

**ADAPTATION AND VALIDATION OF MENOPAUSAL VOICE-RELATED
WORK LIMITATION SCALE (MenoVWL) In MALAYALAM**

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A Dissertation Submitted in Part of Fulfilment of the

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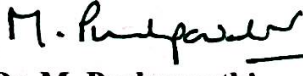
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CERTIFICATE

This is to certify that this dissertation entitled "**Adaptation and Validation of Menopausal Voice-Related Work Limitation Scale (MenoVWL) In Malayalam**" is a bonafide work submitted as part of fulfilment of the degree of Master of Science (Speech Language Pathology) of the student with Registration Number P01II24S123017. 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.

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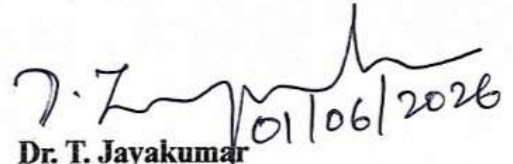
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This is to certify that this dissertation entitled “**Adaptation and Validation of Menopausal Voice-Related Work Limitation Scale (MenoVWL) In Malayalam**” has been prepared under my supervision and guidance. It is also being certified that this dissertation has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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DECLARATION

This is to certify that this dissertation entitled "**Adaptation and Validation of Menopausal Voice-Related Work Limitation Scale (MenoVWL) In Malayalam**" is the result of my own study under the guidance of Dr. T Jayakumar., Professor in Speech Science, Department of Speech-Language Science, All India Institute of Speech and Hearing, Mysuru and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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Chapter 1

Introduction

Voice is the primary means of communication, it plays an important role in daily life. Voice also communicates personal information, including social status, personality traits, and the speaker's emotional state (Zhang, 2016). Voice is a vital part of our social communication, individual identity, and expression of emotions. For voice professionals (VPs), it also serves as a means of livelihood (Vilkman, 1996). Voice professionals have individual characteristics and work practices that can increase their risk of developing voice disorders compared to the general population. In this population, the voice is considered as the main work instrument (Martins et al., 2024). Several factors can interfere with the voice production. These factors may be endogenous, which is related to the individual, such as respiratory allergies, or exogenous, linked to external aspects like noise, dust, mold, temperature, and other environmental conditions (Smith et al., 1997). Endogenous and exogenous factors (i.e., individual, organizational, and environmental risks) cause vocal complaints and symptoms which are linked with occupation, may help in genesis and/or maintenance of work-related voice disorder (Martins et al., 2024).

1.1 Menopause and Voice Problems

Voice problems which is related to menopause represents a challenge for clinicians in diagnostics and management of voice disorders. With a steady growth of aging population, particularly menopausal women, there is a likely to be an increasing demand for maintaining effective vocal communication abilities for as long as possible. Voice changes occurring during the peri- and postmenopausal stage may have a greater impact on professional voice users, these changes may be less significant for woman who do not rely heavily on their voice professionally. To optimize diagnostic procedures and therapy, an interdisciplinary

cooperation of gynecologists, otolaryngologists, phoniatricians, and general practitioners is desirable and necessary (Schneider et al., 2004a).

1.1.1 Hormonal Impact on the Human Voice

Sex steroid hormones — estrogen (E), progesterone (P), and testosterone (T) — play an crucial role in shaping sex-specific physical traits. These hormones are also closely involved in the development of gender-related voice characteristics. Differences in lung capacity, vocal fold structure, laryngeal cartilages, and vocal tract dimensions between males and females, largely influenced by hormonal changes during puberty, provide strong evidence that the voice is significantly affected by sex hormones. The voices of both men and women naturally change with aging. Throughout life, from childhood to old age, the human voice is significantly influenced by sex hormones. As a secondary sexual characteristic, the voice is highly impacted by hormonal variations, resulting in notable differences between genders (Zamponi et al., 2021). Because the female endocrine and reproductive systems are more complex, the female voice is more sensitive to hormonal fluctuations throughout the lifespan. (Lã & Ardura, 2022). Including the significant hormonal changes that occur at the end of the reproductive period during menopause. (Roman Lay et al., 2020) . Once again, changes in sex steroid hormonal concentrations seem to be associated with vocal symptoms (Abitbol et al., 1989; Boulet & Oddens, 1996). They play a crucial role in influencing the vocal apparatus, impacting the larynx and the surrounding structures of the vocal tract. Whether under normal biological conditions or in the presence of endocrine disorders, the human voice can undergo significant and consistent changes. (Hari Kumar et al., 2016)

1.1.2 Hormonal Changes During Menopause and Their Impact on Voice

Apart from puberty, the female voice can be affected by variabilities in sex steroid hormones throughout the menstrual cycle. Additionally, notable hormonal changes occur towards the end of a woman's reproductive years, beginning with the onset of menopause (Roman Lay et al., 2020)

It is expected that, with the increasing population of longer-living women, more menopausal women will seek to maintain high levels of effective communication skills despite the vocal disturbances associated with menopause (Lã & Ardura, 2022).

Natural menopause is characterized by the absence of menstruation for a minimum of 12 consecutive months following the last menstrual cycle, without any underlying pathological or surgical causes. (Gong et al., 2016) . Following menopause, women face a sharp and significant drop in estrogen levels, accompanied by a relative rise in androgen levels. In contrast, men go through a gradual decrease in androgen levels, leading to a relative rise in the estrogen-to-androgen ratio (Kaufman & Vermeulen, 2005; Lamberts et al., 1997) . There is an equal increase in pituitary hormones. Pituitary hormones include numerous hormones including follicle stimulating hormone (FSH). Changes to these hormones have been related to many changes in body function, including changes to the quality of the voice. For example, the fundamental frequency (f_0) of postmenopausal women was lower than that of premenopausal women during both the production of speech and the production of sustained vowels /a/ (Geukes et al., 2012). Menopausal vocal syndrome is marked by reduced vocal intensity, increased vocal fatigue, and a diminished vocal range, including the loss of higher notes and changes in the timbre of both speaking and singing voices. These symptoms can be attributed to structural changes in the larynx after menopause, such as thickening of the vocal folds, vocal fold edema, and greater prominence of the vocal processes (Abitbol et al., 1999; Hirano et al.,

1989; Kahane, 1987) thickening of the vocal folds may account for the enhanced glottal closure seen in older women, leading to a smaller posterior glottal gap, a feature also commonly found in younger women. Consequently, post-menopausal women tend to exhibit less vocal breathiness compared to their younger counterparts (Chandran et al., 2011; D'haeseleer et al., 2011; Pontes et al., 2005). Another common vocal change following menopause is voice becoming deeper and a more masculinized vocal timbre. This alteration is largely attributed to the thickening of the vocal folds caused by the relative rise in androgen levels after menopause. However, F0 changes in post-menopausal women can vary. Since adipose tissue becomes the primary source of estrogen production after menopause, women with higher body mass indexes often exhibit a comparatively higher F0 (D'haeseleer et al., 2013).

1.2 Global and Regional Variations in Age at Natural Menopause

There are many different signs that mark your body's transition into menopause including hot flashes, sweats at night, problems with urination or genital changes, poor sleeping/insomnia and others. On average, menopause starts anywhere between 45 – 55 years old for women worldwide / across the globe (*Menopause*, n.d.). Currently, the average age at which a woman experiences natural menopause is about 51 years in developed countries, while it varies much more (43-49 years) among women living in developing nations. Average age at natural menopausal in India varies with the regions. In Eastern India, it is 47.3 years of age; 46.2 years in Western India; 45.5 in Northern India; 46.1 years in Southern India; and 47.8 years in the Central parts of India (Prasad et al., 2021). The mean age of the menopause in Kerala women is of 48.3 years, based on a cross-sectional study of 120 postmenopausal women using semi-structured questionnaire.

1.3 Impact of Menopause on Voice and Work Ability

In a study Boulet & Oddens (1996) Forty-eight female and twenty-four male professional singers aged forty to seventy-four were contacted regarding possible voice changes around the fifth decade of life. Twenty-nine percent of the women had experienced negative voice changes in their fifties compared to thirty-eight percent of the men. Both genders reported hoarseness in their voices. However, the women were reported to have more problems repeating their sounds, controlling their sound and singing at high pitches than the men reported.

