

Attitudes and opinions about 360 virtual videos to relieve muscle pain and fibrosis in the neck and shoulder

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ABSTRACT

Myofascial pain syndrome (MPS) is a musculoskeletal disease that is stimulated by Myofascial trigger points (TrPs). Exercise is recognized as one of the most essential treatment interventions for people at risk of MPS. Currently, there is an inexpensive equipment available on the online market for recording 360 videos. Meanwhile, YouTube provides free services for users to upload 360 videos. Based on these advances, the VR technique to treat MPS should have a better opportunity to reach more users. The primary aim of this research was to examine the attitudes and opinions of working-age women on VR360 videos presenting content focused on relieving MPS in the neck and shoulder area by conducting simple exercises. The 20 working-age women aged 25-40 who were considered at risk of the MPS were selected as participants of this study. The questionnaires and in-depth interviews were utilized to collect the data after the participants viewed the VR360 video, during March-April 2017. The participants were extremely satisfied with the VR360 video. They strongly agree that the VR360 video makes them concentrate on the subject seen in the face rather than the normal video, feel part of the event that they were viewing and feel free to control the direction of viewing. They also agreed that the video was interesting and well-organized, while the choice of presenter, location, emotional expression, mood and tone and duration were appropriate. Working women who watched VR360 videos with content to relieve muscle pain and fibrosis in the neck and shoulder area have a positive opinion on the subject. The combination of adequate and well-designed content and lowered costs of relevant technology make VR360 videos an acceptable method of dealing with pain.

Key words: VR360, health communication, media technology, media production, attitudes

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INTRODUCTION

Background

Myofascial pain syndrome (MPS) is a common musculoskeletal disease that is induced by Myofascial trigger points.¹ Personalities at risk included the working class between 25 and 50 years. In Thailand, reports state that this problem occurs in 65 percent of personnel whose work tasks are computer-based. The syndrome is more prevalent in female patients than males. One study found that 64.3 percent of women were at risk of MPS compared to 35.7 percent of males.² The muscle stiffness can occur in many parts of the body, although it commonly occurs on the neck and back muscles.³ The main pharmaceutical treatment used are different anti-inflammatory drugs and muscle relaxants which, if used incorrectly or for a prolonged period, can cause harm.^{4,5,6} Consequently, numerous non-drug interventions have been invented to treat MPS, such as acupuncture, electrical therapy, use of heat, muscle stretching, and massage.⁷

One of the possible treatments would represent the use of virtual reality (VR) or augmented reality (AR) tools. The positive effects of including virtual reality in the training of young doctors, surgeons and medical staff have been evident for a longer period of time.^{8,9,10} VR technology is also used as a treatment of mental health problems like phobias¹¹, social anxiety¹², cognitive rehabilitation^{13,14}, PTSD^{15,16} and even for empathy trainings.^{13,17} The confirmation of neural mechanisms shared by pain and emotion and relevance of emotions in the perception of pain allows postulation of the positive effects of using VR technology in treatments for relieving pain.^{18,19,20} Immersive VR approach has been tested and confirmed as an effective treatment of the pain caused by burns^{21,22}, experimentally caused pain²³, complex

regional pain syndrome²⁴, chronic pain^{25,26} and the phantom limb syndrome²⁷, to name a few examples. The explanation of this effectiveness may lie in the role of VR as a distraction.^{21,26,28,29,30}

One study found that neck mobility was improved while the feeling of pain was weakened by providing bogus visual feedback.³¹ This suggests that VR can serve as more than just a distraction. Along with the arguments in favor of its effectiveness in dealing with motoric difficulties like the ones during the process of spinal cord injury rehabilitation³², rehabilitation of motoric difficulties after the traumatic brain injuries³³ and diverse potential applications in motoric rehabilitation in general³⁴, these findings indicate that VR could also be used in the treatment of the MPS.

