1 to 5	0	0
		6 to 10	6	30
		11 to 15	2	10
		16 to 20	3	15
		>21	9	45
Q2	How many months in a year do you perform Theyyam?	<2months	0	0
		3-4 months	2	10
		5-6 months	12	60
		7-8 months	6	30
		>9months	0	0
Q3	In a year, approximately how many performances do you give?	<10	1	5
		11 to 50	10	50
		51 to 100	9	45
		101 to 150	0	0
		>151	0	0
Q4	How many days in a week you perform?	1 to 2 days	1	5
		3 to 4 days	1	5
		5 to 6 days	18	90
		7days	0	0
Q5	How many hours in a day you perform Theyyam?	>1 hour	0	0
		2 to 4 hours	0	0
		5 to 8 hours	1	5
		9 to 10 hours	7	35
		>11 hours	12	60
Q6	Have you had Theyyam performance training?	Yes	20	100
		No	0	0
Q7	At what age you began practicing Theyyam performance?	<10 years	0	0
		11 to 15 years	19	95
		16 to 20 years	1	5
		20 to 25years	0	0
		>26years	0	0
Q8	Do you warm up your voice before the performance?	Yes	0	0
		No	20	100
Q9	Do you do vocal cool down exercises after the performance?	Yes	0	0
		No	20	100
Q10	Do you sing and mimic natural sounds/animal cries, to train your voice?	Yes	0	0
		No	20	100
Q11	Do you have a job in addition to Theyyam performance?	Yes	20	100
		No	0	0

Table 4.1 continued

Q. No.	Question	Response	Frequency (out of 20)	Percentage
Q12	During your performance, in addition to dancing and singing are you frequently required to speak or involve in dialogue delivery? If yes, how long you speak?	Yes	20	100
		No	0	0
		15 minutes	0	0
		30 minutes	0	0
		45 minutes	0	0
Q13	Do you sing and speak in a noisy environment? Do you feel the need to raise your voice against background noise?	>60minutes	20	100
		Yes	20	100
		No	0	0
		Yes	20	100
Q14	Do you use microphones/amplification devices during the performance?	No	0	0
		Yes	20	100
Q16	How often you need to change your voice during your performance?	Never	0	0
		Rarely	0	0
		Sometimes	0	0
		Often	20	100
		Always	0	0
Q17	Do you experience any restriction in opening your mouth or breath intake or speaking due to your ornaments or cloths which you wear during performance?	Yes	20	100
		No	0	0
Q18	Have you ever had training for your speaking voice?	Yes	0	0
		No	20	100

Section II. Voice and Speech Characteristics

Responses of the participants to the second section of the questionnaire (voice and speech characteristics) are tabulated in Table 4.2. All the participants felt that loud/soft voice, low pitch/high pitch, varying intonation and change in voice quality were required for Theyyam artists. In addition, participants reported

of infrequently clenching their teeth, or tightening the muscles to make speech or voice more dramatic.

Table 4.2: Frequency counts and percentages of voice and speech characteristics

Q. No.	Questions	Response	Frequency (out of 20)	Percentage
Q19	According to you what kind of voice/ characteristics of voice/speech is required for a Theyyam artist?	Change in voice quality	0	0.00
		Loud/soft voice	0	0.00
		Low/high pitch	0	0.00
		Varying Intonation	0	0.00
Q20	Do you clench your teeth, tense your jaw, tongue tighten your neck muscles while singing/speaking to make your voice/speech more dramatic?	All of the above	20	100.0
		Never	0	0.00
		Rarely	0	0.00
		Sometimes	12	60.0
		Often	8	40.0
		Always	0	0.00

Section III. Prevalence of voice problems and awareness

Table 4.3 represents the responses of the participants to the third section of the questionnaire (Prevalence of voice problems and awareness). All the participants experienced a mild voice problem since they joined in their profession and reported that the onset of the problem is gradual. Loud and continuous talking, sleepless nights in performance days and background noise are considered as risk factors for developing voice problems.

Table 4.3: Frequency counts and percentages of prevalence of voice problems and voice care awareness

Q. No.	Questions	Response	Frequency	Percentage (out of 20)
Q21	Have you had any voice related problems since you joined this profession that has prevented you from singing/acting?	Yes	20	100.0
		No	0	0.00
Q22	When did you first notice your voice problem?	Last 1week	0	0.00
		Last 1 year	0	0.00
		>1year	0	0.00
		last month	18	90.0
		last 6 months	2	10.0
Q23	How will you describe the onset of your voice problem?	Sudden	0	0.00
		Gradual	20	100.0
		Intermittent	0	0.00
		Progressive	0	0.00
	Is your voice problem getting worse day by day?	Yes	20	100.0
		No	0	0.00
Q24	Do you have a problem with your voice today, which is preventing you from doing all you want to do? If yes, how severe is the problem?	Yes	20	100.0
		No	0	0.00
		Mild (10-30%)	20	100.0
		Moderate (31-60%)	0	0.00
		Severe (61-90%)	0	0.00
		Very Severe (>90%)	0	0.00
Q25	How would you describe your voice in the last 6 months?	Very bad	0	0.00
		Bad	8	40.0
		Average	11	55.0
		Good	1	5.0
		Very good	0	0.00
Q26	What do you think are the risk factors for developing a voice problem?	Loud talking	0	0.00
		Continuous Talking	0	0.00
		Background noise	0	0.00
		Sleepless nights	0	0.00
		All of the above	20	100.0

Section IV. Voice problems often experienced while or after performing

Table 4.4 represents the responses of the participants to the fourth section of the questionnaire. All the participants have reported hoarseness in their voice, dryness in throat, vocal fatigue, frequent coughing and effortful voice production. Most of the participants experienced a momentary loss of voice and reduced breath support.

Table 4.4: Frequency counts and percentages of voice problems often experienced while or after performing

Q. No.	Questions	Response	Frequency (out of 20)	Percentage
Q27	Hoarseness/Harshness/breathiness change in voice quality	Yes	20	100.0
		No	0	0.00
Q28	Reduced pitch range/trouble changing pitch	Yes	19	95.0
		No	1	5.0
Q29	Dryness in the throat	Yes	20	100.0
		No	0	0.00
Q30	Vocal fatigue/ vocal tiredness	Yes	20	100.0
		No	0	0.00
Q31	Tightness in the throat	Yes	10	50.0
		No	10	50.0
Q32	Momentary loss of voice or pitch breaks	Yes	2	10.0
		No	18	90.0
Q33	Discomfort in the throat	Yes	20	100.0
		No	0	0.00
Q34	Pain in the throat	Yes	7	35.0
		No	13	65.0
Q35	Reduced breath support/shortness of breath	Yes	3	15.0
		No	17	85.0
Q36	Complete Loss of voice	Yes	0	0.00
		No	20	100.0
Q37	Trouble speaking loudly	Yes	20	100.0
		No	0	0.00
Q38	Effortful production of voice	Yes	20	100.0
		No	0	0.00
Q39	Loss of vocal endurance and flexibility especially after performing for more than an hour	Yes	20	100.0
		No	0	0.00
Q40	Pitch breaks, momentary loss of voice or other sudden changes	Yes	20	100.0
		No	0	0.00

Table 4.4 continued

Q. No.	Questions	Response	Frequency (out of 20)	Percentage
Q41	Discomfort in the throat, especially after performing for more than an hour	Yes	20	100.0
		No	0	0.00
Q42	Tension or Pain in the throat, especially after performing for more than an hour	Yes	18	90.0
		No	2	10.0
Q43	Frequent coughing	Yes	20	100.0
		No	0	0.00
Q44	Effortful singing/speaking	Yes	19	95.0
		No	1	5.0
Q45	Tightness of muscles at higher pitches	Yes	15	75.0
		No	5	25.0

Section V. Phono traumatic Behaviors

Responses of the participants to the fifth section of the questionnaire (Phono traumatic Behaviors) are tabulated in Table 4.5. All the participants were used to speak with a loud voice and consciously alter their voice and speech during performance. Throat clearing is another phono traumatic behavior which can be seen in all the participants. Majority of the participants (90%) were used to perform Theyyam even if they have any voice problem, throat infection or any other health issues.

Table 4.5: Frequency counts and percentages of phono traumatic behaviors

Q. No.	Questions	Response	Frequency (out of 20)	Percentage
Q46	Do you speak with loud voice?	Yes	20	100.0
		No	0	0.00
Q47	Do you consciously alter your voice or speech?	Yes	20	100.0
		No	0	0.00
Q48	Do you speak fast/run out of air when you speak?	Yes	16	80.0
		No	4	20.0
Q49	Do you usually find yourself doing most of the talking when conversing with a friend or in a social gathering?	Yes	2	10.0
		No	18	90.0
Q50	Do you clear your throat often?	Yes	20	100.0
		No	0	0.00
Q51	Do you cough frequently?	Yes	19	95.0
		No	1	5.0
Q52	Do you perform when you have any throat infections?	Yes	18	90.0
		No	21	10.0

Section VI. Lifestyle factors

Table 4.6 represents the responses of the participants to the sixth section of the questionnaire. Based on the data collected related to the lifestyle factors majority of the participants have odd timings of food intake. Sometimes spicy or oily food intake was a part of the diet of 65% of the participants and 20% of the participants often used to eat spicy food during performance days. All the participants reported that the habit of alcohol consumption and among that 75% of them used to consume alcohol during or after the performance. Sleep disturbances also found to be a major problem in Theyyam artists (100%).

