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Original Article

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Construction of Thai Monosyllabic Word Lists for Speech Recognition Test of Adults

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ABSTRACT

OBJECTIVE The objective of this study was to construct new Thai monosyllabic word lists that are phonetically balanced and to study the accuracy of speech recognition measuring tests for adults.

METHODS This study creation of four Thai monosyllabic word lists (KKU lists) of twenty-five words each in a CD recording based upon an accuracy evaluation. The 76 participants recruited were between 19 and 70 years of age and were recruited based on four groups of hearing level. Each group of 19 subjects consisted of people with normal hearing as well as people with moderate, moderately severe, and severe sensorineural hearing loss with symmetrical hearing. Only the dominant ear of each of the participants was chosen for testing. Audiometry in that ear was conducted using randomized nine-word lists from the four newly constructed Khon Kaen University lists (KKU lists) and five lists of RAMA SD lists-1 from the original Thai monosyllabic word lists (OTL) [OTL consisted of RAMA SD list-1 (there are 5 lists) and RAMA SD list-2 (there are 4 lists)]. The participant's accurately spoken words will be recorded as a number and percentage.

RESULTS No statistically significant differences were found in the speech recognition scores of any of the four KKU lists among the four participant groups ($p > 0.05$). Similar to Kasmer and Brown's study, the speech recognition scores (SRS) of the KKU lists and OTL lists declined as the degree of the severity of hearing loss increased. The score range (min-max) at each level of hearing loss for all nine-word lists was in the standard value range. However, the SRS of the KKU lists were found to be closer to the standard reference than the scores from the OTL list.

CONCLUSIONS The KKU lists can provide more accurate score results and more precise diagnoses of hearing loss and can also be applied in clinical examination and speech recognition testing.

KEYWORDS Thai monosyllabic word lists, phonetic balance, speech recognition scores

INTRODUCTION

Speech recognition scores are used for analysis when seeking to address patient socialization problems among sensorineural hearing loss patients including assessing the severity of communication problems, evaluating the effects of hearing rehabilitation and identifying the pathologies of the hearing loss. Both Speech Recognition Scores

(SRS) and Speech Discrimination Scores (SDS) are one part of speech audiometry evaluation using monosyllabic word lists. In 1930, Fletcher and Steinberg developed the first word list, the Western Electric 4A test (later called the 4C test) (1). That assessment uses an analog recording to obtain a stable voice volume based on evaluation of the perceived sound clarity. This helped examiners evaluate the severity of the hearing loss and to determine how it affected communication. In addition, Ronald C. Egan, who was later the President of Harvard University, developed another word list in 1948 which is known as the Phonetically Balanced 50 (PB-50) (2). Egan's objective was to appraise speech comprehension. The PB-50 consists of 20-word lists for speech recognition tests, each consisting of 50 words that are used in daily life. This experiment was later considered to be a prototype for evolving new word lists. The correlation between the speech recognition score and the degree of hearing loss indicates that the score will be lower when the degree of hearing loss is greater (3, 4). Additionally, inaccuracies in SRS can occur when a live voice rather than a recording is used for testing. Using voice recordings in speech recognition tests can ameliorate this inaccuracy issue (5). In addition, to obtain more accurate scores, the language used in the examination should be the examinees' mother tongue with which they are familiar and that they use in their daily lives (6, 7).

Consonants, vowels, and tones are joined together as speech sounds. Previous studies have shown that consonant sounds can affect speech frequency changes (8). Speech recognition problems in sensorineural hearing loss patients can be described by the fact that an initial consonant of words may be identified in the frequency range in which those patients are hard of hearing (9, 10). Tone is another a variable that enables words to have different meanings. Thai is one of the languages in the world that has five tones (11). Vowel sounds can improve pronunciation skill and final consonant sounds may act as an enhancer of cognitive competency in the Thai language (12, 13). The Computerized Speech Laboratory (CSL) system is a tool that can be utilized in the analysis of sound waves. It can be used to assess human voices, which are composed of component waves that have different complex shapes and levels of frequency (14). In regard to recording speech, the quality of the speaker's voice recording will affect the test results and can be assessed through listening. The method known as GIRBAS (grade, roughness, breathiness, asthenia, strain scale) has been widely used and is accepted as a standard test in clinical settings (15). An evaluation score of zero, which indicates good sound quality, is used to select sounds in a recording. In evaluating recordings, female and male voices have been found to be not significantly different with regard to the speech classification values, but the speech of women's voices has more variability between words than the speech of men's voices (16, 17).