The study Geukes et al.(2012) aimed to test the impact of menopausal symptoms on work ability among working women. It was a cross-sectional study conducted on 208 healthy women aged 44–60 years, employed in hospital and home care settings. The Greene Climacteric Scale (GCS) assessed menopausal symptoms, while work ability was determined by the Work Ability Index (WAI). The assessment was based on the subject's current ability in comparison to their lifetime best, and was assessed based on job requirements, how many medical diagnoses received from providers, and the amount of time absent from work in the previous year due to illnesses related to the medical diagnoses. A self-assessment of the subject's ability to perform over the next 2 years was also included and referred to the mental resources of the subject as a result of working and social activities. There was a significant inverse correlation ($r = -0.58$) between the number of menopausal symptoms and the amount of work ability of the participants, indicating that higher symptom levels are associated with lower work performance. Regression analysis revealed that menopausal symptoms explained about 33.8%–38.4% of the variance in work ability. Among the symptoms, psychological and somatic symptoms were the strongest predictors, while factors like age, BMI, smoking, and exercise were not significant.

In another study of Geukes et al. (2016) investigated the impact of severe menopausal symptoms on work ability among women aged 44–60. Comparing 60 symptomatic women attending a menopause clinic with 205 healthy working women, the researchers found that those with severe symptoms had significantly lower work ability scores and were 8.4 times more likely to report low work ability. Over three-quarters of symptomatic women struggled with meeting physical and mental work demands, indicating a higher risk of prolonged sickness absence.

Limitations in the occupational use of the voice tend to affect females more significantly than males. This disparity can be attributed to factors such as variations in laryngeal physiology, hormonal influences, other non-laryngeal physiological differences, as well as non-physiological and behavioral characteristics. Consequently, the voice, due to its close association and interaction with vital bodily systems, appears to be highly susceptible to numerous physiological processes and functions that may initially seem unrelated to vocal production (Hunter et al., 2011). Women are almost twice as likely as men to report experiencing voice-related issues and account for up to 76% of referrals made to voice specialists (Roy et al., 2005; Watson, 1998)

Menopause is known to cause self-perceived challenges in the workplace. Firstly, women often feel dissatisfied with how their employers or managers treat them. Secondly, many perceive a reduced ability to perform their jobs due to menopause-related symptoms, particularly vasomotor issues. Lastly, female professional voice users (FPVUs), such as singers and teachers, frequently experience a decline in vocal range, endurance, and vocal fold flexibility during menopause, which negatively affects their self-assessment of vocal quality (Lã et al., 2025). Voice-related menopausal symptoms were self-perceived as mild in postmenopausal FPVUs (Geukes et al., 2012). Several validated self-assessment questionnaires

exist to measure work ability. For example, the Work Ability Index was developed as part of a study exploring the relationship between an individual's health status and their capacity to work. This index has been widely used to facilitate the early detection of workers who may need targeted work-related health support. However, despite evidence of voice-related challenges among female professional voice users (FPVUs) during menopause, no validated tools were available to evaluate how these vocal limitations impact their work ability specifically (Tuomi et al., 2017). To address this gap, Filipa M.B. La et al. (2025) developed and validated a 13-item questionnaire specifically aimed at assessing self-perceived voice-related limitation among menopausal female professional voice users (FPVUs), and was subsequently termed as The Menopausal Voice-Related Work Limitation Scale (MenoVWL)(Lã et al., 2025): This scale measures how the menopause can affect a woman's perception of their job performance based on how much she uses her voice for work and how much work is required of her voice, as well as the impact of menopause on their professional identity and expectations of themselves. Few studies have attempted to document voice changes due to menopause, or their interaction with occupational voice use, in this population. In spite of the earlier age for menopause in Indian women, not enough efforts are being made to conduct research and forewarn women about postmenopausal voice changes so as to reduce their potential psychosocial impact. The study by Sovani & Mukundan, (2010) investigated how menopause affects voice changes in women who are professional voice users (teachers) compared to non-professional voice users. Using acoustic and aerodynamic measures, they found that menopause leads to a decrease in fundamental frequency (pitch), speaking fundamental frequency, and maximum phonation time, while noise-to-harmonic ratio and voice turbulence index increase, indicating voice quality deterioration. Professional voice use influences these changes, with teachers showing a smaller decrease in pitch, possibly due to regular voice use, but reporting greater vocal difficulties subjectively.

1.4 Need for the study

The translation and cross-cultural adaptation of the Menopausal Voice-Related Work Limitation Scale (MenoVWL)(Lã et al., 2025) into Malayalam is essential due to the linguistic, cultural, and occupational diversity of the Malayalam-speaking population. Professional voice users, such as teachers, singers, broadcasters, and call-centre employees, form a large proportion of the workforce in Kerala and are highly susceptible to voice-related problems during menopause. In a study of K.P.(2024) reported substantial impact of menopause related symptoms on the job performance of female college teachers in Kerala. The absence of a validated Malayalam instrument limits accurate assessment of menopause-related voice difficulties, leading to underreporting of occupational voice limitations and delayed clinical intervention. This gap also restricts appropriate workplace modifications and the development of evidence-based management strategies.

Adapting the MenoVWL into Malayalam will ensure semantic, conceptual, and experiential equivalence, thereby maintaining the validity and reliability of the instrument in the new cultural context. A culturally relevant tool will improve the precision of assessment, enhance clinical decision-making, and support standardized data collection in both research and practice. It will also help identify early signs of menopause-related vocal difficulties, enabling timely preventive, therapeutic interventions, facilitate cross-cultural comparisons, and provide data to advocate for workplace accommodations for menopausal women.

1.5 Aim of The Study

The aim of the study is to translate, culturally adapt, and validate the Menopausal Voice-Related Work Limitation Scale (MenoVWL) into Malayalam, in order to provide a

linguistically and culturally appropriate tool for measuring self-perceived voice-related work limitation due to menopause.

1.6 Objectives

- To translate the original MenoVWL questionnaire(Lã et al., 2025) into Malayalam and culturally adapt it into the Malayalam language.
- Validate the Menopausal Voice-Related Work Limitation Scale (MenoVWL)(Lã et al., 2025) into Malayalam language among female professional voice users, comparing (Group 1: pre-menopausal women and Group 2: post-menopausal women)

Chapter 2

Method

2.1 Aim of the study:

The present study aimed to translate, culturally adapt, and validate the Malayalam version of the Menopausal Voice-Related Work Limitation Scale (MenoVWL)(Lã et al., 2025). The study also aimed to identify menopause-related voice difficulties and their impact on work performance among female professional voice users (FPVUs) in Kerala, India.

2.2 Study design:

The present study will employ a survey research design to translate, culturally adapt, and validate the Malayalam version of the Menopausal Voice-Related Work Limitation Scale (MenoVWL)(Lã et al., 2025). The study will be conducted in two phases:

- Translation and cross-cultural adaptation of the scale.
- Administration and validation of the Malayalam MenoVWL questionnaire.

2.3 Participants

The study recruited female professional voice users (FPVUs) aged between 40 to 65 years of native Malayalam speakers, participants were categorized according to the 2001 Stages of Reproductive Aging Workshop (STRAW) system (Soules et al., 2001). This framework provides a standardised terminology and staging system for ovarian ageing, incorporating both menstrual patterns and qualitative hormonal criteria to define each stage. The STRAW system offers a reliable approach for characterising reproductive ageing and the menopausal transition, ensuring consistency in participant classification. The reproductive phase includes stages –5 to –3. Stages –2 to -1 correspond to early and late peri-menopause, whereas stages +1 to +2 represent early and late post-menopause. It thereby facilitates research and clinical

applications, including the study of menopausal voice-related work limitations addressed by the MenoVWL scale (Harlow et al., 2012). The main features and stages of STRAW as discussed in the study are summarized below in table 2.1 (Soules et al., 2001)

Table 2.1

2001 Stages of Reproductive Aging Workshop (STRAW) system.

STRAW Stage	Description		Key Characteristics
-5	Early stage	reproductive	Menstrual cycles become regular after menarche
-4	Peak stage	reproductive	Regular menstrual cycles every 21–35 days with stable fertility
-3	Late stage	reproductive	Elevated early follicular phase FSH; estradiol remains normal or elevated; initial symptoms may appear
-2	Early transition	menopausal	Variation in menstrual cycle length of ≥ 7 days; monotropic FSH rise begins
-1	Late transition	menopausal	2 or more skipped cycles; intermenstrual interval ≥ 60 days; symptoms become more noticeable
+1a	Early menopause year)	post- (first	First 12 months after the final menstrual period (FMP); ovarian hormone levels reach permanently low levels
+1b	Early menopause years)	post- (1–5	Next 4 years following the first postmenopausal year; accelerated bone loss occurs
+2	Late post-menopause		Begins 5 years after FMP and continues for the remainder of life

