Using Health Demonstration Videos with Sign Language to improve Health Literacy of students with hearing disability : Evidence from a try–out work

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Abstract

People with hearing impairment are among those at high risk of limited health literacy. The inability to hear and read Thai is a barrier to accessing health information and services. This becomes worse when health information is in written or audio forms. As people with hearing impairment rely mainly on a visual language, pictograms and health demonstration videos with sign language may be more appropriate. A try-out work was conducted to see the effectiveness of health materials in forms of health information posters and health demonstration videos on health knowledge and health literacy after a single brief exposure. The suitability of the health materials was also studied. Methods: a pre-test post-test design was employed. Health knowledge scores were obtained using a developed health knowledge questionnaire. Health literacy

was measured using a sign language version health literacy questionnaire of which the items were selected from the Information and Support for Health Action Questionnaire (ISHAQ) based on the content of nine health messages from Thai Health Literacy 66. Differences on health knowledge and health literacy between groups were explored with Mann Whitney U tests. The differences on suitability of the health materials were explored using Wilcoxon Signed Rank tests. The significance level was at .05. Results: Both the poster and video groups improved the scores on health knowledge and health literacy after viewing the health materials. The health knowledge and health literacy scores after viewing the materials of both groups were not statistically significant (U = 163.5, p = .318, U = 147.5, p =.155 respectively), although the video group had higher health knowledge and health literacy scores at the post-test compared with those of the poster group. Although more participants rated higher for the videos on seven out of nine aspects, there were only three aspects on which the videos received more suitability scores as it was statistically significant. Those include content topics (Z=-2.355, p=.019), captions (Z=-2.065, p=.039), and motivation (Z=-2.27, p=.023). Conclusion: This try-out work found that both the health information posters and health demonstration videos with sign language could similarly improve health knowledge and health literacy with a single brief exposure. The videos with sign language seemed more suitable for students with hearing impairment. Further studies can look at effects of different forms of materials for multiple exposures on health knowledge and health literacy.

Key words: students with hearing impairment, hearing disability, health knowledge, health literacy, health demonstration video, sign language, health information poster

■ Introduction

According to the disability statistics report 2017 from the department of Empowerment of Persons with Disabilities (DEP), there were 330,488 Thai citizens registered as living with a hearing disability, the second most prevalence of disabilities following physical disabilities[1]. The Integrated Conceptual Model for Health Literacy proposed by Sorensen et al.[2] shows that being health literate requires more than accessing health information but also understanding and utilizing health information to appraise and use health-related information to maintain and improve health[2]. International studies have found that people with a hearing disability are among those at high risk of inadequate health literacy[3]. They often face language barriers to health care and other factors that contribute to increased risks for poorer health outcomes than the general population[4-6]. Moreover, it has been reported that they make more general practitioner appointments, are not satisfied with communication with health care providers, do not receive enough preventative health

information, have difficulties understanding health information in print, accessing health services and understanding treatment-related procedures[7]. As people with a hearing disability mainly rely on a visual language that does not have a written form[8-9], written health materials increase the risk of misunderstanding and misusing health information, particularly if the reader is not literate in reading Thai. This can have negative effects on how people with a hearing disability use new health information in making decisions related to their health and preventive care. If health information is in inaccessible forms or difficult to understand, one might be unable to appraise and apply this health information in all health domains. The abilities to access, understand, appraise and apply are the crucial components of one's health literacy. The Department of Health by the Office of DoH 4.0 and Health Literacy realizes that there are needs to develop effective health information materials that are accessible in easy-to-understand formats to benefit people with hearing disabilities. Therefore, four clip video demos with sign language of three minutes each were created based on Thai Health Literacy 66 (66 basic health messages). The videos, however, have not been tried out for the effectiveness on knowledge and health literacy.

■ Objectives

The present study aims to try out two forms of health materials: posters and videos with sign language with potential target groups with hearing disability. The study would demonstrate how they would affect health knowledge and health literacy after a single brief exposure to the materials for the first time. The suitability of the materials as perceived by the participants was also considered.

■ Methods

A pre-test–post-test design was used to see how effective the interventions were to change knowledge and health literacy regarding the content of the health information provided. Focus group discussions were facilitated to allow the participants to share and discuss levels of suitability and usefulness from their perspectives when viewing the health information materials.

● Sampling strategy

The working group recruited potential participants through non-probabilistic purposeful sampling. Potential participants for this try-out work would have hearing disabilities and be studying in the secondary school classes. The school for the deaf in Nonthaburi province was chosen as it was closest to the ministry of Public Health. It was more convenient for both the participants and the working group

members to coordinate, manage and travel. Given that this is a try-out work, the number of participants was limited to fit the budget and did not represent the deaf population. The power to detect an effect size was not calculated as it was not the purpose of this try-out work.