In Thailand, the original Thai monosyllabic word lists (OTL) that are currently used were created more than 40 years ago. It has been found that some of the words on these lists are not commonly used today. Additionally, there are duplicate words in some word lists as well as issues of phonetic imbalance. For that reason, new Thai monosyllabic word lists have been developed to provide more accurate score results and more precise diagnoses of hearing loss. The objectives of the current study are: 1) to construct new Thai monosyllabic word lists that are phonetically balanced and 2) to determine the accuracy of the new Thai monosyllabic word lists for speech recognition testing in adults (KKU lists).

METHODS

This study was approved by the Khon Kaen University Ethical Committee for Human Research (HE651273) and was registered in the Thai Clinical Trials (TCTR20220810005). Before participating in this trial, full written informed consent was obtained from all participants. This study was conducted in two steps as shown in the study flow (Figure 1).

Word list construction and recording

A total of 283 familiar words were selected from the Thai National Corpus (National Thai Language Data Archive Under the Royal Patronage of Her Royal Highness Princess Maha Chakri Sirindhorn), and were arranged in order from highest to lowest frequency found in daily use. The study selected 283 words from a list of 400 most familiar words. The principles criteria for selection were as follows: 1) the words were

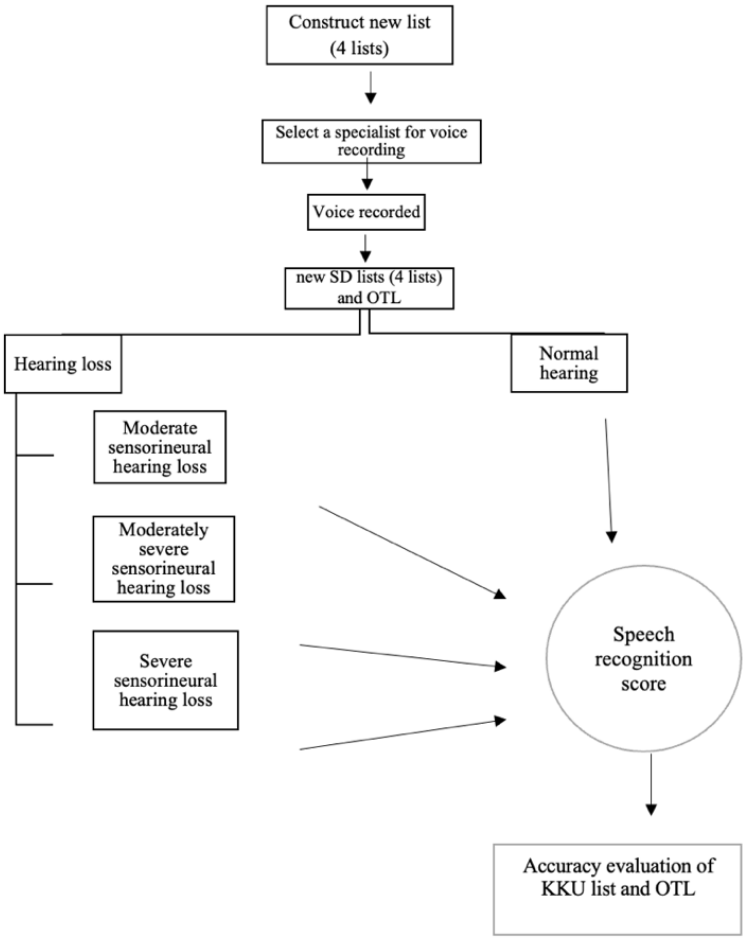

Figure 1. The flow of the study

meaningful, 2) they were not diphthongs, 3) they were polite words, and 4) there were no /r/ sounds. The words were sorted according to the frequency of the initial consonant sounds. In addition, 109 words that have high-tone consonants (> 2,000 Hz), 79 words that have mid-tone consonants (500-2,000 Hz), and 95 words with low-tone consonants (< 500 Hz) were selected. A higher number of high-tone initial consonants was selected due to their effects on changes to the perception of sounds in the Thai language. All words were analyzed for mean frequency using the CSL. Following the CSL analysis, the words were