Two groups of participants from the state of Karnataka were recruited. Group 1, consisted of 34 female professional voice users (FPVUs) of post-menopausal (Stages -3 to -1), and Group 2, consisted of 40 female professional voice users (FPVUs) of pre-menopausal (Stages 0 to +2), would be recruited for the study. To avoid the influence of age-related differences in voice characteristics, responses from females aged 39 years or younger were excluded while investigating menopause-related voice symptoms among female professional voice users (FPVUs) (Lã et al., 2025)

Both groups of participants knows to read, write and speak the Malayalam language. Participants were recruited through professional networks, educational institutions, hospitals, social media platforms, and personal contacts. Participants characteristics are given in the table 2.2

Table 2.2

Demographic and Occupational Characteristics of Participants by Group

Characteristic	Group 1 (n = 34)	Group 2 (n = 40)	Total (N = 74)
Age (years)			
Mean (SD)	52.47 (3.76)	45.24 (3.48)	48.50 (5.37)
Range	41 – 59	40 – 55	40 – 59
Occupation			
Teacher	30 (88.2%)	34 (85.0%)	64 (86.5%)
Singer	2 (5.9%)	3 (7.5%)	5 (6.8%)
Other voice professional	2 (5.9%)	3 (7.5%)	5 (6.8%)
Menopausal Status			
Post-menopausal (Clinical Group)	34 (100%)	—	34 (45.9%)
Pre-menopausal (Control Group)	—	40 (100%)	40 (54.1%)

Note. Group 1 = post-menopausal women; Group 2 = pre-menopausal women. Occupation and menopausal status values are presented as *n* (%). Age is presented as mean (*SD*) and range. Other voice professional includes professionals such as nurses, doctors, and insurance consultants who rely on voice as a primary tool of their occupation. *SD* = standard deviation. — = not applicable.

2.3.1 Inclusion Criteria:

- **Women within specific menopausal stages:** The study involved pre-menopausal women (stage -3 to -1 according to STRAW system) and post-menopausal women (stage 0 to +2).

- **Age Range:** Only responses from participants at stages-3 to +2 of STRAW belonging to a restricted age range (40 to 65 years old) was considered
- **Voice Professional Status:** The scale (MenoVWL) targets women classified as FPVUs (Female Professional Voice Users) of level I-III (Level I FPVu will face job performance problems if they have slight vocal issues or abnormalities. In Level I, professionals include singers, actors, and radio- TV announcers who can be considered professionals. Level II Skilled Users of the Voice include a wide range of other professionals whose moderate vocal disorder would prevent them from being able to perform their duties properly, including but not limited to: teaching, public speaking, politics, call centres, office work, sales, judges, and lawyers, etc. Level III includes anyone whose severe dysphonia will inhibit their ability to work properly, e.g.: counselling, psychological, receptionist, PR, telephone operator, speech and language pathologist (Koufman & Isaacson, 1991)

2.3.2 Exclusion Criteria:

- Women with known voice disorders unrelated to menopause.
- Women undergoing hormonal treatments other than those related to menopause.
- Medically diagnosed with any sensory impairment
- to have ≤ 39 or ≥ 66 years old;
- Pregnant women
- Women with endocrinological problem (e.g., ovarian cancer, polycystic ovarian syndrome, endometriosis, hyperthyroidism /hypothyroidism)
- Women using hormonal contraceptive medication
- Women undergoing hormonal replacement therapy

2.4 Materials

The study utilized:

- Original English version of the Menopausal Voice-Related Work Limitation Scale (MenoVWL) developed by Filipa M.B. Lã et al. (2025)
- Malayalam translated version of the MenoVWL for validation.

2.5 Procedure

Phase-I: Translation of Menopausal Voice-Related Work Limitation Scale (MenoVWL) Malayalam.

The translation process followed standard WHO (2001) guidelines for cross-cultural adaptation of self-report scale. The following steps were followed in the study:

1. Forward Translation
2. Expert Panel review
3. Back Translation
- Content validation
4. Pilot Study
5. Final Version

Step 1: Forward Translation

The original English version of the Menopausal Voice-Related Work Limitation Scale (MenoVWL), developed by Filipa M.B. Lã et al. (2025), it consists of 13 statements which assess voice-related work limitations experienced by menopausal women. The items address areas such as restrictions in work, feelings of reduced competence, concerns regarding the financial consequences, and the influence of voice problems on career-related decisions. An example item includes: *“My voice restricts my work activities.*

The English version of this scale MenoVWL (Lã et al., 2025) was translated into Malayalam by Experimenter. The translation process focused on preserving intended meaning, conceptual equivalence, and cultural appropriateness while ensuring simplicity and clarity of language.

Step 2: Expert Panel Review

Following forward translation, the translated Malayalam version along with the original English version of Menovwl was reviewed by a Speech-Language Pathologist and voice expert possessing a doctoral degree and proficient in both Malayalam and English languages. The expert evaluated: Accuracy of translation, Adequacy of wording, Clarity and ambiguity of items, Grammatical appropriateness, Cultural relevance and suitability . Based on all suggestions and corrections which is provided by the expert, necessary modifications were incorporated and prepare a pre-final Malayalam version of the MenoVWL questionnaire.

Step 3: Back Translation

A bilingual Speech-Language Pathologists (SLP), of more than three years of clinical experience in the assessment and management of voice disorders and proficiency in both Malayalam and English, participated in the back-translation/reverse translation process. The pre-final Malayalam version of the MenoVWL was provided to Speech-Language Pathologist (SLP), who independently translated the questionnaire back into English without referring to the original English version. The purpose of this reverse translation procedure was to examine the equivalence between the translated Malayalam version and the original English questionnaire in terms of meaning and content.

The back-translated English version then compared with the original MenoVWL questionnaire developed by Filipa M.B. Lã et al. (2025). A agreement of 90- 95% between the

back-translated versions and the original questionnaire was found. Following this comparison, the Malayalam version of the MenoVWL was finalized for further validation and administration. During the back-translation process, ambiguity was identified in Item 11th of the scale. To resolve this, the item was independently back-translated by two additional bilingual Speech-Language Pathologists (SLPs) for confirmation. Based on their feedback, the necessary modifications were incorporated into the final Malayalam version of the MenoVWL questionnaire.

Content validation:

The translated Malayalam version of the MenoVWL scale was evaluated for the content validation by 3 experts: a Speech-Language Pathologist with more than five years of experience in assessing and treating communication disorders, a Malayalam linguist with over five years of professional experience, and a menopausal female professional voice user (teacher). The experts reviewed the questionnaire for clarity, cultural appropriateness, relevance, and ambiguity, rated the items on a four-point Likert scale (1-4). Necessary modifications were incorporated based on their suggestions before finalizing the scale. The description provided for each parameter for each point for content validation are depicted in the table 2.3 (Athira V.,2022)

Table 2.3

Parameters considered for content validation and their corresponding rating

Parameters	1	2	3	4
Ambiguity	Doubtful	Item needs some revision	No doubt but needs minor revision	Meaning is clear
Cultural Appropriateness	Inappropriate	Item needs some revision	Appropriate but needs some minor revision	Highly appropriate
Clarity	Not clear	Item needs some revision	Clear but needs minor revision	Very clear

Representativeness	Not representative of the desired content	a	Item needs some revision	Representative but needs some revision	Highly representative
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Step 4 : Pilot Study

Before the final administration of the Malayalam MenoVWL questionnaire, a pilot study was conducted on six female professional voice users (FPVUs), including three pre-menopausal and three post-menopausal participants. The inclusion criteria used for the pilot study were the same as those adopted for the main study.

The participants were asked to read, interpret, and respond to each item in the questionnaire. They were also encouraged to report any words, phrases, or statements that were difficult to understand or culturally inappropriate. The feedback obtained from the participants was reviewed, and the necessary modifications were made to improve the clarity and comprehensibility of the questionnaire before preparing the final Malayalam version of the MenoVWL.

Step 5: Final Version Preparation

After incorporating all modifications suggested during content validation and pilot testing, the final Malayalam version of the Menopausal Voice-Related Work Limitation Scale (MenoVWL) was prepared. The finalized questionnaire was then used for administration and validation in the main study.

Phase II: Administration of the Malayalam MenoVWL Questionnaire

The Malayalam version of the MenoVWL questionnaire consisted of 13 items. Participants were instructed to rate each item on a 6-point Likert scale ranging from 1 (“totally disagree”) to 6

(“totally agree”), based on the extent to which each statement reflected their voice-related work limitations. Higher scores indicated greater voice-related work limitation.