Table 4.6: Frequency counts and percentages of lifestyle factors

Q. No.	Questions	Response	Frequency (out of 20)	Percentage
Q55	Do you have odd timings of food intake?	Yes	1	5.0
		No	19	95.0
	Does your diet involve Spicy or oily food?	Never	0	0.00
		Rarely	2	10.0
		Sometimes	13	65.0
		Often	4	20.0
		Always	1	5.0
	Does your diet involve extreme hot or cold items?	Never	0	0.00
		Rarely	2	10.0
		Sometimes	13	65.0
Often		5	25.0	
Always		0	0.00	
Q56	Indicate your experience regarding the use of cigarettes/Beedi	Never smoked	13	65.0
		Used to smoke-quit more than 6 months	2	10.0
		Smoking intermittently	5	25.0
		Smoking regularly	0	0.00
Q57	Do you chew tobacco/Pan/Ghutka/Betel?	Never	8	40.0
		Rarely	4	20.0
		Often	7	35.0
		Always	1	5.0
Q58	Do you consume alcohol?	Yes	20	100.0
		No	0	0.00
	If yes, how often?	Rarely	10	50.0
		Once a month	2	10.0
		once in 2-3 weeks	3	15.0
		once in a week	4	20.0
		Daily	1	5.0
Do you consume alcohol before or after or during the performance?	Yes	15	75.0	
	No	5	25.0	
Q59	Do experience any problem with your sleep?	Yes	20	100.0
		No	0	0.00
Q60	How many hours in a day do you sleep regularly?	<2 hours	10	50.0
		3-4 hours	10	50.0
		5-6 hours	0	0.00
		7-8 hours	0	0.00
		>9 hours	0	0.00

Table 4.6 continued

Q. No.	Questions	Response	Frequency (out of 20)	Percentage
Q61	Which of the following you drink often in between your performance?	Water	18	90.0
		coconut water	2	10.0
		Coffee	0	0.00
		Tea	0	0.00
		Palm wine	0	0.00

Section VII. Health-related factors

Responses of the participants to the seventh section of the questionnaire (Health-related factors) are tabulated in Table 4.7. All the participants reported the presence of recurrent cold, acid reflux/heart burn and stress related to the profession. Majority of the participants reported that they have asthma (90%), sinus problems (90%), nasal allergies (65%) and dry mouth (95%).

Table 4.7: Frequency counts and percentages of health related factors

Q. No.	Questions	Response	Frequency (out of 20)	Percentage
Q63	Asthma	Yes	2	10.0
		No	18	90.0
Q64	Sinus problems	Yes	2	10.0
		No	18	90.0
Q65	Nasal allergies	Yes	7	35.0
		No	13	65.0
Q66	Frequent cold	Yes	20	100.0
		No	0	0.00
Q67	Dry mouth or throat	Yes	19	95.0
		No	1	5.0
Q68	Difficulty in hearing normal conversation	Yes	11	55.0
		No	9	45.0
Q69	Acid reflux or heartburn	Yes	20	100.0
		No	0	0.00
Q70	Stress related to your profession	Yes	20	100.0
		No	0	0.00
Q71	Do you take any medication regularly for any of these problems?	Yes	1	95.0
		No	19	5.0

Section VIII. Effect of voice problem

Responses of the participants to the eighth section of the questionnaire (Effect of voice problem) are tabulated in Table 4.8. Most of the Theyyam artists reported of having voice problem but 75% of the artists reported that it does not affect them in their career life and 25% of them reported that they rarely affected by their voice problems. According to the data obtained in this section, daily activities, career and quality were not that much affected by the presence of the voice problems.

Table 4.8: Frequency counts and percentages of effect of voice problem

Q. No.	Questions	Response	Frequency (out of 20)	Percentage
Q72	How do you feel about your voice problem?	doesn't affect	15	75.0
		Rarely	5	25.0
		Sometimes	0	0.00
		Often	0	0.00
		Major stress	0	0.00
Q73	In the past one year, how much have you missed work because of a problem with your voice?	None	20	100.0
		2-3days	0	0.00
		About a week	0	0.00
		>2 weeks	0	0.00
Q74	Does the voice problem affect your profession and in turn cause financial burden?	No	20	100.0
		Yes	0	0.00
Q75	Does your voice problem cause you to interact less with your family or friends?	Yes	0	0.00
		No	20	100.0
Q76	Do you avoid going out socially because of the voice problem?	Yes	0	0.00
		No	20	100.0
Q77	Do you have trouble using the telephone because of the voice problem?	Yes	1	5.0
		No	19	95.0
Q78	Do you have to repeat yourself to be understood?	Yes	4	20.0
		No	16	80.0

Section IX. Voice care

Table 4.9 represents the responses of the participants to the ninth section of the questionnaire. Neither of the participants ever consulted any physician or speech

speech-language pathologist or other professionals for their voice problems however they are aware that consultation is to be done within a few days. Seventy percent of the artists did not receive any instructions on voice care 30% of the artists received instructions from their senior artists. Home remedies were used as precautions by some of the artists (65%) and voice rest was practiced by others (35%). All the participants were ready to receive instructions for voice care in the future from professionals.

Table 4.9: Frequency counts and percentages of voice care

Q. No.	Questions	Response	Frequency (out of 20)	Percentage
Q79	Have you ever consulted Physician/ENT specialists/SLP for your voice problem?	Yes	0	0.00
		No	20	100.0
Q80	How long would you wait to consult if you have a voice problem?	Never consult	0	0.00
		Few days	20	100.0
		7-15 days	0	0.00
		1 month	0	0.00
		>1 month	0	0.00
Q81	Have you received specific instructions about caring for voice?	Yes	6	30.0
		No	14	70.0
Q83	If you have not received any instructions for voice care, what precautions you take to maintain your voice?	Voice rest	7	35.0
		Home remedies	13	65.0
		Drinking water	0	0.00
		Vocal exercises	0	0.00
Q84	Are you interested in receiving instructions for voice care in future?	Yes	20	100.0
		No	0	0.00
Q85	Do you think adequate voice rest during throat infections can protect you from developing voice problems?	Yes	20	100.0
		No	0	0.00

Voice Characteristics of Theyyam artists

Results of statistical analysis of perceptual and acoustical data are presented as follows.

1. Normality check of the perceptual data.
2. Descriptive statistics (Mean, median, standard deviation and interquartile range) of the various parameters of perceptual evaluation for Theyyam and Control group.
3. Comparison of various perceptual parameters of Theyyam and Control group
4. Inter rater reliability of perceptual measures using Interclass correlation coefficient (ICC).
5. Normality check of the acoustic data
6. Descriptive statistics (Mean, median, standard deviation and interquartile range) of the various parameters of acoustic evaluation for Theyyam and Control group.
7. Comparison of various acoustic parameters of Theyyam and Control group.

Normality check of the perceptual data

Shapiro-Wilk's test was done to check the normality of the perceptual data and two out of six parameters showed normal distribution (Table 4.10).

Table 4.10: Results of Shapiro-Wilk test for perceptual data

Sl. No:	Parameters of CAPE-V	P-value	
		Group I	Group II
1	Overall Severity	0.064	0.318
2	Roughness	0.040	0.013
3	Breathiness	0.000	0.48
4	Strain	0.004	0.23
5	Pitch	0.040	0.02
6	Loudness	0.035	0.125

For normal distribution: $P > 0.05$; for non-normal distribution: $P < 0.05$

Descriptive statistics of perceptual measures of both groups

Descriptive statistics were done to calculate mean, standard deviation, median and IQR for both groups. Descriptive statistics for each group are represented in the Table 4.11

Table 4.11: Descriptive statistics of CAPE-V for both the groups

Parameters	Group I		Group II	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
Overall Severity	9.05 (4.30)	8.12 (5.13)	6.53 (2.50)	6.00 (3.63)
Roughness	8.32 (4.41)	6.00 (5.13)	6.95 (3.64)	5.75 (4.88)
Breathiness	4.10 (3.50)	3.00 (3.19)	4.40 (2.23)	4.25 (4.00)
Strain	7.20 (3.75)	6.25 (5.19)	5.13 (2.35)	5.00 (3.63)
Pitch	3.80 (2.20)	3.50 (4.69)	3.60 (2.01)	2.75 (3.38)
Loudness	2.85 (1.50)	2.40 (2.50)	2.50 (1.00)	2.25 (1.00)

Comparison of perceptual measures across the groups

Independent samples t-test was used to compare perceptual measures those followed normal distribution; whereas a Mann Whitney U test was used to compare the parameters which did not follow a normal distribution (Tables 4.12 & 4.13).

The result of independent sample t test showed a significant difference for overall severity ($t(39) = 2.31$; $P = 0.03$) and the results of Mann Whitney U test showed a significant difference for strain ($Z = 2.05$; $P = 0.04$)

Table 4.12: Results of Independent samples t-test for perceptual data

Sl. No.	Parameters	<i>t</i> value	<i>P</i> -value
1	Overall Severity	2.31	0.03*
2	Loudness	0.95	0.35

*Significant at $P < 0.05$

Table 4.13: Results of Mann-Whitney U test for perceptual data

Sl. No.	Parameters	/Z/ value	P-value
1	Roughness	1.11	0.30
2	Breathiness	1.24	0.21
3	Strain	2.05	0.04*
4	Pitch	0.23	0.81

*Significant at $P < 0.05$

Inter-rater reliability of perceptual measures

Inter-rater reliability for perceptual measures was calculated using Intraclass correlation coefficient. The results of Inter-rater reliability of perceptual measures are tabulated in Table 4.14. Majority of the parameters showed a moderate reliability based on ICC scores (Koo & Li, 2016).

Table 4.14: Average measure of ICC and 95% confidence intervals

Parameters	Average of Interclass correlation	95% Confidence Intervals
Overall Severity	0.63	0.399, 0.784
Roughness	0.62	0.384, 0.779
Breathiness	0.63	0.401, 0.785
Strain	0.65	0.431, 0.796
Pitch	0.63	0.370, 0.787
Loudness	0.44	0.059, 0.682

Normality check of the perceptual data

Shapiro-Wilk's test was done to check the normality of the acoustic data and 11 parameters showed normal distribution whereas, 21 parameters showed non normal distribution for both the groups (Table 4.15).