arranged into three groups based on mean frequency: low-tone (< 175 Hz), mid-tone (175-220 Hz), and high-tone (> 220 Hz). Distribution of selected words in each list was based on both the initial consonant sounds and the mean frequency of the words (Table 1). The four lists of 25 words each are called a KKU list (Table 2). Arrangement of the words within the word lists and the ordering of the word lists was done using a random distribution method.

A voice model was chosen from among three candidates, all of whom were Thai male vocal professionals. To be considered, the mother tongue of candidates had to be Thai, and they had to show good voice quality as measured by the GIRBAS Scale (grade, instability, roughness, breathiness, asthenia, and strain) that were established with a GIRBAS grade of 0. The four KKU lists and the five OTL (RAMA SD-1) lists were recorded in a standard double-walled room using a condenser microphone and a 6.5 cm diameter windshield positioned approximately 20 cm from the speaker's mouth at an angle of 0 degrees to the speaker. The microphone was linked to a sound level meter to control the loudness at 63 dB SPL during sound recording. From time to time, the speaker was given a break. While recording, two audiologists evaluated each word for its natural sound. The audio was recorded in an MPEG-1 Audio Layer 3 (.mp3) audio file format. Before being examined, the sound had to be calibrated using a pure tone

Table 1. The number of words according to the distribution of the initial consonants and the average speech frequency of the words in each set of the KKU lists

	KKU list 1	KKU list 2	KKU list 3	KKU list 4
Low-tone consonant and low-tone mean frequency words	2	2	2	2
Low-tone consonant and mid-tone mean frequency words	3	3	3	3
Low-tone consonant and high-tone mean frequency words	3	3	3	3
Mid-tone consonant and low-tone mean frequency words	3	3	3	3
Mid-tone consonant and mid-tone mean frequency words	3	3	3	3
Mid-tone consonant and high-tone mean frequency words	3	3	3	3
High-tone consonant and low-tone mean frequency words	2	2	2	2
High-tone consonant and mid-tone mean frequency words	3	3	3	3
High-tone consonant and high-tone mean frequency words	3	3	3	3