The study included a total of 74 female professional voice users (FPVUs), with 40 participants in the pre-menopausal group and 34 participants in the post-menopausal group. Data were collected from participants belonging to different voice-related professions, including teachers, special educators, insurance consultants, and singers.

The researcher initially collected the data through direct in-person administration of the questionnaire to ensure better interaction and clarification of participant queries. However, when direct administration was not feasible due to time, distance, or accessibility constraints, the questionnaire was administered online using Google Forms. The survey link was shared with participants through personal contacts and email communication.

Prior to taking part in the study, all participants received information outlining the objectives and procedure of the study. Consent was obtained from the participants before they started filling out the questionnaire. The participants were assured that their responses would be kept confidential and used exclusively for research. The participants were informed that their participation in the study was entirely voluntary and that they could withdraw from the study at will at any time without any penalty.

Chapter 3

Results

The objectives of the present study were to translate and culturally adapt the Menopausal Voice-Related Work Limitation Scale (MenoVWL)(Lã et al., 2025) into Malayalam and to validate the translated version among female professional voice users to compare voice-related work limitation scores between pre-menopausal and post-menopausal women and to examine the impact of menopausal status on occupational voice-related functioning. The study comprised of two phases. Phase I include Adaptation of Menopausal Voice-Related Work Limitation Scale (MenoVWL)(Lã et al., 2025) from English to Malayalam and Phase II include Validation of Malayalam MenoVWL scale.

3.1 Participant Characteristics

A total of 74 female professional voice users participated in this study, comprising 34 post-menopausal women and 40 pre-menopausal women, age ranging from 40-65 years. All participants were engaged in professional voice-demanding occupations, including teaching, singing, and other professions categories requiring sustained vocal use. The groups were matched on the basis of menopausal status, ensuring that observed differences in voice-related work limitation scores could be attributed primarily to menopausal status.

The study was carried out in two phases. Phase I focused on the adaptation and translation of the Menopausal Voice-Related Work Limitation Scale (MenoVWL) into Malayalam, while Phase II involved the administration of the adapted scale among professional voice users to examine voice-related work limitations across pre-menopausal and post-menopausal women.

3.2 Two Phases of the study

3.2.1 Phase I: Translation and Adaptation of MenoVWL Scale into Malayalam

Based on the WHO guidelines the adaptation of Menopausal Voice-Related Work Limitation

Scale (MenoVWL)(Lã et al., 2025) was done by following the five steps: 1) Forward translation, 2) Expert panel review, 3) Back translation (Content Validation was done after reverse translation), 4) Pre-testing and cognitive interviewing (Pilot study) and 5) Final version. Thus, final MenoVWL was adapted and translated to Malayalam.

The scores obtained during content validation by the expert raters are presented in Table 3.1. Based on the suggestions and feedback provided by the validators, the necessary modifications were incorporated into the translated version before finalizing the Malayalam adaptation of the MenoVWL.

Table 3.1

Content Validity Ratings of Malayalam MenoVWL by Three Expert Raters

Items	A - Ambiguity Raters (1,2,3)	B - Cultural Appropriateness Raters (1,2,3)	C -Clarity Raters (1,2,3)	D - Representativeness Raters (1,2,3)
S1	4,3,4	4,3,4	4,4,4	4,4,4
S2	4,2,4	4,3,4	4,4,4	4,4,4
S3	4,4,4	4,4,4	4,4,4	4,4,4
S4	4,4,4	4,4,4	1,3,4	1,4,4
S5	4,4,4	4,3,4	1,4,3	1,4,4
S6	4,4,4	4,4,4	4,4,4	4,4,4
S7	4,4,4	4,4,4	4,4,4	4,4,4
S8	4,4,4	4,4,4	2,4,4	2,4,4
S9	4,4,4	4,4,4	4,4,4	4,4,4
S10	4,4,4	4,4,4	4,4,4	4,4,4
S11	4,4,4	4,4,4	2,4,4	2,4,4
S12	4,4,4	4,4,4	4,4,4	4,4,4
S13	4,4,4	4,4,4	4,4,4	4,4,4

Note. Ratings range from 1 to 4, where 1 = Not clear/appropriate and 4 = Completely clear/appropriate. A =Ambiguity; B = Cultural Appropriateness; C = Clarity; D = Representativeness

3.2.2 Phase II: Validation of Malayalam MenoVWL Scale

Administration of Malayalam MenoVWL Scale

The translated Malayalam MenoVWL Scale was administered to thirty four individuals of Professional voice users in post menopause stage (Group I) and forty individuals of Professional voice users in pre menopause stage (Group II).

The Malayalam MenoVWL scale consisted of thirteen statements related to voice-related work limitations experienced during menopause. Participants were instructed to rate each statement using a 6-point Likert scale ranging from 1 (“totally disagree”) to 6 (“totally agree”), based on the extent to which each statement reflected their voice-related occupational difficulties. Higher total scores indicated greater voice-related work limitation and increased self-perceived vocal difficulty in occupational functioning.

Using SPSS Software (version 26.0), Descriptive statistics like mean, standard deviation (SD), median and inter-quartile range (IQR) were calculated for each statement. Shapiro-Wilk test of normality was carried out and data did not follow a normal distribution pattern ($p > 0.05$). Hence, non-parametric test (Mann Whitney –U test) was carried out to find the difference between Professional voice users in post-menopause stage (Group I) and Professional voice users in pre-menopause stage (Group II). To assess the reliability of the Malayalam MenoVWL, intra-rater reliability was carried out by re-administering the questionnaire to five participants after a one-week interval. Cronbach's alpha and Spearman's rank-order correlation coefficient were used to estimate the intra-rater reliability for each item.

The results of the study are explained in the following sections:

3.3 Descriptive Statistics

Descriptive statistics for the total Malayalam MenoVWL score are presented in Table 3.2 Post-menopausal women (Clinical Group) obtained a higher mean total scores ($M = 25.41$,

$SD = 14.01$, Median = 19.50, IQR = 21) compared to the pre-menopausal women (Control Group) ($M = 17.83$, $SD = 8.23$, Median = 14.50, IQR = 6). The substantially wider interquartile range in the Clinical Group (IQR = 21 versus IQR = 6 in the Control Group) reflects considerably greater heterogeneity in self-perceived voice-related occupational limitation among post-menopausal participants — a pattern consistent with the variable hormonal and physiological changes characteristic of the post-menopausal state.

Table 3.2

Descriptive Statistics for Total MenoVWL Score by Group

Group	<i>n</i>	Mean (SD)	Median	IQR
Post-menopausal (Group 1)	34	25.41 (14.01)	19.50	21
Pre-menopausal (Group 2)	40	17.83 (8.23)	14.50	6

Note. IQR = Interquartile Range; SD = Standard Deviation.

3.4 Testing of Distributional Assumptions

The normality of the total MenoVWL score distribution was examined using the Kolmogorov-Smirnov (K-S) test with Lilliefors correction and the Shapiro-Wilk (S-W) test (Table 3.3). Results indicated statistically significant deviations from normality for both groups. For the Clinical Group, K-S = .209 ($df = 34$, $p = .001$) and S-W $W(34) = .830$ ($p < .001$). For the Control Group, K-S = .290 ($df = 40$, $p < .001$) and S-W $W(40) = .646$ ($p < .001$). The lower Shapiro-Wilk values indicated that the data were not normally distributed. Given these findings, non-parametric inferential tests were considered appropriate for all between-group comparisons.

Table 3.3*Tests of Normality for Total MenoVWL Score*

Group	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	p	Statistic	df	p
Post-menopausal (Group 1)	.209	34	.001	.830	34	<.001
Pre-menopausal (Group 2)	.290	40	<.001	.646	40	<.001

Note. Lilliefors Significance Correction applied. All tests are two-tailed. Significant p-values (< .05) indicate departure from normality, justifying non-parametric analysis.

3.5 Comparison of Scores Between Post-menopausal Group and Pre-menopausal Group on Malayalam MenoVWL (Individual Items)

Mann-Whitney U tests were performed to compare the post-menopausal and pre-menopausal groups on each of the 13 items of Malayalam MenoVWL scale. Results including the Mann-Whitney U statistic, Z score, two-tailed asymptotic significance, and mean ranks for both groups are presented in Table 3.4. Item S10 was constant (zero variance) in the Control Group and was therefore omitted from the normality analysis; however, it was retained in the Mann-Whitney comparison, as its uniform zero response in the Control Group constitutes a clinically meaningful finding in itself.