People who are at risk of MPS should learn and practice stretching muscles until it becomes the norm. The training is usually composed of stretching to balance the muscles that work together in the neck and shoulder area (cervicothoracic stabilization training) including rhomboid, upper flexors, upper trapezius, serratus anterior, and pectoralis major. The principle is to stretch by using a little force and hold for a long time in the position, avoid exerting a jerk, and using appropriate stretching force to avoid injury. Williams et al. (2017) experimented with virtual reality technology to treat MPS in the neck and shoulders.³⁵ The results showed that the participants' neck disability index (NDI) decreased, along with improved ability to move the neck (cervical range of motion: ROM), with neck movements becoming more accurate.³⁵

Another study conducted by Hayashi et al. confirmed these results by showing the reduced pain in participants exposed to VR.³⁶ However, all these results were obtained from lab experiments in which the equipment was provided to participants. The major drawback in repeating these results outside of the lab is

that users must have a specific device and must download a specific program. These requirements can be too expensive for those in pain. Therefore, to transfer these results from labs to the real world, other methods that allow users to access the treatment more easily should be applied. Currently, YouTube provides free services for users to upload 360 videos. Moreover, inexpensive equipment for recording 360 videos is commonly available in the online market. Therefore, the VR technique to treat MPS should have a better opportunity to reach more users.

However, having the content available online does not mean that people will use it. Many factors related to the perceived quality of the content (or service) can affect the decision to use or avoid certain content in an online and offline environment.^{37,38,39} Since low-cost production videos can have lower quality compared to more professional videos created exclusively for the market, it is relevant to know whether persons suffering or at risk of developing MPS like them. This study investigates the perception of YouTube VR360 videos that could be used as the treatment of MPS explicitly on one of the groups at the greatest risk of developing the disorder – young working-age women.

Research objectives

To study the attitudes and opinions of dominantly young working-age women on low-cost VR360 videos focused on relieving muscle pain and fibrosis in the neck and shoulder area.

Research questions

What are the opinions of women at risk of MPS on the VR360 video containing exercises focused on relieving muscle pain due to fibrosis in the neck area?

METHODS

Sample

This study adopted the purposive sampling method to collect data from 20 working-age women aged 25-40 years and who were at risk of MPS. In this study, we included women who worked in offices and use computers for majority of their working hours. None of them were diagnosed with MPS, although their working habits indicated they were at risk of developing it.² All of the invited participants accepted the invitation and participated in the study.

Instrument

Equipment for experiment

The research team created a VR 360 video with contents focused on relieving muscle pain and fibrosis in the neck area. The following seven basic positions recommended by health professionals were incorporated in the exercise demonstration with a male actor performing and encouraging viewers to conduct these exercises. The video was shot in an office room with bright light. Apart from the actor's voice, there were no music or sound effects in the video.

- 1st position: sit straight, face to the right and hold for 10 seconds, then turn back to sit straight and turn face to the left and hold for 10 seconds.
- 2nd position: sit straight, bend the chin down to the chest and hold for 10 seconds. After that, sit back straight.
- 3rd position: sit straight and bend the head to the back to look at the ceiling and hold for 10 seconds. After that, sit back straight.
- 4th position: sit straight and stretch both arms up, clasping

	hands and stretching the arms to the front. Then bend to the back to look at the ceiling and hold for 10 seconds. After that, sit back straight.		neck. Put the right hand at the left elbow and pull the elbow to the right, hold for 10 seconds. After that sit straight.
5 th position:	sit straight and stretch both arms up, clasping hands and stretching the arms to the ceiling. Then bend to the back to look at the ceiling and hold for 10 seconds.	7 th position:	sit straight, lift the right arm to the back of the neck. Put the left hand at the right elbow and pull the elbow to the left, hold for 10 seconds. After that sit straight.
6 th position:	sit straight, lift the left arm to the back of the		

Table 1 Description of video recorder and formatting used in the exercise:

Technical specifications of the camera and video	
<i>camera</i>	
make	Xiao Mi
model	MI Sphere Camera Kit
app	MI Sphere Camera
<i>video</i>	
format	H.264
resolution	2304x1152
frame rate	30 FPS

The researchers edited the VR 360 video with the Premiere Pro CS6 program and then used the Spatial Media Metadata Injector program to convert VDO files to VR360 for displaying on YouTube. VR Shinecon glasses were chosen to watch VR 360 video since they are suitable for viewing 4- to 6- inch smartphones. The cost of the camera, the application, and the goggles at the time of the study was less

than 300 USD. Although the weight of VR Shinecon glasses with a smartphone is about 0.3 kilos, which can cause a significant strain to a painful neck, our intervention was focused on women at risk rather than women with diagnosed MPS. Therefore, it serves dominantly as a method of popularizing exercises with a function to help in the prevention of MPS.