KKU list, Khon Kaen University lists

Table 2. KKU lists

KKU list 1		KKU list 2		KKU list 3		KKU list 4	
	IPA		IPA		IPA		IPA
เก่า (old)	ŋîap	โลก (world)	lôːk	ผ่าน (pass)	pʰàːn	ใหญ่ (big)	jàì
เงียบ (silent)	kàw	อ่อน (soft)	ʔɔ̀ːn	แดง (red)	dɛːŋ	เกาะ (island)	kɔ̀ː
เลือก (select)	lɯ̂ak	วัน (day)	wan	คิด (think)	kʰít	ยอก (peak)	jɔ̂ːt
หนึ่ง (one)	nɯ̀ŋ	ญาติ (relative)	jâːt	นิ่ง (still)	nîŋ	ไทย (Thai)	tʰaj
ยิ้ม (smile)	jím	พิมพ์ (print)	pʰim	ข่าว (news)	kʰàːw	ตั้ง (set up)	tâŋ
ตา (eye)	tāː	เปิด (open)	pɤ̀ːt	ผิว (skin)	pʰǐw	ลม (wind)	lom
พื้น (floor)	pʰɯ́ːn	หน่วย (unit)	nùaj	ท่าน (you)	tʰâːn	ชุด (suit)	tɕʰút
เที่ยว (trip)	tʰîaw	วิ่ง (run)	wíŋ	เล็ก (small)	lék	ขาย (sell)	kʰaːj
ขาด (lack)	kʰàːt	ข้าม (cross)	kʰâːm	ไฟ (fire)	faj	แก้ว (glass)	kɛ́ːw
สอบ (test)	sɔ̌ːp	ต่ำ (low)	tàm	ตัด (cut)	tàt	เลิก (quit)	lêːk
เพื่อน (friend)	pʰɯ̂ːn	พ่อ (father)	phɔ̂ː	บอก (tell)	bɔ̀ːk	เพิ่ม (add)	pʰɤ̂m
ลืม (forget)	lɯ́m	พื้น (practice)	fɯ́k	เชื่อ (believe)	tɕʰɯ̂ːa	สี่ (four)	sìː
จุด (point)	tɕùt	พูด (speak)	phúːt	พืช (plant)	pʰɯ̂ːtɕʰ	บาท (bath)	baːt
ใช่ (correct)	tɕʰâj	ส่ง (send)	sòŋ	มือ (hand)	mɯː	ชื่อ (name)	tɕʰɯ̂ː
คุย (talk)	kʰuːi	คู่ (couple)	kʰûː	เกิด (born)	kɤ̂ːt	ห้าม (forbid)	hâːm
แพทย์ (doctor)	pʰɛːtˆ	หลัง (back)	lǔŋ	สอง (two)	sɔ̌ːŋ	จ่าย (pay)	tɕàːj
แบ่ง (divide)	bɛ̀ːŋ	กอง (pile)	kɔ̄ːŋ	นอก (outside)	nɔ̀ːk	ออก (exit)	ʔɔ̀ːk
ป่า (forest)	pàː	สาว (young lady)	saːw	ใต้ (under)	tâj	ยาก (difficult)	jaːk
ข้าว (rice)	kʰâːw	แทน (replace)	tɛːn	ถูก (correct)	tʰùːk	เพชร (diamond)	pʰɛ̌ː.tɕʰɤː
ห้อง (room)	hɔ̂ːŋ	ยาย (grandmother)	jaːj	หนุ่ม (young man)	nùm	ถาม (ask)	tʰǎːm
ตอบ (answer)	tɔ̂ːp	ต้น (tree)	tôn	ป้า (aunt)	pâː	น้ำ (water)	nám
หัว (head)	hǔa	ห่าง (far)	hàːŋ	แยก (separate)	jɛ̀ːk	เส้น (line)	sên
แสน (hundred thousand)	sɛ̌ːn	ชอบ (like)	tɕʰɔ̂ːp	โต๊ะ (table)	tóʔ	ปิด (close)	pìt
นก (bird)	nók	ขาว (white)	kʰǎːw	ใส่ (put)	sài	แต่ง (decorate)	tɛ̀ŋ
ง่าย (easy)	ŋâːj	ใหม่ (new)	mài	กว้าง (wide)	kwâːŋ	ดิน (soil)	din

* The International Phonetic Alphabet (IPA); KKU list, Khon Kaen University lists

at the frequency of 1 kHz, with the volume unit meter (VU meter) set at 0 and the loudness set to 60 dB.

Accuracy testing of the word lists

The participants

A total of 76 native Thai-speaking patients from the Ear, Nose, and Throat Outpatient Department at Khon Kaen University's Srinagarind Hospital, with an age range of 19-70 years, participated in the study between June 2021 and February 2022. There were four sample groups: 19 participants with normal hearing (≤ 25 dB HL), 19 with moderate Sensorineural hearing loss (SNHL) (41-55 dB HL), 19 with moderately severe SNHL (56-70 dB HL), and 19 with severe SNHL (71-90 dB HL) (18, 19). Configuration of hearing loss had not been specified and was considered to be symmetrical, i.e., the same in both ears. All participants had undergone normal otolaryngology examina-

tions and all were born in Thailand. Their native language was Thai, and they had normal speech production organs. Individuals who had severe dizziness, secretions from their ears, psychopathy, or mental problems, as well as those who communicated abnormally or who were uncooperative were excluded.