11 of the 13 items demonstrated statistically significant between-group differences ($p < .05$). The strongest effects were observed for item S11 ($U = 377.0$, $Z = -4.015$, $p < .001$), S13 ($U = 445.0$, $Z = -3.476$, $p = .001$), S7 ($U = 444.5$, $Z = -3.469$, $p = .001$), S10 ($Z = -3.221$, $p = .001$), and S3 ($U = 428.5$, $Z = -3.133$, $p = .002$). In all the statistically significant comparisons, mean ranks were consistently and substantially higher in the Group 1, indicating greater self-perceived voice-related occupational limitation among post-menopausal women. Items S1 ($p = .116$), S2 ($p = .270$), and S8 ($p = .072$) did not reach statistical significance, although their mean ranks were uniformly higher in the Clinical Group, suggesting a positive trend in the hypothesised direction.

Table 3.4*Mann-Whitney U Test Results for Individual Items: Group 1 vs. Group 2*

Item	<i>U</i>	<i>Z</i>	<i>p</i>	MR Group 1	MR Group 2
S1	555.50	-1.574	.116	41.16	34.39
S2	593.50	-1.103	.270	40.04	35.34
S3	428.50	-3.133	.002	44.90	31.21
S4	533.50	-2.570	.010	41.81	33.84
S5	469.50	-2.930	.003	43.69	32.24
S6	490.00	-2.641	.008	43.09	32.75
S7	444.50	-3.469	.001	44.43	31.61
S8	544.50	-1.796	.072	41.49	34.11
S9	513.50	-2.020	.043	42.40	33.34
S10	520.00	-3.221	.001	42.21	33.50
S11	377.00	-4.015	<.001	46.41	29.93
S12	491.50	-2.236	.025	43.04	32.79
S13	445.00	-3.476	.001	44.41	31.63

Note. MR Group 1 = Mean Rank for post-menopausal group (n = 34); MR Group 2= Mean Rank for pre-menopausal Group (n = 40). Item S10 was constant (all zero) in the Group 2.

3.6 Comparison of Total MenoVWL Score Between Groups

A Mann-Whitney U test comparing the total MenoVWL scores between the Group 1 and Group 2 revealed a statistically significant difference [$U = 436.0$, $W = 1256.0$, $Z = -2.723$, $p = .006$, two-tailed]. The Group 1 attained a substantially higher mean rank (MR = 44.68) relative to the Group 2 (MR = 31.40), confirming significantly greater overall self-perceived voice-related occupational limitation among post-menopausal women. The results are presented in Table 3.5.

Table 3.5*Mann-Whitney U Test: Comparison of Total MenoVWL Score Between Group 1 and Group 2*

Variable		Mann-Whitney U	Wilcoxon W	Z	p	MR Group 1	MR Group 2
Total Score	MenoVWL	436.00	1256.00	-2.723	.006	44.68	31.40

Note. MR = Mean Rank. p-value is two-tailed asymptotic significance.

The significant difference observed in the total MenoVWL scores between the two groups supports the discriminant validity of the Malayalam MenoVWL questionnaire. This indicates that the scale was effective in distinguishing between post-menopausal and pre-menopausal female professional voice users based on their self-perceived voice-related work limitations.

3.7 Reliability of the Malayalam MenoVWL Questionnaire

3.7.1 Intra-Rater Reliability (Test-Retest Reliability)

Intra-rater reliability was assessed to examine the assessed to examine the temporal stability of the Malayalam MenoVWL scale. A sub-sample of 5 participants completed the questionnaire on two occasions separated by a one-week interval. For each of the 13 items, internal consistency between the test (S1–S13) and retest (S1R–S13R) administrations was estimated using Cronbach's alpha, and degree of agreement between the two time points was further quantified using Spearman rank-order correlation coefficient (r_s). Results are presented in Table 3.6

Cronbach's alpha values for the test-retest item pairs ranged from .706 (S13) to 1.000 (S1, S4, S5, S6, S11, S12), indicating excellent to acceptable internal consistency between the two administrations across all 13 items. Specifically, seven items (S1, S4, S5, S6, S11, S12) yielded perfect alpha values of 1.000, reflecting complete score agreement between test and retest sessions. High alpha values above .90 were also recorded for S8 ($\alpha = .968$), S2 ($\alpha = .960$),

and S3 ($\alpha = .936$). Remaining items surpassed the conventional threshold of $\alpha = .70$ for acceptable reliability S10 ($\alpha = .889$), S7 ($\alpha = .882$), S9 ($\alpha = .800$), and S13 ($\alpha = .706$).

Spearman correlation coefficients were statistically significant for 11 of the 13 items at the conventional $\alpha = .05$ level. The highest correlations were obtained for items S1, S2, S4, S5, S6, S7, S10, S11, and S12 ($r_s = 1.000$, $p < .001$ for each), indicating perfect rank-order agreement between test and retest administrations. Items S3 and S8 yielded strong correlations ($r_s = .918$, $p = .028$ for both). Item S9 ($r_s = .811$, $p = .096$) and item S13 ($r_s = .612$, $p = .272$) did not reach statistical significance. Although items S9 and S13 were not statistically significant, their correlation values still suggested moderate to good reliability. The lack of significance may be due to the small sample size ($n = 5$) used for the test–retest analysis. Overall, the findings indicate that the Malayalam MenoVWL questionnaire has satisfactory to excellent stability over a one-week interval.

Table 3.6

Intra-rater Reliability of the Malayalam MenoVWL: Cronbach's Alpha and Spearman's Correlation for Each Item ($n = 5$, One-Week Interval)

Item	α	Spearman's r_s	p
S1	1.000	1.000	< .001
S2	.960	1.000	< .001
S3	.936	.918	.028
S4	1.000	1.000	< .001
S5	1.000	1.000	< .001
S6	1.000	1.000	< .001
S7	.882	1.000	< .001
S8	.968	.918	.028
S9	.800	.811	.096
S10	.889	1.000	< .001
S11	1.000	1.000	< .001
S12	1.000	1.000	< .001
S13	.706	.612	.272

Note. α = Cronbach's alpha computed between test and retest administrations for each item pair. Spearman's r_s = rank-order correlation between test and retest scores. Interpretation: $\alpha/r_s \geq .90 =$

Excellent; .80–.89 = Good; .70–.79 = Acceptable; < .70 = Questionable (Nunnally & Bernstein, 1994). NS = not statistically significant, likely due to limited power at $n = 5$.

Chapter 4

Discussion

4.1 Overview

The present study aimed to translate, culturally adapt, and validate the Menopausal Voice-Related Work Limitation Scale (MenoVWL) into Malayalam to identify menopause-related voice issues among female professional voice users (FPVUs) in Kerala, India. This study represents the Malayalam adaptation of the MenoVWL, and one of the few studies to examine menopausal voice-related occupational limitation in the South Asian context. Phase II of the study compared MenoVWL scores between 34 post-menopausal women (Group 1) and 40 pre-menopausal women (Group 2), and assessed the intra-rater reliability of the adapted scale over a one-week interval.

4.2 Comparison Between Group 1 and Group 2

4.2.1 Total MenoVWL Score

The Mann-Whitney U test revealed a statistically significant difference in total MenoVWL scores between the Group 1 (post-menopausal women) and the Group 2 (pre-menopausal women) [$U = 436.0$, $W = 1256.0$, $Z = -2.723$, $p = .006$], with post-menopausal women attaining a substantially higher mean rank ($MR = 44.68$) compared to pre-menopausal women ($MR = 31.40$). This finding is consistent with and directly corroborates the results of the original MenoVWL validation study, in which Lã et al. (2025) reported significantly higher MenoVWL scores in post-menopausal as compared to pre-menopausal FPVUs using a Mann-Whitney test ($Z = -2.818$, $p = .005$). Similar findings between the original English version and the Malayalam adaptation indicates that the scale maintains its validity across different cultural and linguistic contexts.

The higher total MenoVWL scores among post-menopausal women are consistent with a well-established physiological basis. Oestrogen and progesterone receptors have been identified in the laryngeal mucosa, and the significant depletion of these sex steroid hormones at menopause is associated with histological changes including mucosal atrophy, reduced subglottal secretion, altered viscoelastic properties of the vocal folds, and changes in laryngeal muscle mass and tone (Abitbol et al., 1999; Lã & Ardura, 2022). These changes manifest clinically as vocal fatigue, reduced vocal projection and endurance, timbre, and increased susceptibility to voice breaks. There was a significant difference between the fundamental frequency and pitch and perturbation in frequency of the post-menopausal females as compared to pre-menopausal females (Shankar et al., 2022). In women, the vocal folds may become more edematous with menopause. The thickened mucosa increases the vibratory mass, resulting in a lower pitched voice. The increased edema, typically located in the upper layer of the lamina propria of the vocal fold (Reinke's space), is thought to be related to the loss of hormonal influence on the vocal folds mucosa (Schneider et al., 2004). Hence, post-menopausal female professional voice users (FPVUs) are more likely to experience voice-related difficulties that can negatively affect their vocal performance, endurance, and occupational efficiency. The present findings confirm that these voice-related occupational limitations are measurable and meaningful in the context of Malayalam-speaking professional voice users.