Table 4.15: Results of Shapiro-Wilk test for acoustic data

Sl. No.	Parameters	P-value	
		Group I	Group II
1	Average Fundamental Frequency (F0)	0.657	0.219
2	Mean Fundamental Frequency(MF0)	0.656	0.219
3	Average Pitch Period (T0)	0.883	0.493
4	Highest Fundamental Frequency (Fhi)	0.703	0.284
5	Lowest Fundamental Frequency (Flo)	0.610	0.202
6	Standard Deviation of Fo (STD)	0.568	0.801
7	Phonatory F0-Range in semi-tones(PFR)	0.000	0.000
8	F0-Tremor Frequency(Fftr)	0.026	0.044
9	Amplitude Tremor Frequency(Fatr)	0.007	0.066
10	Length of Analyzed Sample(Tsam)	0.191	0.000
11	Absolute Jitter(Jitta)	0.025	0.001
12	Jitter Percent(Jitt)	0.008	0.002
13	Relative Average Perturbation(RAP)	0.007	0.005
14	Pitch Perturbation Quotient(PPQ)	0.005	0.001
15	Smoothed Pitch Perturbation Quotient(sPPQ)	0.119	0.022
16	Fundamental Frequency Variation(vF0)	0.997	0.878
17	Shimmer in dB(ShdB)	0.517	0.813
18	Shimmer Percent(Shim)	0.520	0.848
19	Amplitude Perturbation Quotient (APQ)	0.795	0.121
20	Smoothed Ampl. Perturbation Quotient(sAPQ)	0.602	0.025
21	Peak-to-Peak Amplitude Variation(VAm)	0.000	0.152
22	Noise to Harmonic Ratio (NHR)	0.038	0.109
23	Voice Turbulence Index (VTI)	0.449	0.145
24	Soft Phonation Index(SPI)	0.052	0.028
25	F0-Tremor Intensity Index(FTRI)	0.000	0.454
26	Amplitude Tremor Intensity Index(ATRI)	0.006	0.111
27	Degree of Voice Breaks(DVB)	0.000	0.000
28	Degree of Sub-harmonics(DSH)	0.000	0.000
29	Degree of Voiceless(DUV)	0.000	0.000
30	Number of Voice Breaks(NVB)	0.000	0.000
31	Number of Sub-harmonic Segments(NSH)	0.000	0.000
32	Number of Unvoiced Segments(NUV)	0.000	0.000

For normal distribution: $P > 0.05$; for non-normal distribution: $P < 0.05$

Descriptive statistics of various parameters of acoustic evaluation

Descriptive statistics were done to calculate mean, standard deviation, median and IQR for both groups. Descriptive statistics for each group are displayed in the Table 4.12.

Table 4.16: Descriptive statistics of MDVP parameters for both the groups

Parameters	Group I		Group II		Parameters	Group I		Group II		Parameters	Group I		Group II	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)		Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)		Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
Fo	159.43 (34.25)	157.44 (53.70)	129.52 (17.57)	125.51 (30.23)	Jitt	0.64 (0.45)	0.48 (0.67)	0.64 (0.39)	0.54 (0.36)	VTI	0.03 (0.01)	0.03 (0.01)	0.03 (0.01)	0.03 (0.02)
MFo	159.42 (34.25)	157.42 (53.67)	129.51 (17.56)	125.50 (30.23)	RAP	0.40 (0.27)	0.28 (0.41)	0.38 (0.24)	0.32 (0.24)	SPI	19.32 (10.53)	18.25 (17.65)	17.9 (8.65)	15.22 (12.69)
To	6.54 (1.37)	6.35 (2.22)	7.85 (1.04)	7.96 (1.79)	PPQ	0.40 (0.26)	0.27 (0.39)	0.36 (0.23)	0.31 (0.18)	FTRI	0.32 (0.22)	0.25 (0.16)	0.28 (0.11)	0.27 (0.15)
Fhi	163.66 (34.48)	161.95 (56.55)	133.50 (17.87)	130.50 (29.05)	sPPQ	0.60 (0.22)	0.50 (0.35)	0.64 (0.20)	0.59 (0.19)	ATRI	2.01 (1.21)	1.76 (1.22)	2.48 (1.19)	2.25 (1.90)
Flo	154.96 (34.10)	152.42 (52.90)	125.70 (16.91)	122.57 (26.51)	vF0	0.89 (0.28)	0.90 (0.39)	1.01 (0.27)	0.99 (0.34)	DVB	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
STD	1.40 (0.41)	1.36 (0.58)	1.30 (0.34)	1.21 (0.51)	ShdB	0.21 (0.10)	0.18 (0.15)	0.27 (0.12)	0.12 (0.18)	DSH	0.00 (0.00)	0.00 (0.00)	0.05 (0.02)	0.00 (0.00)
PFR	1.95 (0.51)	02 (0)	02 (0.5)	02 (0)	Shim	2.41 (1.18)	2.09 (1.68)	3.20 (1.36)	3.10 (2.11)	DUV	0.20 (0.89)	0.00 (0.00)	0.55 (2.23)	0.00 (0.00)
Fftr	3.42 (1.24)	2.90 (1.87)	3.50 (1.77)	2.86 (2.1)	APQ	1.83 (0.78)	1.70 (1.05)	2.54 (1.03)	2.26 (1.41)	NVB	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Fatr	3.96 (1.64)	3.39 (2.48)	4.70 (1.97)	3.90 (2.38)	sAPQ	3.03 (1.10)	3.00 (1.5)	4.02 (1.74)	3.35 (2.02)	NSH	0.00 (0.00)	0.00 (0.00)	0.05 (0.22)	0.00 (0.00)
Tsam	3.04 (0.03)	3.04 (0.05)	3.01 (0.01)	3.00 (0.01)	VAm	5.46 (1.91)	5.13 (1.54)	6.07 (2.28)	5.90 (2.88)	NUV	0.20 (0.89)	0.00 (0.00)	0.55 (0.23)	0.00 (0.00)
Jita	43.60 (32.75)	31.87 (47.96)	50.44 (32.52)	39.54 (30.77)	NHR	0.12 (0.02)	0.12 (0.01)	0.13 (0.02)	0.13 (0.01)					

Comparison of acoustic parameters across the groups

Based on the results of Shapiro-Wilk's test, appropriate statistical tests were carried out for comparison of acoustic parameters. Independent samples t-test was performed to compare acoustic parameters those followed normal distribution; whereas a Mann-Whitney U test was performed to compare the parameters that did not follow a normal distribution.

Independent sample t-test was done for comparison of acoustic parameters of normal distribution, across groups. The result of independent sample t test showed significant difference for the parameters of $Fo(t(39)=3.66, P=0.001)$, $MFo(t(39)=3.66, P=0.001)$, $To(t(39)=3.60, P=0.001)$, $Fhi(t(39)=3.66; P=0.001)$, $Flo(t(39)=3.63, P=0.001)$, $ShdB(t(39)=2.06, P=0.047)$, $Shim(t(39)=2.06, P=0.046)$, and $APQ (t (39) =2.58, P=0.014)$ between the groups. The t -value and P value for both groups are represented in the Table 4.13.

Table 4.17: Results of Independent samples t-test for acoustic data

Sl. No.	Parameters	t -value	P -value
1	Fo	3.66	0.001*
2	MFo	3.66	0.001*
3	To	3.60	0.001*
4	Fhi	3.66	0.001*
5	Flo	3.63	0.001*
6	STD	0.75	0.460
7	VFo	1.46	0.150
8	ShdB	2.06	0.047*
9	Shim	2.06	0.046*
10	APQ	2.58	0.014*
11	VTI	1.30	0.202

*Significant at $P < 0.05$

Mann-Whitney U test was done for comparison of acoustic parameters of non-normal distribution, across groups. The results of Mann-Whitney U test showed a significant difference for $sAPQ (|Z|=1.98; P=0.047)$. The $|Z|$ value and p value of both groups were represented in the Table 4.14.

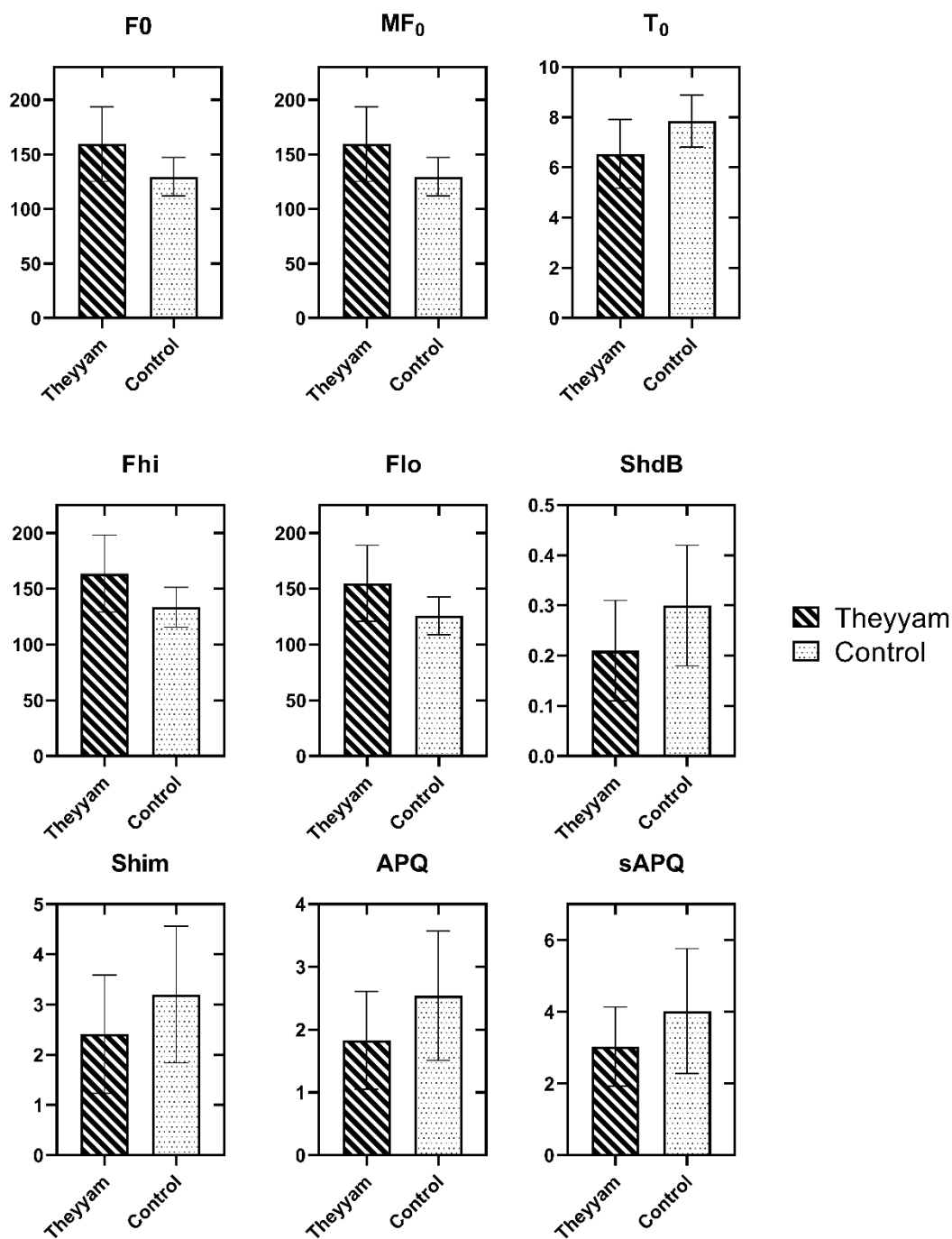
Table 4.18: Results of Mann-Whitney U test for acoustic data