The testing procedures

Audiometry, consisting of both pure tone audiometry and speech audiometry, was performed with all participants. In cases where audiometric test results had been obtained more than 30 days prior, a re-test was performed. Only the dominant ear of each of the participants was chosen for testing using the nine word lists. Before testing, the participants received a brief set of instructions from the audiologist. The audiometer was calibrated at 1 KHz pure tone, with 60 dB set for the 0 VU meter. Testing was conducted using an AC40 clinical audiometer with an IP30 insert earphone transducer. The SRS were determined using the most comfortable level, and the word lists were randomly presented in a sequential order. The results were recorded by two audiologists at the time of testing.

Statistical analyses

To test the hypotheses of the study, the data was analyzed using descriptive analysis, with statistical significance set at 0.05.

The accuracy of the Thai monosyllabic word lists (KKU lists) and the standard OTL test were determined and are presented as percentages and averages.

The consistency of each of the word lists in the Thai monosyllabic speech test which tested the speech discrimination of adults (KKU lists) for all 4 word lists and the standard OTL word lists test for all 5 word lists was analyzed using the intraclass correlation coefficient.

RESULTS

The demographic characteristics of the participants are presented in Table 3. There were 41 males and 35 females with an average age of 46 years in the hearing level groups. The configuration that was discovered consists of 50 flat audiograms (70%), 17 gradually sloping audiograms (20%) and 9 sharply sloping audiograms (10%). The majority of the participants were age 51 to 60 years.

Table 3. Demographics of participants

Characteristics	n=76 n (%)
Genders	
Male	41 (54)
Female	35 (46)
Age (in years)	
19–30	20 (26)
31–40	7 (9)
41–50	8 (11)
51–60	28 (37)
61–70	13 (17)
Ear with better hearing	
Right ear	
Female	15 (20)
Male	25 (33)
Totals	40 (53)
Left ear	
Female	20 (26)
Male	16 (21)
Totals	36 (47)

The current study found no statistically significant differences ($p > 0.05$) in the SRS in the KKU lists or the OTL. In the normal hearing group, no significant differences in the SRS between the KKU lists and OTL were found in an analysis performed using the paired-sample t-test. In all three groups with hearing impairment, it was found that the SRS for the KKU lists and OTL were statistically significantly different ($p < 0.001$) (Table 4).

The relationships between the hearing levels and the SRS in each of the nine-word lists were examined descriptively using correlations. The Pearson's correlation coefficient produced a negative value among all groups of participants ($r = -0.879$; $p < 0.001$) (Figure 2). It was found that as the pure tone average (PTA) increased, the SRS decreased. In the hearing-impaired groups, the SRS in the KKU lists and the OTL were similar with the exception of the OTL (RAMA SD-1) where the SRS were higher than for the other word lists (the linear of RAMA SD-1 % word) (Figure 2). As a result, the authors re-analyzed the statistical relationships after eliminating the RAMA SD-1 scores and found a decrease in the average SRS of the OTL in all participant groups. Analysis using the paired-sample t-test found no significant differences between the OTL and the KKU lists, especially in the severe hearing loss group ($p = 0.083$) (Table 5).

Table 4. The means and standard deviations of the SRS of the KKU lists and OTL

		Mean±SD		Min		Max		Significant level
		Words counted	Word %	Words counted	Word %	Words counted	Word %	
Normal hearing	Totals	24.73±0.51	98.92±2.03	23	92	25	100	0.070
	OTL	24.68±0.53	98.74±2.12	23	92	25	100	
	KKU lists	24.79±0.47	99.16±1.88	23	92	25	100	
Moderate hearing loss	Totals	20.58±1.66	82.33±6.66	17	68	24	96	< 0.001
	OTL	20.94±1.67	83.75±6.70	17	68	24	96	
	KKU lists	20.14±1.55	80.57±6.21	17	68	23	92	
Moderately severe hearing loss	Totals	16.89±1.80	67.56±7.17	12	48	22	88	< 0.004
	OTL	17.18±1.83	68.72±7.31	12	48	22	88	
	KKU lists	16.53±1.72	66.11±6.77	12	48	20	80	
Severe hearing loss	Totals	10.15±3.42	40.58±13.68	4	16	19	76	< 0.083
	OTL	10.45±3.45	41.81±13.82	5	20	19	76	
	KKU lists	9.76±3.36	39.05±13.43	4	16	18	72	