Descriptively, the post-menopausal Group obtained a higher mean total score ($M = 25.41$, $SD = 14.01$, Median = 19.50, IQR = 21) compared to the pre-menopausal Group ($M = 17.83$, $SD = 8.23$, Median = 14.50, IQR = 6). The notably wider interquartile range in the Clinical Group (IQR = 21 vs. IQR = 6) reflects considerable heterogeneity in the experience of menopause related voice-related work limitation. This is consistent with observations by (Lã et al.(2025), who noted a greater spread of outliers in the post-menopausal group and attributed this to the well-documented variability of individual menopausal experience, which is

modulated by biological, lifestyle, and occupational factors. Gartoulla et al. (2016), similarly reported that self-assessed work ability during menopause varies substantially across individuals, primarily due to differences in the severity of vasomotor and related menopausal symptoms. In the present study, the wider IQR in the Group 1 underscores the importance of individualised clinical assessment using a tool such as the Malayalam MenoVWL.

4.2.2 Item-wise Comparison

Item-level analysis showed statistically significant differences between Group 1 and Group 2 on 10 of the 13 MenoVWL items, indicating that the Malayalam version of the scale effectively captures various dimensions of menopause-related voice and occupational difficulties.

The largest group difference was observed for **item S11** ('I cannot get my message across at work because of my voice'; $U = 377.0$, $Z = -4.015$, $p < .001$; MR Group 1 = 46.41 vs. MR Group 2 = 29.93). This item captures a fundamental communicative occupational limitation, the inability to convey information effectively at work due to voice difficulties. For professional voice users such as teachers, public speakers, and lecturers, whose core occupational function is effective vocal communication, this is arguably the most consequential dimension of voice-related work limitation. Nanjundeswaran et al. (2015) emphasised that the communicative demands placed on professional voice users are disproportionately high relative to the general working population, rendering communication failure particularly disabling for this group. The highly significant group difference on this item confirms its clinical centrality within the Malayalam MenoVWL.

Item S13 ('My voice reduces the chances of getting professional opportunities'; $U = 445.0$, $Z = -3.476$, $p = .001$) also demonstrated a strong discriminant effect. This item reflects the broader career-level impact of menopausal voice change — specifically, the perception that

voice difficulties reduce access to professional advancement, new roles, or enhanced responsibilities. Lã & Ardura, (2022) specifically designed the MenoVWL to capture not only immediate functional limitations but also longer-term career implications, noting that attitudes and self-evaluation beliefs concerning work activities and self-accomplishment in professional environments negatively correlate with depression and aggravation of physical symptoms (Bowling et al., 2010). Hardy et al. (2017) in a qualitative investigation of working menopausal women's perspectives, reported that participants feared professional marginalisation and negative employer attitudes as a direct consequence of menopausal symptoms, including voice-related difficulties. The significant difference on S13 reflects this broader career-impact dimension of the menopausal experience.

Item S7 ('My voice affects my decisions about my future career'; $U = 444.5$, $Z = -3.469$, $p = .001$) similarly showed a strong group difference. This item captures the extent to which voice difficulties influence strategic career decision-making — including choices about role changes, workload modification, or career continuation. Lã (2009), in a pilot investigation with post-menopausal elite performers, reported that participants described the need to modify their professional activities substantially in response to menopausal voice changes, including choosing different repertoire, reducing performance schedules, and in some cases temporarily cancelling professional engagements. The significant difference on item S7 in the present study indicates that this career-impact dimension is also experienced meaningfully by Malayalam-speaking professional voice users.

Item S10 ('I am underpaid because of my voice'; $Z = -3.221$, $p = .001$) showed a highly significant group difference, with the additional finding that all pre-menopausal Group participants scored zero on this item — producing constant data and reflecting a floor effect. The perception of financial under-compensation attributable to voice difficulties is a construct unique to the post-menopausal experience in this sample, suggesting that menopausal voice

changes can reach a severity that participants perceive as directly affecting their economic standing. This finding resonates with Lã et al. (2025), also included items concerning financial consequences of voice difficulties ('I worry I will lose money as a result of my voice') on the basis that economic security and workplace fairness are central to women's self-concept and work motivation, and that their perceived loss is associated with heightened anxiety and workplace-related depression (Kulkarni et al., 2018).

Item S3 ('My voice makes me feel incompetent'; $U = 428.5$, $Z = -3.133$, $p = .002$) reflects the psychological and self-concept dimension of menopausal voice-related work limitation. This item captures the extent to which perceived vocal inadequacy translates into feelings of professional incompetence. Schneider et al. (2004) documented significant voice impairment associated with menopause and noted that affected women frequently reported diminished professional self-confidence. Lã et al. (2025) explicitly included questions on employee self-concept in the MenoVWL because self-evaluation of perceived professional competence has been significantly associated with job satisfaction and organisational commitment, both of which are negatively associated with depression, one of the most commonly reported menopausal symptoms (Kulkarni et al., 2018). The significant difference on item S3 in the present study confirms the importance of this psychological dimension in the Malayalam-speaking FPVU population.

Item S5 ('I cancel professional engagements because of my voice'; $U = 469.5$, $Z = -2.930$, $p = .003$) and **item S6** ('I think about changing my job due to my voice'; $U = 490.0$, $Z = -2.641$, $p = .008$) reflect behavioural consequences of menopausal voice difficulties at the occupational level. Item S5 captures the direct reduction of professional activity through cancellation of work-related engagements, a behaviour with immediate economic and professional consequences for FPVUs. Lã (2009) reported that post-menopausal elite performers described temporary cancellations of public engagements as a coping response to

unpredictable menopausal voice changes. Item S6, reflecting consideration of changing profession due to voice difficulties, captures a more extreme career-level response. (Verdolini & Ramig (2001) noted that professional voice users who feel unable to meet vocal demands may contemplate withdrawal from their vocations, with significant implications for economic security and professional identity.

Item S4 ('I worry I will lose money as a result of my voice'; $U = 533.5$, $Z = -2.570$, $p = .010$) reflects financial anxiety arising from voice difficulties — a dimension closely related to occupational security. Post-menopausal women reported significantly greater worry about financial consequences of their voice difficulties than pre-menopausal women. This is consistent with Lã et al. (2025), who noted that FPVUs may fear becoming underpaid or unemployed as a result of voice-related disruptions to their professional activities, and that this fear can contribute to the aggravation of menopausal symptoms through heightened anxiety and diminished occupational self-esteem (Bowling et al., 2010) .

Item S12 ('My voice worsens as I work'; $U = 491.5$, $Z = -2.236$, $p = .025$) captures the experience of intra-session vocal deterioration during occupational voice use. This reflects a core physiological dimension of menopausal voice change: the reduced vocal endurance and heightened susceptibility to vocal fatigue associated with hormonally driven changes in vocal fold hydration and mucosal integrity (Abitbol et al., 1999; Lã & Ardura, 2022). (Fiuza et al.(2023) in a systematic review of singing at menopause, identified diminished vocal stamina and increased vocal fatigue as among the most consistently reported menopausal voice complaints in professional singers and teachers. The significant difference on S12 confirms the salience of this dimension in the present Malayalam-speaking sample.

Item S9 ('I cannot use the entire capacity of my voice at work'; $U = 513.5$, $Z = -2.020$, $p = .043$) reflects self-perceived limitation in the full utilisation of vocal capacity during

professional activities. This item taps into the functional dimension of menopausal voice limitation, the perception that one's voice is no longer able to meet the full demands of one's professional role. Lã & Ardura (2022) documented reductions in vocal range and fundamental frequency variation as among the most consistently measured acoustic changes associated with menopause, and Fiuza et al.(2023) highlighted the perceived reduction in vocal range and flexibility as a significant concern for menopausal professional singers and teachers. The significant group difference on S9 confirms the functional relevance of this dimension in the present study.

