EFFECTIVENESS OF GLUTEAL STRETCHING EXERCISES THROUGH TELEREHABILITATION ON GLUTEAL PAIN ON PROLONGED SITTING IN ONLINE CLASS STUDENTS OF UPH-DJGTMU

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ABSTRACT

The growing numbers of sedentary lifestyles during this pandemic has contributed to rising musculoskeletal conditions such as gluteal pain. Gluteal pain is described as a tear in one of the gluteal muscles, prolonged sitting is one of the aggravating factors of gluteal pain leading to severe discomfort in the buttocks thus weakening and wasting the gluteal muscles. The overall purpose of this study is to provide the effectiveness of gluteal stretching exercises through telerehabilitation on gluteal pain which is obtained from prolonged sitting among online class students. A quasi-experimental research design has been utilized among twenty-five (25) 2nd year nursing online class students who met the required inclusion criteria to participate in determining whether the gluteal stretching exercises through telerehabilitation is effective. The study started by collecting the pretest scores of the respondents using the Visual Analog Scale (VAS) and Lower Extremity Functional Scale (LEFS) before the researchers implemented the gluteal stretching exercise intervention for four weeks. Gluteal stretching exercise intervention which includes (1) Seated figure-four stretch, (2) Standing figure-four stretch, (3) Hip Flexion, (4) Hip Extension, and (5) Hip Abduction. The respondents were measured again after the four weeks of intervention to acquire the post-test scores using the same outcome measures. Results of the study show that in VAS score there is a significant difference between pretest and posttest scores. This indicates that the gluteal stretching exercise intervention was found effective in improving the respondents' rated pain, thus an alternative hypothesis for VAS is accepted. Additionally, the LEFS score presented no significant difference between pretest and posttest scores after the gluteal stretching exercise intervention, thus null hypothesis for LEFS is accepted. Gluteal stretching exercise is determined to be effective in relieving gluteal pain due to prolonged sitting among online class students.

Keywords: Gluteal Stretching Exercise, Prolonged Sitting, Telerehabilitation

INTRODUCTION

Prolonged sitting is a typical yet harmful activity among modern people. Even after adjusting for leisure time physical activity, greater sitting time has been linked to chronic illnesses and an increased risk of death (Thosar et al., 2014). Gluteal pain is described as a tear in one of the gluteus muscles. The gluteus maximus, gluteus medius, and gluteus minimus are the three gluteal muscles that make up each buttock. A gluteal pain occurs when one or more of these

muscles are torn. As stated by Offiong (2019), exercise is an activity that a person engages in to promote and maintain physical fitness and overall wellness. Having active and strong glutes is immensely important to the overall health of the body, which is why Physical Therapist recommends gluteal exercises for an ample amount of reason such as for the better posture, improving your mobility and balance, reducing injuries in other areas of the body such as knees, hamstring, and lower back. (Cummins, 2020). The purpose of this study is to provide a method of intervention to individuals affected by gluteal pain caused by prolonged sitting in online class students.

LITERATURE REVIEW

Health Risks and Effects of Prolonged Sitting

The literature reviews of Dunstan et al., Baker et al., and Boukabache et al., provided substantial insights on the risk factors and effects of prolonged sitting on musculoskeletal health. According to Dunstan et al. (2012), the idea that sitting for lengthy periods of time is bad for one's health. According to Baker et al. (2018), prolonged sitting is a potential hazard for musculoskeletal health and studies revealed a link between sitting, gluteal pressure, and pain, and that sitting for 90 minutes or more causes clinically significant discomfort and lower limb discomfort. In a study conducted by Boukabache et al. (2020), it is observed that prolonged sitting reduces passive hip extension by 6.1 degrees, indicating a physiological adaptation in passive muscle stiffness.

The Challenge of Musculoskeletal Pain

The literature reviews of Bergman, Tuzun, and World Health Organization provided substantial insights on the challenges of musculoskeletal pain. A study conducted by Bergman (2007), musculoskeletal diseases affects the ability of a person to perform and participate in the society and is the main reason for long-term sick leave. According to a study conducted by Tuzun (2007), aside from the physical health consequences of musculoskeletal pain, it can also affect an individual's emotional and social well-being. In a research conducted by World Health Organization (2015), musculoskeletal disorders become more common and have a greater impact as people get older. Musculoskeletal disease is a major problem in both developed and developing countries.

Effects of Exercises on Health and Musculoskeletal Pain

The literature reviews of Horst et al, Gisella, Musumeci et al., Roberts, and Justesen et al., provided substantial insights on the effects of exercises on musculoskeletal health and pain. According to Horst et al. (2007), physical exercise throughout childhood and adolescence is also essential for establishing and maintaining appropriate bone strength, as well as for normal skeletal development. According to a study conducted by Gisella, physical exercises are beneficial to one's health providing health-promoting outcomes such as maintaining and strengthening muscle strength, endurance, and resilience. Furthermore, a study by Musumeci et al. (2018), stated that physical exercise may aid in the therapy of musculoskeletal issues by increasing physical and mental health and decreasing fatigue. A musculoskeletal training program attempts to stimulate bone turnover, improve functional joint stability, build muscular strength and endurance, improve balance, decrease pain, and reduce health risks associated with a sedentary lifestyle. The benefits of exercise on physical restriction and fatigue in musculoskeletal issues seem to be beneficial in both the short and long term. Additionally, physical exercise is linked to lower mortality and better health outcomes. In