The statistical significance level was $p < 0.05$;
KKU list, Khon Kaen University lists; OTL, original Thai monosyllabic word lists

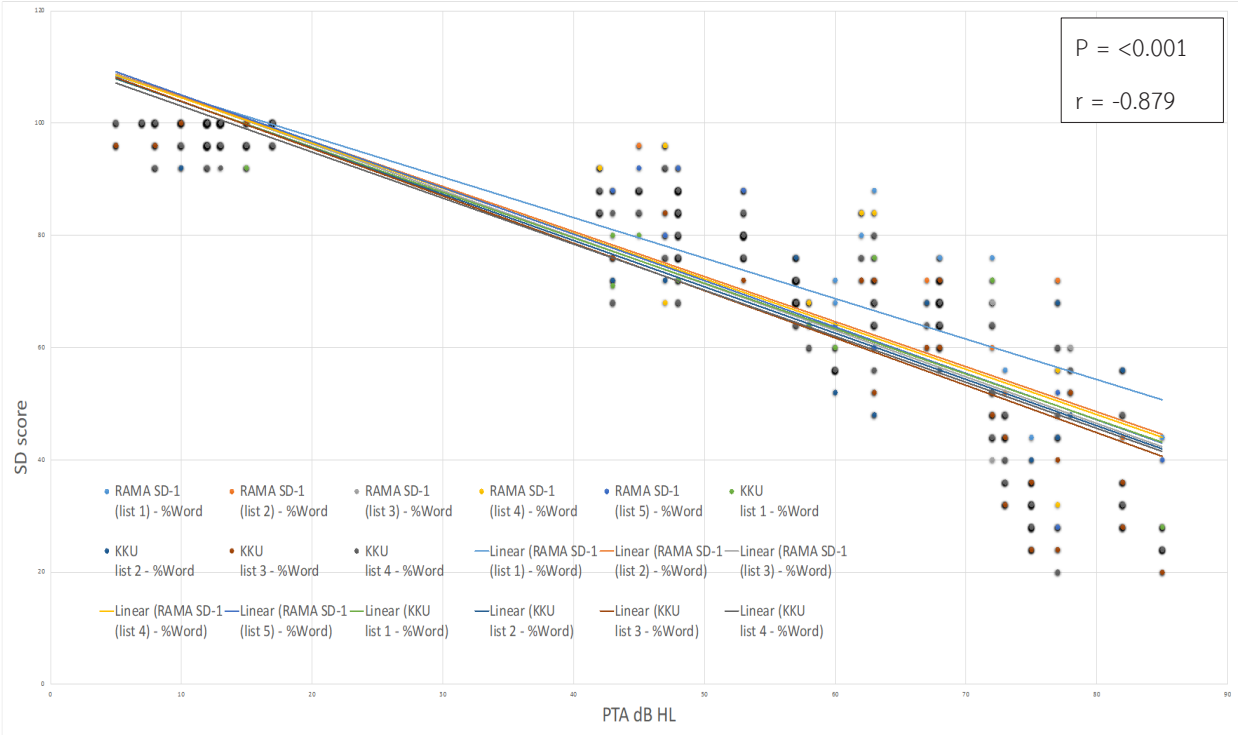

Figure 2. Pearson's correlation analysis of the PTA and the SRS of the OTL and the KKU lists for all the studied groups

Cronbach's alpha coefficient was used to measure the consistency within each word list in the KKU lists and the OTL as well as between the KKU lists and the OTL (Table 6).