Sl. No.	Parameters	/Z/ value	P-value
1	PFR	0.34	0.730
2	Fftr	0.27	0.780
3	Fatr	1.58	0.120
4	Tsam	3.65	0.00*
5	Jita	1.20	0.230
6	Jitt	0.44	0.650
7	RAP	0.39	0.700
8	PPQ	0.40	0.690
9	Sppq	0.95	0.340
10	sAPQ	1.98	0.047*
11	VAm	1.07	0.280
12	NHR	1.21	0.230
13	SPI	0.05	0.950
14	FTRI	0.78	0.430
15	ATRI	1.41	0.160
16	DVB	0.00	1.000
17	DSH	0.98	0.330
18	DUV	0.55	0.580
19	NVB	0.00	1.000
20	NSH	0.98	0.380
21	NUV	0.58	0.580

* Significant at $P < 0.05$

Figure 4.1 shows comparison between some MDVP parameters that are significantly different across both the groups.

Figure 4.1. MDVP parameters that are significantly different across the groups



CHAPTER 5

DISCUSSION

The aim of this study was to investigate the voice characteristics and vocal problems of individuals who perform Theyyam as their traditional performance. In order to determine the voice problems, an adapted self-reported voice problem questionnaire was used in Theyyam group. The comparison of acoustic parameters and perceptual measures were made between the group of Theyyam artists and age (distributional) and gender matched control group.

Vocal habits and voice problems in Theyyam artists

The voice survey questionnaire was administered in Theyyam group to determine their vocal problems, their vocal and non-vocal habits, and their knowledge of vocal techniques. The result depicts the voice and speech characteristics of Theyyam artists, the prevalence of voice problems and the awareness, nature of the voice problems, phono traumatic behaviors, lifestyle factors, and health-related factors. In addition to this, the effect of voice problems and their knowledge about voice care is also depicted in the results.

Environmental factors relating to voices of Theyyam artists

The majority of the participants in Group I had more than 21 years of experience in Theyyam performance and started performing Theyyam at a young age. During their performance time in addition to singing and dancing, they were frequently required to be involved in dialogue delivery for more than one hour. They were not exposed to any formal voice or vocal technique training during their training period, which may also be one of the reasons why they may have strained themselves during their vocal performances. All the Theyyam artists sing and speak without using microphones in noisy environments and reported that they need to raise their voices

against background noise. The findings can be supported by a study done by Doherty et al. (1988) where they quoted that the setting for the stage is typically outdoors for folk performers and is overlapped by the background noise from people, vehicles, or construction is one of those obstacles. Theyyam artists have experienced restrictions in opening their mouths, breath intake, and speaking due to the ornaments or clothes they wore during the performance. According to Hoffman-Ruddy et al. (2001), some costumes are so heavy or constricting that the actor may end up with bad posture in order to authentically portray the role. Additionally, certain costumes may be uncomfortable to wear due to intense heat, which causes physical exhaustion. Because of the Theyyam frame is attached to various bodily areas, blood circulation is disturbed (John & Jacob., 2015).

Physical factors relating to voices of Theyyam artists

Theyyam artists have reported that, while performing infrequently clench their teeth or tighten their muscles to make speech or voice more dramatic. Loud and continuous talking, sleepless nights in performance days and background noise are considered as risk factors for developing voice problems. All the participants have reported hoarseness in their voice, dryness in throat, vocal fatigue, frequent coughing and effortful voice production. Most of the participants experienced a momentary loss of voice and reduced breath support. A study done by Raphael and Scherer (1987) showed some issues that professional voice users encounter with their voices which include throat fatigue, general physical exhaustion, throat tightness, strained or tense throat, problems in producing and sustaining voice, reduction in pitch range, and greater difficulty producing higher pitches.

Lifestyle factors relating to voices of Theyyam artists

The Theyyam group also admitted to engaging in various improper vocal and non-vocal behaviors, such as shouting, speaking loudly, throat clearing, consuming alcohol, eating at odd times, eating spicy food, inadequate quantity of water intake, and smoking cigarettes, all of which contribute to voice problems. It has been discovered that roughly 22% of dancers who regularly used alcohol to cope with the strain eventually developed an alcohol addiction. (John & Jacob., 2015). The majority of the participants were used to perform Theyyam even if they had any voice problems, throat infections, or any other health issues. Lack of adequate time for sleep is also found to be a major problem in Theyyam artists.

A case study done by John and Jacob (2015) revealed that Theyyam performance can be longer than 12 or even 24 hours and during that time, he will not be able to eat or drink anything, which would lead to strain on his body. The performer works day and night for several weeks throughout the season, which puts a lot of pressure on him. Theyyam artists frequently neglect to drink enough water on performance days, which can lead to dehydration and subsequent vocal problems. According to what they have reported, this is because it is difficult to urinate between long performances while wearing heavy costumes.

Prevalence of voice problems in Theyyam artists

All the Theyyam artists have reported that they had voice related problems since they joined in their profession and to some extent that it has prevented them from performing Theyyam. Most of them reported that the onset of the problem was gradual. The habit of loud talking, continuous talking, background noise and sleepless nights during the season of Theyyam performance were considered as the prominent

reason behind the vocal problems. Even though questionnaires' results shows that the Theyyam performers had vocal issues, the results of the acoustic measures and perceptual measures showed only few parameters that showed significant difference between voice characteristics of the Theyyam artists and control group. Hence, we can perceive that the vocal issues that the Theyyam performers faced, nevertheless, were only temporary. They will be taking a break of four to five months following each performance season (usually six to eight months). Therefore, with sufficient voice rest or other home remedies, the majority of them recovered after a certain period.

Health-related Factors of Theyyam artists

Theyyam artists have reported the presence of recurrent cold, acid reflux/heartburn burn, and stress related to the profession. The majority of the participants reported that they have asthma, sinus problems, nasal allergies, and dry mouth. In the same case study, John and Jacob (2015) have described certain health issues experienced by Theyyam artists. Over 42% of Theyyam artists report having hypertension on a regular basis and also report of having rheumatic conditions (28%). Arthritis is known to be a prevalent disease among Theyyam artists (John & Jacob, 2015).

Voice characteristics of Theyyam artists

Comparison of perceptual measures across the groups

The perceptual evaluation of collected voice samples was carried out and a significant difference in overall severity and strain was obtained between the groups. Similar findings were obtained in a study done by Arabi et al. (2023). The aim of the study was to investigate the relationship between auditory-perceptual

and acoustic voice parameters in Iranian theater artists. Similar to the current study, using the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V) in Persian, the auditory-perceptual evaluation was conducted and the findings were the overall severity and strain had the higher value among male and female individuals across the auditory-perceptual measures.

Inter-rater reliability of perceptual measures among the experienced speech-language pathologists was also determined. The findings shows that a moderate agreement is present among the four judges in the current study. In the similar study done by Arabi et al. (2023) the inter-rater reliability between two judges was incorporated and each auditory-perceptual parameter's Krippendorff's Alpha (0.95 confidence interval) was calculated, and a percentage of agreement between the two raters was achieved. The agreement rate was highest for overall severity and lowest for strain. Unlike the current study Krippendorff's Alpha was used and a significant agreement was seen between two judges.

Comparison of acoustic parameters across the groups

In addition to the perceptual evaluation, acoustic analysis of phonation samples of Theyyam and normal groups were compared to study the vocal characteristics of the Theyyam group. In the current study, the result of the acoustic analysis shows that there is a significant difference in Fo, MFo, To, Fhi, Flo, ShdB, Shim, APQ and sAPQ, between Theyyam and normal group. Theyyam artists had increased fundamental frequency (Fo) when compared to the control group. Based on the findings of perceptual evaluation and self-reported questionnaire data, the increased pitch might be due to the increased strain in Theyyam artists. Similar to Theyyam artists, the majority of Yakshagana performers lacked formal vocal instruction. Because of this, it's very feasible that they employ their phonatory

system in an inappropriate way to produce their singing or speaking at greater frequencies and intensities (Kalaiselvi, 2006). When compared to the Theyyam group, the control group's perceived breathiness was found to be higher, and this finding was reflected in the amplitude perturbation measures of MDVP and CAPE=V. That is, when compared to the Theyyam group, the shimmer is greater in the control group. This indicates the control group's subject selection may not have been entirely typical, which would constitute a study limitation.