Item S8 ('I feel pressure at work because of my voice'; $U = 544.5$, $Z = -1.796$, $p = .072$) also did not reach significance. The experience of workplace pressure related to voice difficulties may similarly be prevalent across both pre- and post-menopausal professional voice users, reducing its discriminatory power in this comparison. Hunter et al.(2011) reported that perceived occupational voice-related pressure is a broad occupational health concern for women in vocally demanding careers and is not exclusively associated with the menopausal transition. Nonetheless, the consistently higher mean rank in the Group 1 (MR Group 1 = 41.49 vs. MR Group 2 = 34.11) suggests a meaningful clinical trend for this item.

Item S1 ('My voice restricts my work activities'; $U = 555.5$, $Z = -1.574$, $p = .116$) and

Item S2 ('I feel I need fewer hours of work because of my voice'; $U = 593.5$, $Z = -1.103$, $p = .270$) did not reach statistical significance, though mean ranks were consistently higher in the Group 1 (MR = 40.04 and 41.16, respectively, compared to MR = 35.34 and 34.39 in the Group 2). The absence of significance for item S2, reflecting the desire to reduce working hours due to voice difficulties — may indicate that the majority of participants in both groups, as working professional voice users, feel an obligation to maintain full working hours irrespective of vocal difficulties, potentially masking true differences. Similarly, the non-significance of item S1

may reflect the high base rate of perceived voice restrictions across all professional voice users, irrespective of menopausal status. (Vilkman (1996) noted that generalized voice-related work restrictions are common across professional voice user populations and are not specific to menopause.

4.3 Intra-rater Reliability of the Malayalam MenoVWL

Intra-rater reliability, assessed over a one-week interval in a sub-sample of five participants, was satisfactory to excellent across all 13 items of the Malayalam MenoVWL. Cronbach's alpha for the test-retest item pairs ranged from .706 (item S13) to 1.000 (items S1, S4, S5, S6, S11, S12), and Spearman's rank-order correlations were statistically significant for 11 of 13 items, with nine items yielding perfect correlations ($r_s = 1.000, p < .001$).

These findings compare favourably with the reliability evidence reported for the original MenoVWL and other voice-related patient-reported outcome measures. Lã et al. (2025) reported an excellent Cronbach's alpha of .951 for the full 13-item scale across their validation sample ($n = 192$), confirming the strong internal consistency of the instrument's item pool. In the present study, Cronbach's alpha was computed for each item pair between test and retest administrations, providing a granular perspective on item-level temporal stability. This approach is consistent with methodology reported by (Ma & Yiu, 2001) for the Voice Activity and Participation Profile (VAPP) and by (Jacobson et al., 1997) for the Voice Handicap Index (VHI), both of which demonstrated high test-retest reliability in comparable validation contexts.

Items S9 ($\alpha = .800; r_s = .811, p = .096$) and S13 ($\alpha = .706; r_s = .612, p = .272$) did not achieve Spearman significance, which should be interpreted in the context of the sub-sample size of $n = 5$. At this sample size, only correlations approaching $r_s \geq .878$ would yield significance at $p < .05$, rendering the non-significance of S9 and S13 an artefact of limited statistical power

rather than evidence of true instability. Both items met the minimum accepted threshold of $\alpha \geq .70$ (Nunnally & Bernstein, 1994), supporting their retention in the scale. The overall reliability findings confirm that the Malayalam MenoVWL demonstrates satisfactory to excellent temporal stability across a one-week interval, supporting its use as a reproducible clinical and research instrument.

4.4 Cultural and Linguistic Appropriateness

A core contribution of the present study is the rigorous cultural adaptation of the MenoVWL into Malayalam, following the five-step process recommended by WHO (2020): forward translation, expert panel review, back-translation, content validation, and cognitive debriefing during the pilot phase. The significant between-group findings of Phase II provide empirical evidence that the adapted scale preserves the construct validity of the original instrument. Female professional voice users in Kerala, particularly teachers, who constitute one of the largest professionally voice-dependent groups in the state, currently have no access to a standardised, linguistically appropriate tool for assessing menopausal voice-related work limitation. The Malayalam MenoVWL addresses this gap directly. Cultural modifications made during Phase I, including adaptations to occupational references and communication contexts relevant to the Malayalam-speaking professional environment, appear to have enhanced the ecological validity of participants' responses, as reflected in the broad pattern of significant between-group findings across the scale's 13 items.

4.5 Clinical Implications

The validation of the Malayalam MenoVWL carries important implications for speech-language pathology practice and women's health in Kerala. The scale provides clinicians with a validated, standardised tool for the screening and clinical assessment of voice-related occupational limitation in menopausal professional voice users. Its demonstrated discriminant

validity ($p = .006$) supports its use as a clinical adjunct and intervention outcome measure. Secondly, the high scores on items reflecting inability to communicate at work (S11), career impact (S13, S7), financial concern (S10, S4), and professional self-concept (S3) highlight the multidimensional burden of menopausal voice difficulties for FPVUs in Kerala, pointing to the need for integrated clinical management that addresses not only the physiological voice changes of menopause but also their psychological and career-level consequences. Third, the findings reinforce the call by Lã et al. (2025) for inclusion of the MenoVWL in medical evaluations as a preventive occupational health measure, enabling early identification of at-risk FPVUs and timely referral to speech-language pathology services.

Chapter 5

Summary and Conclusion

The present study successfully translated and culturally adapted the Menopausal Voice-Related Work Limitation Scale (MenoVWL) into Malayalam through a rigorous five-step adaptation process, and conducted a preliminary validation among female professional voice users in Kerala. The Malayalam MenoVWL demonstrated satisfactory psychometric properties for use as a clinical and research instrument.

A statistically significant difference was observed between post-menopausal women (Group 1) and pre-menopausal women (Group 2) on both total MenoVWL score [$U = 436.0$, $Z = -2.723$, $p = .006$] and on 11 of 13 individual items, with post-menopausal women consistently reporting greater self-perceived voice-related work limitation. This finding replicates and extends the key validation result of the original MenoVWL study by Lã et al.(2022) ($Z = -2.818$, $p = .005$) to a new linguistic and cultural context, confirming the cross-cultural construct validity of the scale. The strongest between-group differences were observed for items capturing inability to communicate at work (S11), reduced professional opportunities (S13), career decision impact (S7), perceived financial under-compensation (S10), and feelings of professional incompetence (S3), reflecting the broad functional, psychological, and career-level dimensions of menopausal voice-related work limitation in this population.

Intra-rater reliability, assessed over a one-week interval in five participants, was excellent to acceptable across all 13 items (Cronbach's $\alpha = 0.706$ to 1.000 ; Spearman's $r_s = 0.612$ to 1.000), supporting the temporal stability of the adapted scale. Collectively, these findings establish the Malayalam MenoVWL as a linguistically appropriate, culturally relevant, and psychometrically sound instrument for measuring self-perceived voice-related work limitation in menopausal professional voice users, with significant potential to advance clinical

assessment, evidence-based intervention planning, and occupational health practice in Malayalam-speaking communities.

Limitations

Few limitations of the present study should be acknowledged when interpreting its findings.

- **Sample size and generalisability.** The present study included 74 participants, which was adequate for preliminary comparison between the groups. However, this sample size was not sufficient to perform advanced statistical analyses such as confirmatory factor analysis. In comparison, the original validation study of the MenoVWL by Lã et al. (2025) included 192 participants, which enabled detailed evaluation of the scale's factor structure through exploratory and confirmatory factor analyses. Therefore, future studies on the Malayalam version of the scale should include a larger and more diverse sample of participants from different regions and occupations across Kerala to improve the generalisability of the findings.
- **Cross-sectional design.** The present study used a cross-sectional group comparison. Lã et al. (2025) acknowledged that longitudinal designs tracking the same FPVUs across menopausal transition stages using the STRAW system are considered the gold standard for studying the impact of menopause. Future research should adopt this design.

Future Directions

Several directions for future investigation are recommended based on the present findings. Future studies should recruit larger samples including representation across all three levels of the professional voice user classification system (Koufman & Isaacson, 1991), particularly level I professionals — singers, actors, and broadcasters — for whom even slight vocal difficulties impair occupational ability. Lã et al. (2025) speculated that larger effect sizes might

be observed in samples enriched with level I professionals, a hypothesis warranting empirical investigation in the Malayalam context.

Longitudinal application of the Malayalam MenoVWL — tracking the same FPVUs across peri- and post-menopausal stages using the STRAW menopausal staging system — would provide valuable insights into the trajectory of voice-related occupational limitation during the menopausal transition, as recommended by Lã et al. (2025).

The Malayalam MenoVWL should be applied as an outcome measure in clinical intervention studies evaluating the impact of voice therapy, vocal hygiene counselling, and multidisciplinary menopausal health support on self-perceived voice-related work limitation. Finally, adaptation of the MenoVWL into other Indian regional languages — Tamil, Telugu, Kannada, and Hindi — would extend access to this validated instrument across a much larger population of menopausal FPVUs in India.