● **Interventions**

Health Demonstration Videos with Sign Language

Nine messages of Thai Health Literacy 66 were selected by the working group. The working group consisted of two public health technical officers, two specialists in health communication and media, a person with several year experiences working with deaf people, a deaf person who could write and read Thai and a sign language interpreter. The messages were used to design a one day in a life story of a person with a hearing disability (Figure 1). The aim of incorporating the health messages in a one day story was to demonstrate how health information could assist making health related decisions and what actions could be done accordingly. The making of videos followed the steps in adapting source materials to film for deaf audiences suggested by Pallard et al.[10]. People with hearing disabilities, who used health materials following these steps, reported that the content was more relevant, engaging and effective. There were four videos of three minutes each. They were put in an order based on a routine daily lifestyle[10].

Health Information posters

The messages from the Thai Health Literacy 66 were presented in small posters with pictures and captions for easy understanding. There were nine posters depicting the nine messages as used for the health demonstration videos with sign language.

● **Measures**

Health knowledge

Health knowledge on specific conditions is related both to performance on tests of health literacy and health[11]. In this try – out work, it was assessed with a questionnaire developed by the working group. Word difficulty of the questionnaire was assessed by two deaf people who could read and write Thai. It comprised 10 questions that assessed knowledge of specific facts related to the contents of the videos and posters. The questions did not require substantial reading or numeracy skills. The students had to choose the right answer from three choices of each question. A sign language interpreter translated the questions to sign language. The students in the same intervention group answered the same question at a time. The assessment was administered at the baseline and immediately after viewing the materials. The maximal score was 10 and minimal was 0 points.

Health Literacy

Health literacy was assessed

Figure 1 Health Demonstration Videos with sign language

using the Information and Support for Health Action Questionnaire (ISHAQ); version sign language videos developed by the Health System Research Institute (HSRI). ISHAQ has been tested to be a valid and reliable tool for identifying strengths and weaknesses for health literacy needs[12]. As health literacy is context and content specific, the working group selected the items from ISHAQ that contained skills, knowledge and attitude related to the selected messages. The questionnaire contained 21 items (Table 1). The students chose a number from 1 to 10 that indicated their thought the most for each item. 1 referred to most disagree and 10 referred to most agree. The assessment was administered at the baseline and immediately after completing the health knowledge assessment. The scores on health literacy obtained from the questionnaire did not reflect the individual overall health literacy as a number of specific items were selected to fit the content of the health materials.

Suitability of health materials

An adapted version of the Suitability Assessment of Materials (SAM) was developed by the working group. It is a rating scale questionnaire to assess suitability of specific aspects of materials for target populations. The scales included 0=inadequate, 1=adequate and 2=superior for nine aspects. Those were purpose, content topics, vocabulary, writing styles, graphics, captions, sentence construction, motivation, and cultural appropriateness. The students chose a scale that fit their opinions the most. The scales were 0=not appropriate, 1=appropriate and 2=very appropriate. A sign language interpreter translated the texts to sign language. The students in the same intervention group did the questionnaire

moving from an aspect to the next at a time. The assessment was done after the two groups completed the health knowledge and health literacy assessment after viewing the materials.

● **Data collection procedure**

The working group members explained the study purpose and procedures to the participants through sign language interpreters. The participants were asked to raise questions related to the procedures. Then they signed on the informed consent to voluntarily participate in the try–out work. Next, the participants were instructed to;

1. do a pre–test on health knowledge and health literacy
2. count one or two that indicated which group they would be in
3. view the health materials (those viewing the posters spent a minute on each poster)
4. do a post – test on health knowledge and health literacy
5. view the health materials from the other group
6. give scores on the suitability of the health demonstration videos with sign language and health information posters and reflect on the health materials. The items for the assessments of the pre–test were the same for the post – test.

● **Data analysis**

Mann Whitney U tests were performed to compare the mean scores on health knowledge and health literacy between groups. Wilcoxon Signed–Rank tests were used to compare differences in the suitability scores on nine aspects of the two forms of materials. The Mann Whitney U tests were chosen because some health knowledge scores were not normally distributed and the health literacy scores were considered as an ordinal variable. The Wilcoxon Signed–Rank tests were chosen because the suitability scores were considered as an ordinal variable. The suitability scores of the posters and videos were collected from the same participants. The differences were perceived statistically significant at a significance level of .05.