A study, conducted by Sabu et al. (2019) in Theyyam artists to determine the acoustic characteristics. To date this is the only study done in Theyyam artists. To identify the voice features among them, voice evaluation was done using Praat software. Jitter percentage and Shimmer were used as voice parameters in the study. Similar to the current study findings this study results also revealed that there is no statistically significant difference between the Theyyam artists and the normal public in terms of jitter. However, this study not investigate the vocal problems of Theyyam artists.

Hoffman-Ruddy et al. (2001) raised comparable issues in their analysis of the perturbation measures in three groups of high-risk artists (musical theater, choral ensemble, and street theater). A choral group and a musical theater group came in second and third, respectively, with higher jitter and shimmer percentages. But the current study and Hoffman-Ruddy's study differ significantly in several ways. Perhaps the only thing the two investigations have in common is that they both involved singing and dialogue delivery. In the current study significant difference showed by shimmer not jitter. Another study looked at the relationship between auditory-perceptual and acoustic voice parameters in Iranian theater artists (Arabi et al., 2023).

The current study presents insightful information on the vocal problems and voice characteristics of Theyyam artists. Further study should focus on the investigation of voice in Theyyam artists utilizing a multi-dimensional procedure that includes various perceptual, acoustic, aerodynamic, and video-stroboscopic variables employing a larger sample size, which can give a more accurate representation of their voice and a deeper understanding of the vocal characteristics of Theyyam artists can be obtained by recording voice samples during or shortly after the performance.

CHAPTER 6

SUMMARY AND CONCLUSION

Speech and singing are the two basic inter-human communication methods that utilize the human voice. Hence voice plays a vital role in everyday life because it is the primary mode of human communication. Theyyam is a form of Hindu ritualistic singing and dance performance practiced in the Malabar region of Kerala where the art form is revered as a regional cultural icon. The current study aimed to investigate the vocal problems and voice characteristics of Theyyam artists. A total of 40 participants: 20 Theyyam artists and 20 normal individuals were recruited for the study. An adapted voice survey questionnaire (Devadas et al., 2019) was administered in the Theyyam group to determine their vocal problems. Acoustic analysis and perceptual evaluation were done to study the voice characteristics of Theyyam artists by collecting phonation samples and reading samples from both groups.

The results of the self-reported voice survey questionnaire were checked using a frequency count and percentage. The perceptual evaluation was carried out using CAPE-V analogue scale and the acoustic evaluation was carried out using MDVP software, by using a phonation sample and speech sample.

In general, the outcome of the questionnaire shows that all the participants in the Theyyam group have experienced voice problems in their careers. The vocal loading, they experience, bad vocal and non-vocal habits, and their limited understanding of voice care are all contributing factors to their vocal problems. Even though questionnaires' results shows that the Theyyam performers had vocal issues, the results of the acoustic measures and perceptual measures showed only few parameters

that showed a significant difference between the groups. The majority of them recovered with sufficient time gap after a certain period.

The comparison of perceptual measures between the two groups revealed that the overall severity and strain showed a significant difference between the groups and the inter-rater reliability using the Interclass correlation coefficient was also considered and a moderate agreement was present among four judges.

Acoustic analysis showed a significant difference in fundamental frequency-related measures and amplitude perturbation measures between the Theyyam and the normal group. Theyyam artists had increased fundamental frequency (F0) when compared to the control group and it might be due to the increased strain in Theyyam artists. The perceptual evaluation also showed significant difference in overall severity and strain between the groups.

To conclude, through questionnaires, all Theyyam artists experienced voice problems in their careers though it is temporary and comes to normal voice quality show According to the interpretation of the with certain period of time. However, they experience any voice related problems. To avoid dysphonia and the consequences, Theyyam artists should obtain counseling on voice care and vocal exercises before performances.

Implications of the study

The outcome of the study has the following implications:

1. The study results highlight the vocal problems and voice characteristics of Theyyam artists
2. Theyyam artists can be provided with vocal hygiene strategies along with voice care techniques as a preventive/intervention strategy
3. This is the first study reporting vocal problems, acoustic and auditory

perceptual characteristics of Theyyam artists.

Limitations of the study

1. Since the data collection was carried out in the initial period of the Theyyam season, the vocal problems were not that evident among Theyyam artists. Also, these would not have a major impact on their daily life
2. The present study involved only 20 Theyyam artists which make it difficult to generalize the results
3. The recording of the voice and speech samples were carried out in places where Theyyam was performed. Although these places were quiet, recordings are not comparable to what is obtained from a sound treated room.

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APPENDIX I

Questionnaire
Prevalence and risk factors of voice problems in Theyyam artists

തെയ്യം കലാകാരന്മാരുടെ ശബ്ദ പ്രശ്നങ്ങളുടെ വ്യാപ്തിയും അപകട ഘടകങ്ങളും

വ്യക്തിപരമായ അടിസ്ഥാന വിവരങ്ങൾ

പ്രായം:

വിദ്യാഭ്യാസം:

സാമ്പത്തിക സ്ഥിതി/മാസവരുമാനം:

തൊഴിൽ:

തൊഴിലും പരിശീലനവുമായി ബന്ധപ്പെട്ട വിശദാംശങ്ങൾ

- 1 തെയ്യം കലാകാരനായി അനുഷ്ഠാനം തുടങ്ങിയിട്ട് എത്ര വർഷമായി?
1-5 വർഷം 6-10 വർഷം 11-15 വർഷം 16-20 വർഷം >21 വർഷം
- 2 വർഷത്തിൽ എത്ര മാസമാണ് നിങ്ങൾ തെയ്യം അവതരിപ്പിക്കുന്നത്?
 <2 മാസം 3-4 മാസം 5-6 മാസം 7-8 മാസം >9 മാസം
- 3 ഒരു വർഷത്തിൽ, നിങ്ങൾ ഏകദേശം എത്ര തെയ്യം ചെയ്യാറുണ്ട്?
 <10 11-50 51-100 101-150 >151
- 4 ആഴ്ചയിൽ എത്ര ദിവസം നിങ്ങൾ തെയ്യം ചെയ്യാറുണ്ട്?
1-2 ദിവസം 3-4 ദിവസം 5-6 ദിവസം 7 ദിവസം ആഴ്ചയിൽ
- 5 ഒരു ദിവസം എത്ര മണിക്കൂർ നിങ്ങൾ തെയ്യം അവതരിപ്പിക്കും?
 <1 മണിക്കൂർ 2-4 മണിക്കൂർ 5-8 മണിക്കൂർ 9-10 മണിക്കൂർ >11 മണിക്കൂർ
- 6 തെയ്യം അവതരിപ്പിക്കാൻ പരിശീലനം നേടിയിട്ടുണ്ടോ? ഉണ്ട് ഇല്ല
 • ഉവ്വ് എങ്കിൽ, നിങ്ങൾ എത്ര വർഷം പരിശീലനം നേടി?
 <6 മാസം 6-12 മാസം 1-2 വർഷം 2-4 വർഷം >5 വർഷം
- 7 ഏത് പ്രായത്തിലാണ് നിങ്ങൾ തെയ്യം അവതരിപ്പിക്കാൻ തുടങ്ങിയത്?
 <10 വർഷം 11-15 വർഷം 16-20 വർഷം 20-25 വർഷം >26 വർഷം
- 8 തെയ്യം അവതരിപ്പിക്കുന്നതിനു മുമ്പ് നിങ്ങളുടെ ശബ്ദം ഉണ്ട് ഇല്ല
 ഉഷ്ണമയ്ക്കുമാക്കാറുണ്ടോ?
 • ഉണ്ടെങ്കിൽ, നിങ്ങൾ എന്താണ് ചെയ്യുന്നത്?
ഹമ്മിംഗ് നാവു ചുണ്ടും ട്രില്ലുകൾ പിച്ചിന്റേ ഗ്ലൈഡിംഗ്
 (ഉയർന്നതും താഴ്ന്നതും) മറ്റൊന്നെങ്കിലും
- 9 തെയ്യം അവതരിപ്പിച്ചതിന് ശേഷം നിങ്ങൾ വോക്കൽ കൂൾ ഉണ്ട് ഇല്ല
 ഡൗൺ വ്യായാമങ്ങൾ ചെയ്യാറുണ്ടോ?
 • ഉണ്ടെങ്കിൽ, നിങ്ങൾ എന്താണ് ചെയ്യുന്നത്?