DISCUSSION

Consonants, tones, and vowels come together creating the frequency changes of words that affect speech recognition (20). Moreover, tone is important in predicting words, particularly among individuals with sensorineural hearing loss who encounter difficulties with speech recognition. In 2018, Juthamanee demonstrated the confusion that can occur from Thai tonal differences (21). Low tones and rising tones can lead to a high degree of confusion. Particularly in cases of severe sensorineural hearing loss, ambivalence in speech recognition is found from low tones into

Table 5. The means and standard deviations of the SRS of the KKU lists and the OTL (without the SRS from RAMA SD-1 (list 1))

		Mean±SD		Min		Max		Significant level
		Words counted	Word %	Words counted	Word %	Words counted	Word %	
Normal hearing	Totals	24.73±0.51	98.92±2.03	23	92	25	100	0.131
	OTL	24.68±0.53	98.58±2.23	23	92	25	100	
	KKU lists	24.79±0.47	99.16±1.88	23	92	25	100	
Moderate hearing loss	Totals	20.58±1.66	82.33±6.66	17	68	24	96	< 0.001
	OTL	20.94±1.67	83.10±6.71	17	68	24	96	
	KKU lists	20.14±1.55	80.57±6.21	17	68	23	92	
Moderately severe hearing loss	Totals	16.89±1.80	67.56±7.17	12	48	22	88	< 0.001
	OTL	17.18±1.83	67.68±7.32	12	48	22	88	
	KKU lists	16.53±1.72	66.11±6.77	12	48	20	80	
Severe hearing loss	Totals	10.15±3.42	40.58±13.68	4	16	19	76	< 0.001
	OTL	10.45±3.45	40.47±13.32	5	20	19	76	
	KKU lists	9.76±3.36	39.05±13.43	4	16	18	72	

The statistical significance level was $p < 0.05$
KKU list, Khon Kaen University lists; OTL, original Thai monosyllabic word lists

Table 6. The internal consistency values of the PTL and the KKU lists

	OTL	KKU lists	Totals	Significant level
Normal hearing	0.714	0.738	0.807	0.000
Moderate hearing loss	0.953	0.946	0.974	
Moderately severe hearing loss	0.938	0.950	0.947	
Severe hearing loss	0.973	0.969	0.985	
Totals	0.995	0.996	0.998	

KKU list, Khon Kaen University lists; OTL, original Thai monosyllabic word lists

Table 7. The numbers of tones in each of the KKU lists

Tones	Words			
	KKU list 1	KKU list 2	KKU list 3	KKU list 4
Flat tone	3	5	3	5
Down tone	8	8	8	7
Falling tone	9	9	9	9
High tone	3	0	3	2
Rising tone	2	3	2	2

KKU list, Khon Kaen University lists; OTL, original Thai monosyllabic word lists

flat tones, from rising tones into low tones, and from rising tones into flat tones. Lertsukprasert illustrated that children who had experienced severe sensorineural hearing loss and who used hearing aids had low speech recognition scores, especially when hearing words with low tones and rising tones. For that reason, in word lists used in speech recognition tests there should be an awareness of the numbers of words with low tones and rising tones (22) in order to balance the difficulty of guessing words. In the current study, the four KKU lists classified the tones, especially the numbers of words with similar low tones and rising tones, in each word list. Moreover, the lists were phonetically balanced (Table 7). Each word list in the KKU lists was compose of 25 words. In situations involving complicated issues, choosing two word lists for more precising test results might be considered.

The score range (min-max) at each level of hearing loss for all nine-word lists was in the standard value range (Table 8). Thus, the KKU

Table 8. The standard value of speech recognition score compared with KKU lists and OTL.

Levels of hearing (18, 19)	Speech Recognition Scores				
	Standard values (23)	KKU lists		OTL	
	Min-Max	Min-Max	Mean	Min-Max	Mean
Normal (0-25 dB)	90-100%	92-100%	99.16%	92-100%	98.74%
Mild (26-40 dB)	75-89%	-	-	-	-
Moderate (41-55 dB)	60-74%	68-92%	80.57%	68-96%	83.75%
Moderately severe (56-70 dB)	50-59%	48-80%	66.11%	48-88%	68.72%
Severe (>70 dB)	<50%	16-72%	39.05%	20-76%	41.81%

KKU list, Khon Kaen University lists; OTL, original Thai monosyllabic word lists

lists can be used when performing clinical examinations and when determining speech recognition scores.