Figure 1 Xiao Mi camera were used for making the VR 360 video



Figure 2 Thumbnails of the VR 360 video



Figure 3 VR shinecon glasses used for watching the VR 360 video

The instrument for data collection

A brief screening form was used to select appropriate participants. The inclusion criteria included age (25-40 years of age), experience in using VR360 (at least one time), and attitude level towards actors (moderate). The participants reported their impressions of a video on a questionnaire created for this study, using a five-point Likert-type scale (see Appendix.). The questionnaire consisted of three groups of questions: attitudes towards the actors (five questions), VR 360 videos in general (three

questions) and MPS video created for this purpose (seven items).

After watching the VR 360 video, the participants were interviewed to collect information about their attitudes towards the viewed content without the restriction imposed by the closed-ended questions. Therefore, the interview collected data that were used in quantitative analysis (Likert-type scales) and data used for qualitative analysis (open-ended questions) to assess the attitudes of participants from multiple research perspectives, which should have resulted in deeper insights.

Procedure

A VR 360 video that contains content about loosening the neck muscles was prepared and uploaded to YouTube. After preparing the contents, participants were invited to participate in the study using social media sites and mailing lists. Participants who responded to the call were initially screened to assure that they meet the relevant criteria. All of the participants met the criteria, after which they were informed of their rights as participants and the planned procedure of watching the VR360 videos. After watching the video and conducting the presented exercises, the

questionnaire was given to participants to collect information on their attitudes using a quantitative approach. Interviews were conducted afterwards to complement the quantitative findings with qualitative statements of the participants.

FINDINGS

The sample used in this study consisted of both women with experience and those without experience in using VR360 technology, most of them being 26-30 years old (Table 2.). Also, a majority of the participants stated they had no experience with the use of VR technology.

*Participants profile***Table 2** Participants' age and their experience in watching VR 360 video

Item	Number	Percent
AGE		
20-25 years	5	25
26-30 years	12	60
31-35 years	2	10
36-40 years	1	5
Experience		
With experience	5	25
Without experience	15	75

*Participants opinion**Quantitative data*

The results presented in Table 2 provide relevant insights into the participants' attitudes towards the presented material. The descriptive data suggest that although participants generally

considered the actor attractive and amiable, they were unsure how credible and trustworthy he was. Moreover, participants did not put much trust in the actor's expertise, yet despite that, they were very satisfied with his performance.

Table 3 Participants 'attitudes towards the actor, VR 360 video, and the MPS relieving content

Item	M	SD	Interpret
Attitude towards the actors			
Credibility	3.05	0.759	Somewhat Agree
Expertise	2.65	0.745	Somewhat Agree
Trustworthiness	3.10	0.641	Somewhat Agree
Attractiveness	3.80	0.768	Agree

Item	M	SD	Interpret
Amiability	4.10	0.553	Agree
Satisfaction	4.30	0.571	Very satisfied
Attitude towards the VR 360 video			
The VR 360 video makes you concentrate on the subject seen in the face rather than the normal video.	4.35	0.587	Strongly Agree
The VR360 video makes you feel part of the event that you are viewing.	4.30	0.571	Strongly Agree
The VR 360 video makes you feel free to control the direction of viewing.	4.20	0.696	Strongly Agree
Attitude towards the appropriateness of MPS video formatting			
Interestingness	3.85	0.813	Agree
Organization	3.85	0.745	Agree
Presenter	4.00	0.725	Agree
Location	3.60	0.883	Agree
Length of Time	4.10	0.553	Agree
Emotional expression	3.65	0.745	Agree
Mood & Tone	3.90	0.641	Agree

**the scale range was 1= strongly disagree, 2= disagree, 3= somehow agree, 4= agree and 5= strongly agree*

The attitudes towards the VR 360 video were more consistent and positive, as participants generally agreed that the video focused them on the actor and that they felt like a part of the event, while at the same time being in control of what they were viewing. Regarding attitudes towards the appropriateness of MPS video formats, participants generally agreed that all of the specified components were set appropriately.

Qualitative data

3 in 4 of the participants, 20 people, were interested in health content that was designed to relaxing the muscle, while the others were interested in food and calorie calculation. Virtually all of the participants (19 participants) agreed that VR 360 video techniques were interesting and considered as 'new things'. They reported that they had felt amazing and would like to watch more VR 360 videos.

The participants said that the use of Mr. Jirayu La-ongmanee, a famous star, helped make the videos more interesting. However, some of the participants (3 participants) said that the use of Mr. Jirayu La-ongmanee did not increase their viewing appeal. One of the participants acclaimed that: *"This video is supposed to be more relaxing. The voice of Mr. Jirayu La-ongmanee doesn't help to feel relaxed"*.