	<p><input type="checkbox"/>ഹമ്മിംഗ് <input type="checkbox"/> നാവു ചുണ്ടും <input type="checkbox"/>ട്രില്ലുകൾ <input type="checkbox"/>പിച്ച്നിന്നെ ഡൈഡിംഗ് (ഉയർന്നതും താഴ്ന്നതും) <input type="checkbox"/>മറ്റൊന്നെങ്കിലും</p>		
10	<p>നിങ്ങളുടെ ശബ്ദം പരിശീലിപ്പിക്കാൻ നിങ്ങൾ പ്രകൃതിദത്തമായ ശബ്ദങ്ങൾ/മൃഗങ്ങളുടെ കരച്ചിൽ പാടുകയും അനുകരിക്കുകയും ചെയ്യുന്നുണ്ടോ?</p>	ഉണ്ട്	ഇല്ല
11	<p>തെയ്യം അവതരിപ്പിക്കുന്നതിനൊപ്പം ജോലിയുണ്ടോ?</p> <ul style="list-style-type: none"> • അതെ എങ്കിൽ, അതിൽ കൂടുതൽ ശബ്ദ ഉപയോഗം ഉൾപ്പെട്ടിട്ടുണ്ടോ? • ഉണ്ടെങ്കിൽ നിങ്ങളുടെ ശബ്ദ ഉപയോഗം വിവരിക്കുക 	ഉണ്ട് ഉണ്ട്	ഇല്ല ഇല്ല
12	<p>നിങ്ങളുടെ പ്രകടനത്തിനിടയിൽ, നൃത്തത്തിനും പാട്ടിനും പുറമേ, നിങ്ങൾ പതിവായി;</p> <ul style="list-style-type: none"> • സംസാരിക്കണോ അതോ കലാരൂപവുമായി ബന്ധപ്പെട്ട എന്തെങ്കിലും വാചകങ്ങൾ പറയേണ്ടതായിട്ടുണ്ടോ? • ഉണ്ടെങ്കിൽ, നിങ്ങൾ എത്രനേരം സംസാരിക്കും? <input type="checkbox"/>15 മിനിറ്റ് <input type="checkbox"/>30 മിനിറ്റ് <input type="checkbox"/>45 മിനിറ്റ് <input type="checkbox"/>60 മിനിറ്റ് 	ഉണ്ട്	ഇല്ല
13	<p>കൂടുതൽ ശബ്ദമുള്ള അന്തരീക്ഷത്തിൽ നിങ്ങൾ പാടുകയും സംസാരിക്കുകയും ചെയ്യാറുണ്ടോ?</p> <ul style="list-style-type: none"> • അതെ എങ്കിൽ, അപ്പോൾ പരിസ്ഥിതി എത്രത്തോളം ശബ്ദമയമാണെന്ന് നിങ്ങൾ കരുതുന്നു? <input type="checkbox"/>മൃദു (40dB) <input type="checkbox"/>മിതമായ (60dB) <input type="checkbox"/> ഉച്ചത്തിൽ (70-90dB) <input type="checkbox"/>വളരെ ഉച്ചത്തിൽ(>100dB) • പശ്ചാത്തല ശബ്ദത്തിനെതിരെ ശബ്ദം ഉയർത്തണമെന്ന് നിങ്ങൾക്ക് തോന്നാറുണ്ടോ? 	ഉണ്ട് ഉണ്ട്	ഇല്ല ഇല്ല
14	<p>തെയ്യം ചെയ്യുന്ന സമയത്ത് നിങ്ങൾ ഉച്ചഭാഷിണിയോ (മൈക്ക്) അതോ വേറെ ഏതെങ്കിലും ഉപകരണങ്ങളോ ഉപയോഗിക്കാറുണ്ടോ?</p>	ഉണ്ട്	ഇല്ല
15	<p>പൊതുവെ നിങ്ങൾ എന്ത് വേഷങ്ങളാണ് ചെയ്യുന്നത്? (സ്ത്രീ, പുരുഷൻ, ദൈവം/ദേവി, മറ്റുള്ളവർ)</p>		
16	<p>നിങ്ങളുടെ പ്രകടനത്തിനിടയിൽ എത്ര തവണ നിങ്ങളുടെ ശബ്ദം മാറ്റേണ്ടതുണ്ട്? <input type="checkbox"/>ഒരിക്കലും <input type="checkbox"/>അപൂർവ്വമായി <input type="checkbox"/>ചിലപ്പോൾ <input type="checkbox"/>പലപ്പോഴും <input type="checkbox"/>എപ്പോഴും</p>		
17	<p>പ്രകടനത്തിനിടെ നിങ്ങൾ ധരിക്കുന്ന ആഭരണങ്ങളോ തുണികളോ കാരണം വായ തുറക്കുന്നതിനോ ശ്വാസം എടുക്കുന്നതിനോ സംസാരിക്കുന്നതിനോ എന്തെങ്കിലും നിയന്ത്രണം അനുഭവപ്പെടുന്നുണ്ടോ?</p>	ഉണ്ട്	ഇല്ല
18	<p>നിങ്ങൾ എപ്പോഴെങ്കിലും സംസാരിക്കുന്ന ശബ്ദത്തിനായി പരിശീലനം നേടിയിട്ടുണ്ടോ? ഉണ്ടെങ്കിൽ, എത്ര വർഷം?</p>	ഉണ്ട്	ഇല്ല

<6 മാസം 7-12 മാസം 1-2 വർഷം 3-4 വർഷം >5 വർഷം

ശബ്ദത്തിന്റെയും സംസാരത്തിന്റെയും സവിശേഷതകൾ

- 19 നിങ്ങളുടെ അഭിപ്രായത്തിൽ ഒരു തെയ്യം കലാകാരന് ഏതുതരം ശബ്ദം/സ്വരം/സംഭാഷണം എന്നിവ ആവശ്യമാണ്?
 ശബ്ദത്തിന്റെ ഗുണനിലവാരത്തിൽ മാറ്റം
 ഉച്ചത്തിലുള്ള ശബ്ദം / മൃദുവായ ശബ്ദം താഴ്ന്ന പിച്ച് / ഉയർന്ന പിച്ച് വ്യത്യസ്ത സ്വരമാതൃകകൾ മുകളിൽ പറഞ്ഞവയെല്ലാം
- 20 നിങ്ങളുടെ ശബ്ദം/സംസാരം കൂടുതൽ നാടകീയമാക്കാൻ നിങ്ങൾ പാടുമ്പോൾ/സംസാരിക്കുമ്പോൾ പല്ല് കടിക്കുകയോ താടിയെല്ല് പിരിമുറുക്കുകയോ കഴുത്തിലെ പേശികൾ മുറുക്കുകയോ ചെയ്യാറുണ്ടോ?
 ഒരിക്കലും അപൂർവ്വമായി ചിലപ്പോൾ പലപ്പോഴും എപ്പോഴും

ശബ്ദ പ്രശ്നങ്ങളുടെ വ്യാപനവും അവബോധവും

- 21 നിങ്ങൾ ഈ തൊഴിലിൽ ചേർന്നതിന് ശേഷം നിങ്ങൾക്ക് ശബ്ദവുമായി ബന്ധപ്പെട്ട എന്തെങ്കിലും പ്രശ്നങ്ങൾ ഉണ്ടായിട്ടുണ്ടോ,
 അത് തെയ്യം ചെയ്യുന്നതിൽ നിന്ന് നിങ്ങളെ തടഞ്ഞിട്ടുണ്ടോ?
 • നിങ്ങൾക്ക് ശബ്ദ പ്രശ്നം അനുഭവപ്പെട്ടിട്ടുണ്ടെങ്കിൽ, അത് എത്ര തവണയായിരുന്നു?
 6 മാസത്തിലൊരിക്കൽ 2-3 മാസത്തിലൊരിക്കൽ
 മാസത്തിലൊരിക്കൽ ആഴ്ചയിൽ ഒരിക്കൽ
- 22 എപ്പോഴാണ് നിങ്ങളുടെ ശബ്ദ പ്രശ്നം നിങ്ങൾ ആദ്യം ശ്രദ്ധിച്ചത്?
 കഴിഞ്ഞ 1 ആഴ്ച കഴിഞ്ഞ 1 മാസം കഴിഞ്ഞ 6 മാസം
 കഴിഞ്ഞ ഒരു വർഷം >1 വർഷം
- 23 നിങ്ങളുടെ ശബ്ദ പ്രശ്നത്തിന്റെ തുടക്കം നിങ്ങൾ എങ്ങനെ വിവരിക്കും?
 പെട്ടെന്ന് ക്രമേണ ഇടയ്ക്കിടെ ക്രമേണ കുടിക്കുടി വരുന്നു
 നിങ്ങളുടെ ശബ്ദ പ്രശ്നം അനുദിനം വഷളാകുകയാണോ?
- 24 ഇന്ന് നിങ്ങളുടെ ശബ്ദത്തിന് എന്തെങ്കിലും പ്രശ്നമുണ്ടോ, അത് നിങ്ങൾ ചെയ്യാൻ ആഗ്രഹിക്കുന്നതെല്ലാം ചെയ്യുന്നതിൽ നിന്ന് നിങ്ങളെ തടയുന്നുണ്ടോ?
 • ഉണ്ടെങ്കിൽ, പ്രശ്നം എത്ര ഗുരുതരമാണ്?
 മിതമായ (10-30%) വളരെ മിതമായ (31-60%) കഠിനമായ (61-90%) വളരെ കഠിനമായ (>90%)
 • ശബ്ദ പ്രശ്നം കാരണം നിങ്ങൾക്ക് തെയ്യം ചെയ്യുന്നത് മാറ്റി വെക്കേണ്ടി വന്നിട്ടുണ്ടോ? ഉണ്ടെങ്കിൽ, എത്ര?
 1-2 3-5 6-9 10-15 >16
- 25 കഴിഞ്ഞ 6 മാസത്തെ നിങ്ങളുടെ ശബ്ദം എങ്ങനെ വിവരിക്കും?
 വളരെ മോശം മോശം ശരാശരി നല്ലത് വളരെ നല്ലത്

ഉണ്ട്	ഇല്ല
ഉണ്ട്	ഇല്ല
ഉണ്ട്	ഇല്ല
ഉണ്ട്	ഇല്ല

- 26 ഒരു ശബ്ദ പ്രശ്നം കൂടുന്നതിനുള്ള അപകട ഘടകങ്ങൾ എന്താണെന്ന് നിങ്ങൾ കരുതുന്നു?
 □ഉച്ചത്തിൽ സംസാരിക്കൽ □തുടർച്ചയുള്ള സംസാരം □പശ്ചാത്തല ശബ്ദവും സംഗീതവും
 □പ്രകടനം കാരണം ഉറക്കമില്ലാത്ത രാത്രികൾ □മുകളിൽ പറഞ്ഞവയെല്ലാം

പ്രകടനം നടത്തുന്നതിനിടയിലോ ശേഷമോ നിങ്ങൾക്ക് പലപ്പോഴും അനുഭവപ്പെടുന്ന ശബ്ദ പ്രശ്നങ്ങൾ ഇനിപ്പറയുന്നവയിൽ ഏതാണ് എന്ന് ദയവായി സൂചിപ്പിക്കുക. ഏതെങ്കിലും രോഗവുമായി ബന്ധപ്പെട്ടിരിക്കുന്ന സമയത്തെ ശബ്ദ പ്രശ്നങ്ങൾ ഉൾപ്പെടുത്തരുത്.