addition, Roberts Wilson (1999), conducted an investigation regarding the effect duration of two stretching exercise in the lower extremity with the same total amount of time spent in a stretched position. One group performed the stretch for five seconds and nine repetitions while the other group performed the stretch for fifteen seconds and three repetitions. After five weeks of training, both treatment groups showed substantial improvements in active and passive ROM. According to a study conducted by Justesen et al. (2017), strength training has been shown to be useful in lowering musculoskeletal pain in the upper extremities. Additionally, physical exercise is linked to lower mortality and better health outcomes.

Telerehabilitation as a Medium for Treatment

The literature reviews of Brennan et al., Peretti et al., Havran et al., Seron et al., Cottrell et al., and Marti et al., provided substantial insights on telerehabilitation as a medium for treatment. According to Brennan et al. (2021), telerehabilitation is used to provide services to clients in their homes or other living conditions. Telecare empowers and enables individuals to take charge of their medical needs and treatments by offering individualized care, choice, and personal control. According to Peretti et al. (2017), telerehabilitation was developed to care for inpatients by relocating them home following the acute phase of an illness in order to reduce patient hospitalization times and costs to both patients and health care providers. Telerehabilitation treats acute diseases by substituting a face-to-face technique in the patient-rehabilitator interaction for the traditional face-to-face approach. Finally, it may be employed in circumstances when patients find it difficult to go to traditional rehabilitation centers that are located a long distance away from where they live.

According to Havran et al. (2021), virtual PT provides convenient, high-quality treatments with benefits equivalent to conventional kinds of health care services. The advantages of virtual PT include offering access to PT services at the patient's desired location, better serving those who may be geographically isolated, reducing travel distance, and allowing for more rapid responses to treatment. Additionally, it allows other health-care advocates to participate. Also to improve care follow-up while lowering societal expenditures. According to a study conducted by Seron et al. (2021), the goal of the study was to use Telerehabilitation, a subset of telemedicine, to use technology to communicate with patients in order to extend rehabilitation, improve accessibility, and provide continuous health care, particularly in terms of physical therapy, to the community, particularly during this pandemic. According to Cottrell et al. (2017), real-time telerehabilitation seems to be equally effective as standard healthcare delivery systems in improving physical function and pain in a variety of musculoskeletal diseases, according to the researchers. According to Marti et al. (2017), in patients with neurological and musculoskeletal problems, telerehabilitation produces favorable clinical effects that are comparable to traditional face-to-face rehabilitation treatments in terms of physical function, with very low to moderate-high evidence.

METHODOLOGY

Research Design

A quasi-experimental research design was utilized in this study. Through the use of this type of research design, the data acquired helped the researchers to numerically compare the pretest and post test scores of the 25 respondents who were able to complete the program to determine the effectiveness of the gluteal stretching exercise intervention in 2nd year nursing students of UPH-DJGTMU.

Participants, Inclusion and Exclusion criteria

The study consisted of 34 2nd-year nursing online class students of which 24 were able to complete the intervention for four weeks with the ages ranging from 19-21 years old who met the inclusion and exclusion criteria during the screening procedure. The inclusion criteria included the following: (1) Experiencing gluteal pain due to prolonged sitting; (2) A score of less than 12 in S-LANSS; (3) 2nd year nursing online class students of UPH-DJGTMU who are sitting for at least 90 minutes or more during class hours; (4) With a VAS pain intensity ranging from mild pain (5-44mm) to severe pain (75-100mm); (5) Can follow simple instructions; (6) Willing to do gluteal stretching exercises intervention; (7) Experiencing gluteal pain from prolonged sitting from the last six months; (8) Age ranging from 17-25 years old; (9) Patients who will provide informed consent and are willing to participate in the study. On the other hand, the exclusion criteria will included the following: (1) Neuropathic pain; (2) A score of 12 or more in S-LANSS (3) Less than 90 minutes of sitting during class hours; (4) A VAS pain intensity of no pain (0-4mm); (5) Age older than 25 years; (6) Cannot follow simple instructions.

Instrumentation and Validation

For assessing the selected respondents condition, the standardized questionnaire Self-Administered Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) was used it is a seven item questionnaire that will determine if a respondent is experiencing nociceptive pain if total score on this questionnaire is less than 12. On the other hand, to gather the pretest and posttest scores of the respondents in terms of rated pain and lower extremity functions, the research used standardized questionnaires such as the Visual Analog Scale (VAS) and the Lower Extremity Functional Scale (LEFS).