12 participants admitted that their neck and shoulder muscles were tight and felt more relaxed after following the instruction in the video. One of the participants stated: *"My muscle was feeling tight. I realized clearly when I stretched my left hand, looked to the right, up and down, according to the instruction given. I am sure it helps ..."*.

7 participants said that the muscle relaxing content in the video is quite basic, which can be very attractive for beginners. More experienced users may find it not

challenging enough. They also noted that the length of the video is relatively short, while their relaxation would require more time. Although the majority of people agree that they felt encouraged to perform muscle relaxation exercises from the VR 360 video clip, they also considered that they do not need to watch the VR 360 video every time because it presents a set of basic positions that can be easily recalled without the video.

12 people agreed that the videos would be forwarded to a group of friends or published on their own online social networking site because they considered them interesting and useful in alleviating muscle pain. One of the respondents noted that: "I like watching videos with the novelty of the content and like the nature of the Mr. Jirayu La-ongmanee that look and feel fun. Not too serious to watch videos".

CONCLUSION AND DISCUSSION

Working women exposed to VR 360 videos with content to relieve muscle pain and fibrosis in the neck and shoulder agreed that the content of videos was appropriate for them and motivated them to complete the exercises. According to qualitative data, the prepared contents made them focus on the image in front of them more than watching a normal video, which made them feel as having more control over the perspective. In line with the previous studies^{35,36}, the patients reported relaxation of neck muscles after completing the video. The VR 360 video technology, therefore, could create a message that improves the conditions of MPS patients while making the content more interesting.

The qualitative feedback provided by the participants who stated that the exercises helped them in alleviating muscle pain indicated that next to just distraction^{21,26,27}, there can be other factors

related to VR 360 videos that may allow their positive effects on pain.³⁰ One of the factors includes conducting an actual exercise in reality while mentally being present in a pleasant and encouraging environment. VR 360 can also create an illusion of group exercises, which can also enhance the performance of VR users due to social motives.^{40,41,42} This study also discovered that presenters are important factors for making VR360 videos. Many participants agreed that the use of Mr. Jirayu La-ongmanee, a famous actor, helped increase the interest and invited them to see more than ordinary persons who are not famous. Therefore, it can be deduced that the actors affected the working women's attitude towards watching VR 360 videos.

This is consistent with Zia et al. who established that one of the factors that affect the success of mass communication is the use of influential people.⁴³ On the downside, although participants generally had a positive opinion of the actor, they did not consider him a very credible source. This might have undermined slightly their motivation to participate in the exercises, so in future videos, except they are aimed to be informal, the use of more credible actors might yield stronger effects. People are more likely to follow credible sources and buy their products⁴⁴ or have positive opinions on them⁴⁵, which may, in turn, boost the efficacy of videos as people may more precisely follow the instructions.

Although this study confirmed that the VR 360 videos can be an effective tool in motivating individuals to exercise in order to lower muscle pain, it also pointed out that there is still some space left for improvement. One potentially relevant limitation of this study is related to the lack of quantitative measure of the extent to which muscle pain had been reduced, as this would have contributed to the validity of the conclusion regarding the effectiveness of the intervention. Therefore,

we would recommend future researchers to replicate this study as a classic experiment with measurement before and after the intervention. Altogether, further validation of this approach could benefit from experimental design and use of more refined measures for relevant outcomes. The conclusion would be even stronger if one group received this treatment, while the other group watched some other VR 360 video. Moreover, it would be interesting to test the effectiveness of this approach on a broader sample which would enhance the validity of conclusions based on the observed data and make them more comparable with other studies. Finally, it would be relevant to measure the long-term efficacy of such exercise programs against other programs that presume live group exercises as this is an inevitable step in estimating the efficacy of VR 360 exercising videos in the context of exercising in general.

Altogether, working women at risk of MPS expressed a positive attitude towards all aspects of the content formats and were very satisfied with the VR360 video used in this study. Therefore, when creating the videos, it is essential to emphasize the design aspects, as they could predict the positive attitude towards the video. Taken together, positive opinion on the use of VR continually receives confirmation, with some finding it as effective as conventional exercise programs.⁴⁶ These findings open many pathways for further developments and integration of VR into both preventive and curative medical practices.

COMPETING INTERESTS

The authors declare that there is no conflict of interest.

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