27	ശബ്ദത്തിന്റേ ഗുണനിലവാരത്തിൽ പരുക്കൻ/കാഠിന്യം/ശ്വാസതടസ്സം	ഉണ്ട്	ഇല്ല
28	പിച്ച് റേഞ്ച് കുറയുന്നു/പിച്ച് മാറ്റുന്നതിൽ പ്രശ്നം	ഉണ്ട്	ഇല്ല
29	തൊണ്ട വരണ്ടുപോകുന്ന അവസ്ഥ	ഉണ്ട്	ഇല്ല
30	സംസാരിക്കുമ്പോൾ/ ശബ്ദം ഉപയോഗിക്കുമ്പോൾ ക്ഷീണിതനാവുന്ന അവസ്ഥ	ഉണ്ട്	ഇല്ല
31	തൊണ്ടയിൽ മുറുക്കം	ഉണ്ട്	ഇല്ല
32	താൽക്കാലികമായി ഉച്ച/ശബ്ദം നിന്നുപോകുന്ന അവസ്ഥ	ഉണ്ട്	ഇല്ല
33	തൊണ്ടയിൽ അസ്വസ്ഥത	ഉണ്ട്	ഇല്ല
34	തൊണ്ടയിൽ വേദന	ഉണ്ട്	ഇല്ല
35	ശ്വാസതടസ്സം/ ശ്വാസം എടുക്കുന്നതിൽ വേറെ എന്തെങ്കിലും ബുദ്ധിമുട്ട്	ഉണ്ട്	ഇല്ല
36	ശബ്ദത്തിന്റേ പൂർണ്ണമായ നഷ്ടം	ഉണ്ട്	ഇല്ല
37	ഉച്ചത്തിൽ സംസാരിക്കുന്നതിൽ പ്രശ്നം	ഉണ്ട്	ഇല്ല
38	സംസാരിക്കാൻ/ശബ്ദമുണ്ടാക്കാൻ കൂടുതൽ ആയാസപ്പെടുന്ന അവസ്ഥ	ഉണ്ട്	ഇല്ല
39	പ്രത്യേകിച്ച് ഒരു മണിക്കൂറിലധികം പ്രകടനം നടത്തിയതിന് ശേഷം ഉച്ച സംബന്ധിക്കുന്ന സഹിഷ്ണുതയും വഴക്കവും നഷ്ടപ്പെടുന്നു	ഉണ്ട്	ഇല്ല
40	സ്വരത്തിലുള്ള വ്യതിയാനങ്ങൾ, ക്ഷണികമായ ശബ്ദം നഷ്ടപ്പെടൽ അല്ലെങ്കിൽ പെട്ടെന്നുള്ള മറ്റ് മാറ്റങ്ങൾ	ഉണ്ട്	ഇല്ല
41	തൊണ്ടയിലെ അസ്വസ്ഥത, പ്രത്യേകിച്ച് ഒരു മണിക്കൂറിലധികം പ്രകടനം നടത്തിയതിന് ശേഷം	ഉണ്ട്	ഇല്ല
42	തൊണ്ടയിലെ പിരിമുറുക്കം അല്ലെങ്കിൽ വേദന, പ്രത്യേകിച്ച് ഒരു മണിക്കൂറിലധികം പ്രകടനം നടത്തിയതിന് ശേഷം	ഉണ്ട്	ഇല്ല
43	ഇടയ്ക്കിടെയുള്ള ചുമ	ഉണ്ട്	ഇല്ല
44	കഠിനമായ ആലാപനം/സംസാരം	ഉണ്ട്	ഇല്ല
45	ഉയർന്ന പിച്ച്കളിൽ പേശികളുടെ ദൃഢത	ഉണ്ട്	ഇല്ല

ശബ്ദത്തിന് പ്രശ്നമുണ്ടാക്കുന്ന രീതിയുള്ള പ്രവർത്തികൾ/പെരുമാറ്റങ്ങൾ

- 46 നിങ്ങൾ ഉച്ചത്തിലുള്ള ശബ്ദത്തിൽ സംസാരിക്കുന്നുണ്ടോ? ഉണ്ട് ഇല്ല
- 47 നിങ്ങൾ ബോധപൂർവ്വം നിങ്ങളുടെ ശബ്ദത്തിലോ ഉണ്ട് ഇല്ല
സംസാരത്തിലോ മാറ്റം വരുത്തുന്നുണ്ടോ?
- 48 നിങ്ങൾ വേഗത്തിൽ സംസാരിക്കുന്നുണ്ടോ / സംസാരിക്കുമ്പോൾ ഉണ്ട് ഇല്ല
ശ്വാസം തീരാറുണ്ടോ?
- 49 ഒരു സുഹൃത്തുമായി സംസാരിക്കുമ്പോഴോ അല്ലെങ്കിൽ ഒരു ഉണ്ട് ഇല്ല
സാമൂഹികകൂട്ടിച്ചേരലുകളിലോ സംസാരിക്കുമ്പോൾ
സാധാരണയായി
കൂടുതൽ സംസാരിക്കുന്നത് നിങ്ങൾ തന്നെയാണോ?
- 50 നിങ്ങൾ ഇടയ്ക്കിടെ തൊണ്ട ക്ലിയർ/ കണ്ണശുദ്ധി ഉണ്ട് ഇല്ല
വരുത്താറുണ്ടോ?
- 51 നിങ്ങൾക്ക് ഇടയ്ക്കിടെ ചുമയുണ്ടോ? ഉണ്ട് ഇല്ല
- 52 നിങ്ങൾക്ക് തൊണ്ടയിൽ അണുബാധയുണ്ടാകുമ്പോൾ നിങ്ങൾ ഉണ്ട് ഇല്ല
തെയ്യം അനുഷ്ഠിക്കാറുണ്ടോ?
- 53 നിങ്ങൾക്ക് വേറെ എന്തെങ്കിലും ശബ്ദ പ്രശ്നമുണ്ടാകുമ്പോൾ ഉണ്ട് ഇല്ല
നിങ്ങൾ തെയ്യം അനുഷ്ഠിക്കാറുണ്ടോ?
- 54 നിങ്ങൾക്ക് ശാരീരികമായി സുഖമില്ലാത്തപ്പോൾ തെയ്യം ഉണ്ട് ഇല്ല
അനുഷ്ഠിക്കാറുണ്ടോ?

ജീവിതശൈലി ഘടകങ്ങൾ

- 55 തെയ്യം കെട്ടിയാടുന്ന ദിവസങ്ങളിൽ നിങ്ങൾക്ക് ഭക്ഷണം ഉണ്ട് ഇല്ല
കഴിക്കുന്നതിന് പ്രത്യേക സമയമുണ്ടോ?
• നിങ്ങളുടെ ഭക്ഷണക്രമത്തിൽ ഇനിപ്പറയുന്ന ഭക്ഷണ ഇനങ്ങൾ
ഉൾപ്പെട്ടിട്ടുണ്ടോ:
എ. മസാലകൾ അല്ലെങ്കിൽ എണ്ണമയമുള്ള ഭക്ഷണം
ഒരിക്കലും അപൂർവ്വമായി ചിലപ്പോൾ പലപ്പോഴും
എപ്പോഴും
ബി. വളരെ ചൂടുള്ളതോ തണുത്തതോ ആയ ഇനങ്ങൾ
ഒരിക്കലും അപൂർവ്വമായി ചിലപ്പോൾ പലപ്പോഴും
എപ്പോഴും
- 56 സിഗരറ്റ്/ബീഡി ഉപയോഗം സംബന്ധിച്ച നിങ്ങളുടെ അനുഭവം സൂചിപ്പിക്കുക
ഒരിക്കലും പുകവലിക്കാറില്ല പുകവലിക്കാൻ ഉപയോഗിക്കുന്നു
ഇടയ്ക്കിടെ യുള്ള പുകവലി സ്ഥിരമായി പുകവലി
- 57 നിങ്ങൾ പുകയില/പാൻ?ഗുട്ട്/വെറ്റില ചവയ്ക്കാറുണ്ടോ?
ഒരിക്കലും ഇല്ല അപൂർവ്വമായി ചിലപ്പോൾ സാധാരണയായി എപ്പോഴും
- 58 നിങ്ങൾ മദ്യം കഴിക്കാറുണ്ടോ? ഉണ്ട് ഇല്ല
അപൂർവ്വമായി മാസത്തിൽ ഒരിക്കൽ 2-3 ആഴ്ചയിൽ ഒരിക്കൽ
ആഴ്ചയിൽ ഒരിക്കൽ ദിവസവും

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|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| | തെയ്യം കെട്ടിയാടുന്നതിന് മുമ്പോ ശേഷമോ അല്ലെങ്കിൽ സമയത്തോ നിങ്ങൾ മദ്യം/ കള്ള് കഴിക്കാറുണ്ടോ? | ഉണ്ട് | ഇല്ല |
| 59 | നിങ്ങളുടെ ഉറക്കത്തിൽ എന്തെങ്കിലും പ്രശ്നം അനുഭവപ്പെടുന്നുണ്ടോ? (ഉദാഹരണം :ഉറക്കക്കുറവ് /ഉറക്കമില്ലായ്മ) | ഉണ്ട് | ഇല്ല |
| 60 | നിങ്ങൾ സ്ഥിരമായി ഒരു ദിവസം എത്ര മണിക്കൂർ ഉറങ്ങുന്നു?theyyam days
□<2 മണിക്കൂർ □3-4 മണിക്കൂർ □5-6 മണിക്കൂർ □7-8 മണിക്കൂർ □>9 മണിക്കൂർ | | |
| 61 | തെയ്യം കെട്ടിയാടുന്ന ദിവസങ്ങളിൽ ഇനിപ്പറയുന്നവയിൽ ഏതാണ് നിങ്ങൾ കൂടുതലായും കൂടിക്കുന്നത്?
□ കാപ്പി □ചായ □ വെള്ളം □കരിക്ക് □കള്ള് /മറ്റേതെങ്കിലും | | |
| 62 | ഒരു ദിവസം ശരാശരി, താഴെപ്പറയുന്ന ഓരോന്നിന്റേയും എത്ര ഗ്ലാസ്/കപ്പ് നിങ്ങൾ കൂടിക്കും?
<ul style="list-style-type: none"> • കാപ്പി കപ്പുകൾ / ദിവസം • ചായ.....കപ്പ്/ദിവസം • വെള്ളംഗ്ലാസുകൾ/ദിവസം • കരിക്ക്..... • കള്ള്... | | |

ആരോഗ്യവുമായി ബന്ധപ്പെട്ട ഘടകങ്ങൾ

നല്ല ആരോഗ്യത്തെ (ശാരീരികവും മാനസികവും) തടസ്സപ്പെടുത്തുന്ന ഇനിപ്പറയുന്ന ഏതെങ്കിലും പ്രശ്നങ്ങൾ നിങ്ങൾക്ക് സ്ഥിരമായി ഉണ്ടെങ്കിൽ ദയവായി സൂചിപ്പിക്കുക.