■ Results

There were forty students participating in this try–out work. The participant's characteristics are shown in Table 2. There were small differences in characteristics between groups. The health information poster group (poster group) had more males than the health demonstration video group (video group). The video group had more m.3 participants, but fewer m.2 compared with the poster group.

The health knowledge and health literacy scores are described in Table 3. The health knowledge scores at the pre–test of the video group was significantly higher than that of the poster group ($U = 124.5$, $p = .039$).

Table 1 Health messages and Health literacy items

Health messages taken from Thai Health Literacy 66	Health Literacy items taken from the ISHAQ
1. We should eat well-cooked food, use serving spoons and wash hands 2. We should drink 6 – 8 glasses of water and have a variety of meats, vegetables, rice and fruits without taking supplements 3. We should keep the environment clean by reducing garbage, foam food containers and plastic bags. Instead, we should choose right food containers for hot food and use fabric bags.	1. You can easily buy healthy food near your home or workplace
	2. You choose to eat food that is good for your health
	3. You know which foods benefit or harm your health
4. should stand up and have a walk to change postures in every 2 hours as it improves health 5. We can prevent or avoid office syndrome by taking a break from looking at the computer screen and stretching your arm and leg muscles in every hour for 1 – 10 minutes	6. You can manage barriers to exercise
	7. It is easy for you to access good places for exercise
	8. Every day you exercise until you breathe quickly
	9. You know how much exercise you should do each week
	10. You choose types of exercise that are suitable for you
	11. You know how to motivate yourself to exercise
6. We should take good care of our oral health by brushing the teeth with fluoride toothpaste, for at least 2 minutes twice a day and avoiding food for 2 hours after brushing the teeth	12. You still take good care of your health even when your health and daily activities are as usual
7. We should clean the chopping board by washing, exposing it to the sunlight to prevent fungi and keeping it at a 60 cm height from the floor. We should have separate chopping boards from raw food, cooked food and vegetables and fruits	
8. We should wear a helmet, fasten the seat belt and drive under the speed limit. When feeling tired, sleepy or drunk, do not drive	13. you can travel outside home safely
	14. You know ways to travel about safely
	15. it is easy for you to go out for a particular purpose
9. We should read and check up on information before deciding what health services, health products and herbs we would get. We should look for the certification of Goods Manufacturing Practice (GMP)	16. You know sources of trustworthy information about health
	17. You check up on the trustworthiness of information
	18. You only use information from sources that are trustworthy
	19. you can find information about benefits of products
	20. You know what to do to find out if information is worth trusting
	21. You know how to get trustworthy answers to health questions quickly

The health literacy scores at the pre-test were similar between both groups (U =160, p = .279). Both the poster and video groups improved the scores on health knowledge and health literacy after viewing the health materials. The poster group improved the health knowledge scores by 1.6 points and health literacy scores by 0.16 points. The video group improved the health knowledge scores by 1.0 points and health literacy scores by 0.45 points. The health knowledge and health literacy scores after viewing the materials of both groups were not statistically significant (U =163.5, p = .318, U = 147.5, p =.155 respectively), although the video group had higher health knowledge and health literacy scores at the post-test compared with those of the poster group.

Suitability of health materials

The results from the Wilcoxon Signed-Rank tests (Table 4) show that there were more participants giving higher scores for the videos on seven out of nine suitability aspects. The two aspects on which more participants gave higher scores for the posters are graphics and sentence construction. However, there were only three aspects on which the videos received more suitability scores as it was statistically significant. Those include content topics (Z=-2.355, p =.019), captions (Z=-2.065, p = .039), and motivation (Z=-2.27, p = .023).

■ Discussion

This try-out work was conducted to see how effective the interventions (health information posters and health demonstration video with sign language) were to change knowledge and health literacy of students with hearing impairment when exposed for a short time. By comparing interventions, it is better to see effects on the interested outcomes. They serve as a control condition for each other. The results of this try-out work showed that both health information posters and health demonstration videos could increase health knowledge and health literacy scores after a single brief exposure. The posters increased the health knowledge scores more than the videos. The videos increased the health literacy scores more than the poster. The increase was modest in health knowledge and health literacy. However, the post-test scores on health knowledge and health literacy were similar in both groups. When considering the suitability scores of the health materials, the videos seemed more suitable in content topics, captions and motivation.