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Appendix A

The *Menopausal Voice-Related Work Limitation Scale* (MenoVWL), UNED, Spain(Lã et al., 2025)

Instructions: Please read carefully each of the 13 statements presented below concerning voicerelated limitation to work during menopause. Using a 6-point scale (1, totally disagree and 6, totally agree), circle the option that best reflects your degree of agreement or disagreement with each statement.

Statements	Degree of agreement							
1. My voice restricts my work activities.	Totally disagree	1	2	3	4	5	6	Totally agree
2. I feel I need fewer hours of work because of my voice.	Totally disagree	1	2	3	4	5	6	Totally agree
3. My voice makes me feel incompetent.	Totally disagree	1	2	3	4	5	6	Totally agree
4. I worry I will lose money as a result of my voice.	Totally disagree	1	2	3	4	5	6	Totally agree
5. I cancel professional engagements because of my voice.	Totally disagree	1	2	3	4	5	6	Totally agree
6. I think about changing my job due to my voice.	Totally disagree	1	2	3	4	5	6	Totally agree
7. My voice affects my decisions about my future career.	Totally disagree	1	2	3	4	5	6	Totally agree
8. I feel pressure at work because of my voice.	Totally disagree	1	2	3	4	5	6	Totally agree
9. I cannot use the entire capacity of my voice at work.	Totally disagree	1	2	3	4	5	6	Totally agree
10. I am underpaid because of my voice.	Totally disagree	1	2	3	4	5	6	Totally agree
11. I cannot get my message across at work because of my voice.	Totally disagree	1	2	3	4	5	6	Totally agree
12. My voice worsens as I work.	Totally disagree	1	2	3	4	5	6	Totally agree
13. My voice reduces the chances of getting professional opportunities.	Totally disagree	1	2	3	4	5	6	Totally agree

Appendix B

The Menopausal Voice-Related Work Limitation Scale (MenoVWL), Malayalam

ആർത്തവവിരാമകാലത്തെ (മെനോപ്പോസ്) ശബ്ദവുമായി ബന്ധപ്പെട്ട തൊഴിൽപരമായ പരിമിതികൾ വിലയിരുത്തുന്നതിനുള്ള സ്കെയിൽ

ആർത്തവവിരാമകാലത്ത് ശബ്ദവുമായി ബന്ധപ്പെട്ട ജോലിപരമായ ബുദ്ധിമുട്ടുകളെ കുറിച്ചുള്ള താഴെ നൽകിയിരിക്കുന്ന 13 പ്രസ്താവനകൾ ശ്രദ്ധാപൂർവ്വം വായിക്കുക. ഓരോ പ്രസ്താവനയോടുമുള്ള നിങ്ങളുടെ യോജിപ്പിന്റെയോ വിരോധിപ്പിന്റെയോ തോത് 6-പോയിന്റ് സ്കെയിൽ ഉപയോഗിച്ച് രേഖപ്പെടുത്തുക (1 = പൂർണ്ണമായി നിഷേധിക്കുന്നു , 6 = പൂർണ്ണമായി സമ്മതിക്കുന്നു). ഓരോ പ്രസ്താവനയ്ക്കും ഏറ്റവും അനുയോജ്യമായ ഉത്തരത്തിന് വട്ടമിടുക.

- എന്റെ ശബ്ദം കാരണം ജോലി ചെയ്യുന്നതിൽ തടസ്സം ഉണ്ടാക്കുന്നു.
പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു
- എന്റെ ശബ്ദം കാരണം എനിക്ക് കുറച്ച് സമയം മാത്രം ജോലി ചെയ്യാൻ മതിയെന്ന് തോന്നുന്നു.
പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു
- എന്റെ ശബ്ദം കാരണം എനിക്ക് ജോലി അത്ര നന്നായി ചെയ്യാൻ പറ്റുന്നില്ലെന്ന് തോന്നുന്നു .
പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു
- എന്റെ ശബ്ദം കാരണം വരുമാനം നഷ്ടപ്പെടുമോ എന്ന് എനിക്ക് ഭയമുണ്ട്.
പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു
- എന്റെ ശബ്ദം കാരണം ജോലിയിലെ ചില ചുമതലകൾ ഒഴിവാക്കേണ്ടിവരുന്നു.
പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു
- എന്റെ ശബ്ദം കാരണം ജോലി മാറണം എന്ന് ഞാൻ ആലോചിച്ചിട്ടുണ്ട്.
പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു
- എന്റെ ശബ്ദം എന്റെ ഭാവിയിലെ ജോലി തീരുമാനങ്ങളെ ബാധിക്കുന്നു.

പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു

8. എന്റെ ശബ്ദം കാരണം ജോലിയിൽ എനിക്ക് സമ്മർദ്ദം അനുഭവപ്പെടുന്നു.

പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു

9. എന്റെ ശബ്ദത്തിന്റെ മുഴുവൻ ശേഷിയും എനിക്ക് ജോലിക്ക് വേണ്ടി ഉപയോഗിക്കാനാകുന്നില്ല.

പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു

10. എന്റെ ശബ്ദം കാരണം എനിക്ക് ജോലിയിൽ വേണ്ടത്ര ശമ്പളം ലഭിക്കുന്നില്ല.

പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു

11. എന്റെ ശബ്ദം കാരണം ജോലി ചെയ്യുമ്പോൾ ഞാൻ പറയുന്നത് എല്ലാവർക്കും വ്യക്തമാകുന്നില്ല.

പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു

12. ജോലി ചെയ്യുമ്പോൾ എന്റെ ശബ്ദം കൂടുതൽ മോശമാകുന്നു.

പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു

13. എന്റെ ശബ്ദം കാരണം എനിക്ക് ജോലി അവസരങ്ങൾ കുറയുന്നു.

പൂർണ്ണമായി നിഷേധിക്കുന്നു 1 2 3 4 5 6 പൂർണ്ണമായി സമ്മതിക്കുന്നു

Appendix C

Permission Letter From Author

Re: Formal permission requested to translate MenoVWL Quesstinnaire - AllSH, Mysore, India

From FILIPA MARTINS BAPTISTA LA<filipa.la@edu.uned.es>

Date Sun 15-02-2026 22:28

To Dr T. Jayakumar

<jayakumar@aiishmysore.in> Cc SLS-

AIISH <sls.aiish@aiishmysore.in>

Dear Professor Jayakamur,

Thank you very much for your interest in translating and validating the scale MenoVWL into your language.

Hope this instrument will help you to find the answers you are looking for. Please do not forget to cite the original version.

Yours sincerely,

Filipa Lã

On 13 Feb 2026, at 07:07, Dr T. Jayakumar <jayakumar@aiishmysore.in> wrote:

Dear Prof. Filipa M.B. La

Herewith, I am sending the formal permission request letter to translate the MenoVWL Questionnaire as an attachment. I kindly request that you grant the permission as soon as possible.

We have sent the same email from the head of our department; however, we have not received a reply (I have enclosed a screenshot). Hence, I am sending you the formal letter from the head of the department via my email. Please consider this and grant the permission as soon as possible.

Thank you

Dr T. Jayakumar Ph.D

Professor in Speech Sciences

Department of Speech-Language Sciences

All India Institute of Speech and Hearing
Mysore-570006

<Filipa.pdf> <Permission letter of Dr. T. Jayakumar.pdf> <screen short.png>

Filipa M.B. Lã (Phi))

Associate Professor / Prof. Titular de Universidad

Dept. Didactics, School Organisation and Special Didactics

Faculty of Education

UNED

Director of Laboratory for Voice, Music and Language (UNEDVoiceLab)

Faculty of Education

<https://unedvoicelab.com>

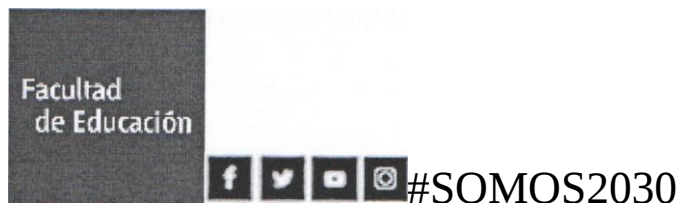
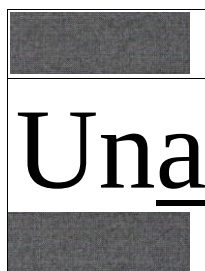
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