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|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| 63 | ആസ്ത്മ | ഉണ്ട് | ഇല്ല |
| 64 | സൈനസ് പ്രശ്നങ്ങൾ | ഉണ്ട് | ഇല്ല |
| 65 | അലർജി | ഉണ്ട് | ഇല്ല |
| 66 | പതിവായിട്ടുള്ള ജലദോഷം | ഉണ്ട് | ഇല്ല |
| 67 | വരണ്ട വായ/തൊണ്ട | ഉണ്ട് | ഇല്ല |
| 68 | സാധാരണ സംഭാഷണം കേൾക്കാനുള്ള ബുദ്ധിമുട്ട് | ഉണ്ട് | ഇല്ല |
| 69 | തികട്ടി വരിക/ നെഞ്ചെരിച്ചിൽ | ഉണ്ട് | ഇല്ല |
| 70 | നിങ്ങളുടെ തൊഴിലുമായി ബന്ധപ്പെട്ട സമ്മർദ്ദം | ഉണ്ട് | ഇല്ല |
| 71 | ഇത്തരം പ്രശ്നങ്ങൾക്ക് നിങ്ങൾ സ്ഥിരമായി എന്തെങ്കിലും മരുന്ന് കഴിക്കാറുണ്ടോ?
ഉവ്വ് എങ്കിൽ, ഏത് ആരോഗ്യപ്രശ്നത്തിനാണ്, എന്ത് മരുന്നുകളാണ് വേണ്ടതെന്ന് ദയവായി സൂചിപ്പിക്കുക? | ഉണ്ട് | ഇല്ല |

ശബ്ദവുമായി ബന്ധപ്പെട്ട പ്രശ്നങ്ങളുടെ സ്വാധീനം

- 72 നിങ്ങളുടെ ശബ്ദ പ്രശ്നത്തെക്കുറിച്ച് നിങ്ങൾക്ക് എന്തു തോന്നുന്നു?
 □ഇത് എന്നെ ബാധിക്കില്ല □അപൂർവ്വമായി എന്നെ നിരാശനാക്കുന്നു □ചിലപ്പോൾ എന്നെ നിരാശനാക്കുന്നു □പലപ്പോഴും എന്നെ നിരാശനാക്കുന്നു
 □ഇത് സമ്മർദ്ദത്തിന്റേയും നിരാശയുടെയും പ്രധാന ഉറവിടമാണ്

- 73 കഴിഞ്ഞ ഒരു വർഷത്തിനിടെ, നിങ്ങളുടെ ശബ്ദത്തിന്റെ പ്രശ്നം കാരണം നിങ്ങൾക്ക് എത്രത്തോളം ജോലി നഷ്ടപ്പെട്ടു?
 □ഒന്നുമില്ല □2-3 ദിവസം □ഏകദേശം ഒരാഴ്ച □രണ്ടാഴ്ച □രണ്ടാഴ്ചയിൽ കൂടുതൽ
- 74 ശബ്ദ പ്രശ്നം നിങ്ങളുടെ തൊഴിലിനെ ബാധിക്കുകയും/ തെയ്യം കെട്ടിയാടുന്നതിനെയും സാമ്പത്തിക ബാധ്യത ഉണ്ടാക്കുകയും ചെയ്യുന്നുണ്ടോ? ഉണ്ട് ഇല്ല
- 75 നിങ്ങളുടെ ശബ്ദ പ്രശ്നം നിങ്ങളുടെ കുടുംബാംഗങ്ങളുമായോ സുഹൃത്തുക്കളുമായോ ഇടപഴകുന്നതിൽ ബുദ്ധിമുട്ടുണ്ടാവാറുണ്ടോ? ഉണ്ട് ഇല്ല
- 76 ശബ്ദ പ്രശ്നം കാരണം നിങ്ങൾ സാമൂഹികമായി പുറത്തിറങ്ങുന്നത് ഒഴിവാക്കുന്നുണ്ടോ? ഉണ്ട് ഇല്ല
- 77 ശബ്ദ പ്രശ്നം കാരണം ടെലിഫോൺ ഉപയോഗിക്കുന്നതിൽ നിങ്ങൾക്ക് ബുദ്ധിമുട്ടുണ്ടാവാറുണ്ടോ? ഉണ്ട് ഇല്ല
- 78 മറ്റുള്ളവർക്ക് മനസ്സിലാക്കാൻ നിങ്ങൾ സ്വയം ആവർത്തിക്കേണ്ടതുണ്ടോ? ഉണ്ട് ഇല്ല

ശബ്ദ പരിചരണം

- 79 നിങ്ങളുടെ ശബ്ദ പ്രശ്നത്തിന് നിങ്ങൾ എപ്പോഴെങ്കിലും ഫിസിയൂൻ/ഇഎൻടി സ്പെഷ്യലിസ്റ്റുകൾ/ സ്നീച്ച് തെറാപ്പിസ്റ്റ് എന്നിവരുമായിമായി ആലോചിച്ചിട്ടുണ്ടോ? ഉണ്ട് ഇല്ല
- 80 നിങ്ങൾക്ക് ഒരു ശബ്ദ പ്രശ്നമുണ്ടെങ്കിൽ ബന്ധപ്പെട്ട ചികിത്സ തേടാൻ നിങ്ങൾ എത്ര സമയം കാത്തിരിക്കും?
 □ഒരിക്കലും ആലോചിക്കരുത് □കുറച്ച് ദിവസങ്ങൾ □7-15 ദിവസം □1 മാസം □>1 മാസം
- 81 ശബ്ദത്തെ പരിപാലിക്കുന്നതിനെക്കുറിച്ച് നിങ്ങൾക്ക് പ്രത്യേക നിർദ്ദേശങ്ങൾ ലഭിച്ചിട്ടുണ്ടോ? ഉണ്ട് ഇല്ല
 അതെ എങ്കിൽ, നിങ്ങൾക്ക് ഈ നിർദ്ദേശങ്ങൾ ആരിൽ നിന്നാണ് ലഭിച്ചത്?
- 82 ശബ്ദ പരിപാലനത്തിനായി നിങ്ങൾക്ക് എന്ത് നിർദ്ദേശങ്ങളാണ് നൽകിയത്? ദയവായി വ്യക്തമാക്കുക
- 83 ശബ്ദ പരിപാലനത്തിനായി നിങ്ങൾക്ക് നിർദ്ദേശങ്ങളൊന്നും ലഭിച്ചിട്ടില്ലെങ്കിൽ, നിങ്ങളുടെ ശബ്ദം നിലനിർത്താൻ നിങ്ങൾ എന്ത് മുൻകരുതലുകൾ എടുക്കുന്നു?
 □ശബ്ദ വിശ്രമം □ കുടിവെള്ളം □ വീട്ടുവൈദ്യങ്ങൾ □ ശബ്ദ വ്യായാമങ്ങൾ □മറ്റെന്തെങ്കിലും
- 84 ഭാവിയിൽ ശബ്ദ പരിചരണത്തിനുള്ള നിർദ്ദേശങ്ങൾ സ്വീകരിക്കാൻ നിങ്ങൾക്ക് താൽപ്പര്യമുണ്ടോ? ഉണ്ട് ഇല്ല
- 85 തൊണ്ടയിലെ അണുബാധ സമയത്ത് മതിയായ ശബ്ദ വിശ്രമം വുമായി ബന്ധപ്പെട്ട പ്രശ്നങ്ങളിൽ നിന്ന് നിങ്ങളെ സംരക്ഷിക്കുമെന്ന് നിങ്ങൾ കരുതുന്നുണ്ടോ? ഉണ്ട് ഇല്ല

APPENDIX II

Standardized Malayalam reading passage

തെങ്ങ്

മനുഷ്യർക്ക് സഹായം ചെയ്യുന്ന മരങ്ങളിൽ ഒന്നാണ് തെങ്ങ് .പലതരം തെങ്ങിൻ കായ്കൾ ഉണ്ട് .ഇവയിൽ ചിലത് നീണ്ടതും മറ്റു ചിലത് ഉരുണ്ടതും ആണ്.തേങ്ങ ഇളപ്പമായിരിക്കുമ്പോൾ പച്ച നിറത്തിലും മൂക്കുമ്പോൾ ഇളം മഞ്ഞ നിറത്തിലും മാറും.ചില കായ്കൾ മുത്താലും പച്ച നിറത്തിൽ തന്നെ ഇരിക്കും.ഈ കായുടെ പുറം കട്ടിയുള്ള തോടുകൊണ്ട് മുടിയിരിക്കും. ഇതിന്റെ ഉള്ളിൽ ചകിരിയും അതിന്റെ അകത്ത് കാണുന്ന ചിരട്ടയുടെ ഉള്ളിൽ തേങ്ങയും ഇളം നീരും കാണപ്പെടും.ഇളനീർ കുടിക്കുവാനും വളരെ രുചിയുള്ളതാണ് .ഇത് നല്ല ഔഷധഗുണമുള്ളതാണ്.തേങ്ങയുടെ ചകിരി കയർ ഉണ്ടാക്കുവാനും,മുദുവായ ചകിരി മെത്തയുടെ ഉള്ളിൽ നിറക്കുവാനും ഉപയോഗിക്കുന്നു .