Using pictures and drawings (with captions) to explain health information has been confirmed to enhance understanding and memorizing the content[13]. Levie and Lentz reviewed 155 studies on the effects of text

Table 2 participant's characteristics (N=40)

Characteristics		Health information posters	Health demonstration videos with sign language
Gender	Male	12	9
	Female	8	11
Education*	m.1	4	4
	m.2	4	2
	m.3	2	6
	m.4	3	2
	m.5	5	5
	m.6	2	1
	Total	**20**	**20**

* education: m.1 to m.3 refer to junior high school level 1 to 3 and m.4 to m.6 refer to senior high school level 4 to 6 of the Thai education system.

Table 3 characteristics of post-health knowledge and health literacy scores and results from the Mann Whitney U tests (N=40)

Measures	Group	N	Mean difference (before minus after)	Mean Rank	Mann – Whitney (U)	P-value
Health Knowledge	Poster	20	-1.60	18.68	163.5	.318
	Video	20	-1.00	22.33		
Health Literacy	Poster	20	-0.16	17.88	147.5	.155
	Video	20	-0.45	23.13		

illustration. They found that text illustration increased understanding in 98 percent of the experiments[14]. The posters showed the health messages with relevant pictures and the videos demonstrated how the health messages could be translated into actions with sign language. An increase in health knowledge requires understanding and memorizing the content and words used. An increase in health literacy requires not only an increase in knowledge, but self-confidence, skills, motivation[2]. Using the person who had a hearing impairment herself in the videos together with sign language to explain the actions might have motivated the students. The effect was supported by the results of this study as more participants rated higher for the videos on the motivation aspects. According to the Motivational Theory of Role modeling[15], peers who can do something better, but share a similar identity can motivate peers

Table 4 results from the Wilcoxon Signed-Rank tests on suitability aspects of health materials

Suitability aspects		N	Mean Rank	Z	p-value
purpose (video-poster)	Negative Ranks	7	10.43	-1.29	.197
	Positive Ranks	13	10.54		
	Ties	20			
	Total	40			
content topics (video-poster)	Negative Ranks	5	9.50	-2.355	.019
	Positive Ranks	15	10.83		
	Ties	20			
	Total	40			
vocabulary (video-poster)	Negative Ranks	7	10.00	-1.738	.082
	Positive Ranks	14	11.50		
	Ties	19			
	Total	40			
writing style (video-poster)	Negative Ranks	6	10.50	-1.789	.074
	Positive Ranks	14	10.50		
	Ties	20			
	Total	40			
graphics (video-poster)	Negative Ranks	11	12.36	-0.771	.441
	Positive Ranks	10	9.50		
	Ties	19			
	Total	40			
captions (video-poster)	Negative Ranks	5	10.00	-2.065	.039
	Positive Ranks	14	10.00		
	Ties	21			
	Total	40			
sentence construction (video-poster)	Negative Ranks	15	12.30	-1.089	.276
	Positive Ranks	9	12.83		
	Ties	16			
	Total	40			
motivation (video-poster)	Negative Ranks	6	10.50	-2.27	.023
	Positive Ranks	16	11.88		
	Ties	18			
	Total	40			
cultural appropriateness (video-poster)	Negative Ranks	5	9.70	-1.444	.149
	Positive Ranks	12	8.71		
	Ties	23			
	Total	40			

who might have similar goals. This is especially true for peers of underrepresented and stigmatized groups in educational and occupational settings[16].

There are limitations to consider. This try-out work did not calculate the power to distinguish differences between groups. The small number of the participants might have explained the insignificance of the differences between the poster and video groups. Other limitations include a single brief exposure and mixture of educational levels. The health materials were shown to the students one time for 10 and 12 minutes for the posters and videos respectively. The health knowledge and health literacy scores could have improved more if the participants had been exposed to the health materials for multiple times. The participants came from different educational levels. The content topics and the understandability of the content might not be equally relevant for all. As the ability to read and understand Thai words was not assessed at the pre-test, it might have played a role in differences in the Health knowledge scores. The measurement tool of health knowledge might have favored the poster groups. This is because the health knowledge questionnaire measured the facts presented in the posters and videos. The participants who could read and understand Thai texts better could have an advantage on memorizing the key words shown in the materials and could have chosen the right answers. It might have reflected the ability to read and memorize the written information rather than the ability to understand and apply the content of the health materials compared with the health literacy questionnaire.

Further studies with more structured designs can look at effects of various formats of health materials and dose responses on health knowledge and health literacy.

■ Conclusion

This try-out has given an evidence-based practice that the health information posters and health demonstration videos with sign language could similarly improve health knowledge and health literacy after a single brief exposure. However, the videos with sign language were practically more suitable than the posters.

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