The averages of the speech recognition scores from the KKU lists and OTL were analyzed using the paired-sample t-test. The results indicate that there were no statistically significant differences among the participants in the normal hearing groups. This result is in accord with the findings of Kasmer, who suggested that people who have normal hearing (0-25 dB HL) have speech recognition scores between 90-100 (23).

The averages of the speech recognition scores between the KKU lists and the OTL among participants who had moderate, moderately severe, and severe sensorineural hearing loss, revealed statistically significant differences. Individuals with mild sensorineural hearing loss (26-40 dB HL) were excluded due to the overlap in the range of normal hearing and moderate sensorineural hearing loss in speech recognition scores (24, 25). Additionally, when the word lists from the KKU lists and the OTL were considered, the outcomes showed that the average scores from the RAMA SD-1 (list 1) differed from the other lists: SRS scores were higher than the other word lists which were found to be equal. However, using the paired-sample t-test to recalculate the scores after removing the RAMA SD-1 (list 1) found that the average scores from the OTL had declined for all hearing levels. Comparison between before the recalculations found the speech recognition scores from the OTL and the KKU lists for the severe sensorineural hearing loss groups had a statistically significant difference ($p < 0.001$), but after recalculation there was no statistically significant difference ($p = 0.083$). This change could be due to the fact that some participants had regularly received audiometry and had previously been tested with OTL, particularly with the RAMA SD-1 (list 1), the first word list used for testing and which is more frequently used than the others. It is very likely that these participants may have been more familiar with the OTL, even though they may have previously had audiometry testing using other word lists before entering the study. In other words, the lack of homogeneity in the OTL suggests that the RAMA SD-1 (list 1) may be easier than other lists and that it could also exhibit an uneven distribution of phonetic and phonemic balance (26, 27). However, when the Mean±SD of the KKU lists and the OTL were examined for the moderate and moderately severe groups, no differences of more than four percent were found between the groups. Regarding the clinical results, the results of SRS testing demonstrated that one correct word had shown a mean of four percent, which meant that there had been no significant differences in the clinical results.

The analyses of the speech recognition scores of the participants with normal hearing and those with severe sensorineural hearing loss showed that the SRS results with both the KKU lists and OTL were in accordance with the standard values (23). However, in the groups with moderate sensorineural hearing loss and moderately severe sensorineural hearing loss, the scores did not follow the standard values.

The differences between the KKU lists and the standard values could have occurred due to the fact that some participants had regularly used hearing aid devices prior to the testing. This may have led to higher scores than those of individuals who did not wear hearing aids despite having similar hearing levels. Another factor that can affect speech recognition scores is the duration

of hearing loss and of rehabilitation (28). Participants may have had different opportunities to gain access to hearing aid devices due to their financial status and to their understanding of the importance of hearing loss rehabilitation (29, 30). According to Downs, patients who have sensorineural hearing loss and who regularly wear hearing aid devices will have significantly better speech discrimination and will require reduced effort in understanding words compared to patients who have similar hearing abilities but who do not use hearing aid devices (31).

CONCLUSIONS

The Thai monosyllabic word lists for the speech recognition test in adults (KKU lists) show phonetic balance in each word list without effects related to the order of usage. The speech recognition scores for each word list of the KKU lists and the OTL, however, tend to decrease as the level of hearing increases. This demonstrates the consistency index value regarding the accuracy of each word list with the exception of the RAMA SD-1 (list 1). Hence, when selecting word lists to determine speech recognition scores, it is advisable to refrain from using the RAMA SD-1 (list 1) due to its limitations in terms of familiarity, phonetic balance, homogeneity of words within the list and elevated SRS. The average SRS from the KKU lists were determined to be closer to the standard value than to the OTL.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to report.

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