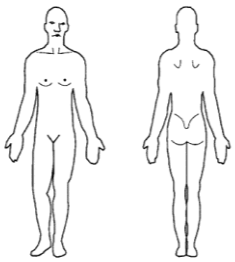
APPENDIX

THE S-LANSS PAIN SCORE

Leeds Assessment of Neuropathic Symptoms and Signs (self-complete)

NAME_____ **DATE**_____

- This questionnaire can tell us about the type of pain that you may be experiencing. This can help in deciding how best to treat it.
- Please draw on the diagram below where you feel your pain. If you have pain in more than one area, **only shade in the one main area where your worst pain is.**



- On the scale below, please indicate how bad your pain (that you have shown on the above diagram) has been in the last week where:
'0' means no pain and '10' means pain as severe as it could be.

NONE 0 1 2 3 4 5 6 7 8 9 10 **SEVERE PAIN**

- On the other side of the page are 7 questions about your pain (the one in the diagram).
- Think about how your pain that you showed in the diagram has felt **over the last week.** Please circle the descriptions that best match your pain. These descriptions may, or may not, match your pain no matter how severe it feels.
- Only circle the responses that describe your pain. **Please turn over.**

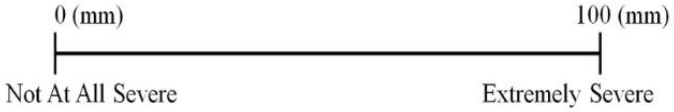
S-LANSS

1. **In the area where you have pain, do you also have 'pins and needles', tingling or prickling sensations?**
   a) NO – I don't get these sensations (0)
   b) YES – I get these sensations often (5)
2. **Does the painful area change colour (perhaps looks mottled or more red) when the pain is particularly bad?**
   a) NO – The pain does not affect the colour of my skin (0)
   b) YES – I have noticed that the pain does make my skin look different from normal (5)
3. **Does your pain make the affected skin abnormally sensitive to touch? Getting unpleasant sensations or pain when lightly stroking the skin might describe this.**
   a) NO – The pain does not make my skin in that area abnormally sensitive to touch (0)
   b) YES – My skin in that area is particularly sensitive to touch (3)
4. **Does your pain come on suddenly and in bursts for no apparent reason when you are completely still? Words like 'electric shocks', jumping and bursting might describe this.**
   a) NO – My pain doesn't really feel like this (0)
   b) YES – I get these sensations often (2)
5. **In the area where you have pain, does your skin feel unusually hot like a burning pain?**
   a) NO – I don't have burning pain (0)
   b) YES – I get burning pain often (1)
6. **Gently rub the painful area with your index finger and then rub a non-painful area (for example, an area of skin further away or on the opposite side from the painful area). How does this rubbing feel in the painful area?**
   a) The painful area feels no different from the non-painful area (0)
   b) I feel discomfort, like pins and needles, tingling or burning in the painful area that is different from the non-painful area (5)
7. **Gently press on the painful area with your finger tip then gently press in the same way onto a non-painful area (the same non-painful area that you chose in the last question). How does this feel in the painful area?**
   a) The painful area does not feel different from the non-painful area (0)
   b) I feel numbness or tenderness in the painful area that is different from the non-painful area (3)

Scoring: a score of 12 or more suggests pain of predominantly neuropathic origin

Visual Analog Scale (VAS)

Note how severe you feel your disease state is with a mark (|) on the line below.



Lower Extremity Functional Scale (LEFS)

Activities		*Exteme Difficulty or Unable to Perform Activity*	*Quite a Bit of Difficulty*	*Moderate Difficulty*	*A Little Bit of Difficulty*	*No Difficulty*
a.	Any of your usual work, housework, or school activities.	0	1	2	3	4
b.	Your usual hobbies, recreational or sporting activities.	0	1	2	3	4
c.	Getting into or out of the bath.	0	1	2	3	4
d.	Walking between rooms.	0	1	2	3	4
e.	Putting on your shoes or socks.	0	1	2	3	4
f.	Squatting.	0	1	2	3	4
g.	Lifting an object, like a bag of groceries from the floor.	0	1	2	3	4
h.	Performing light activities around your home.	0	1	2	3	4
i.	Performing heaving activities around your home.	0	1	2	3	4
j.	Getting into or out of a car.	0	1	2	3	4
k.	Walking 2 blocks.	0	1	2	3	4
l.	Walking a mile.	0	1	2	3	4
m.	Going up or down 10 stairs (about 1 flight of stairs).	0	1	2	3	4
n.	Standinf for 1 hour.	0	1	2	3	4
o.	Sitting for 1 hour.	0	1	2	3	4
p.	Running on even ground.	0	1	2	3	4
q.	Running on uneven ground.	0	1	2	3	4
r.	Making sharp turns while running fast.	0	1	2	3	4
s.	Hopping.	0	1	2	3	4
t.	Rolling over in bed.	0	1	2	3	4
Column Totals:						

Evaluation and Scoring

To determine the respondents' level of gluteal pain from prolonged sitting due to online class, the visual analog pain scale (VAS) was used. In addition, to determine the functionality of the respondents' lower extremity when it comes to activities of daily living, the lower extremity functional scale (LEFS) was also used.

Interpretation of scores in VAS from the 100mm line can be classified as:

Pain Intensity	**Score range**
No pain	0-4 mm
Mild pain	5-44 mm
Moderate pain	45-74 mm
Severe pain	75-100 mm

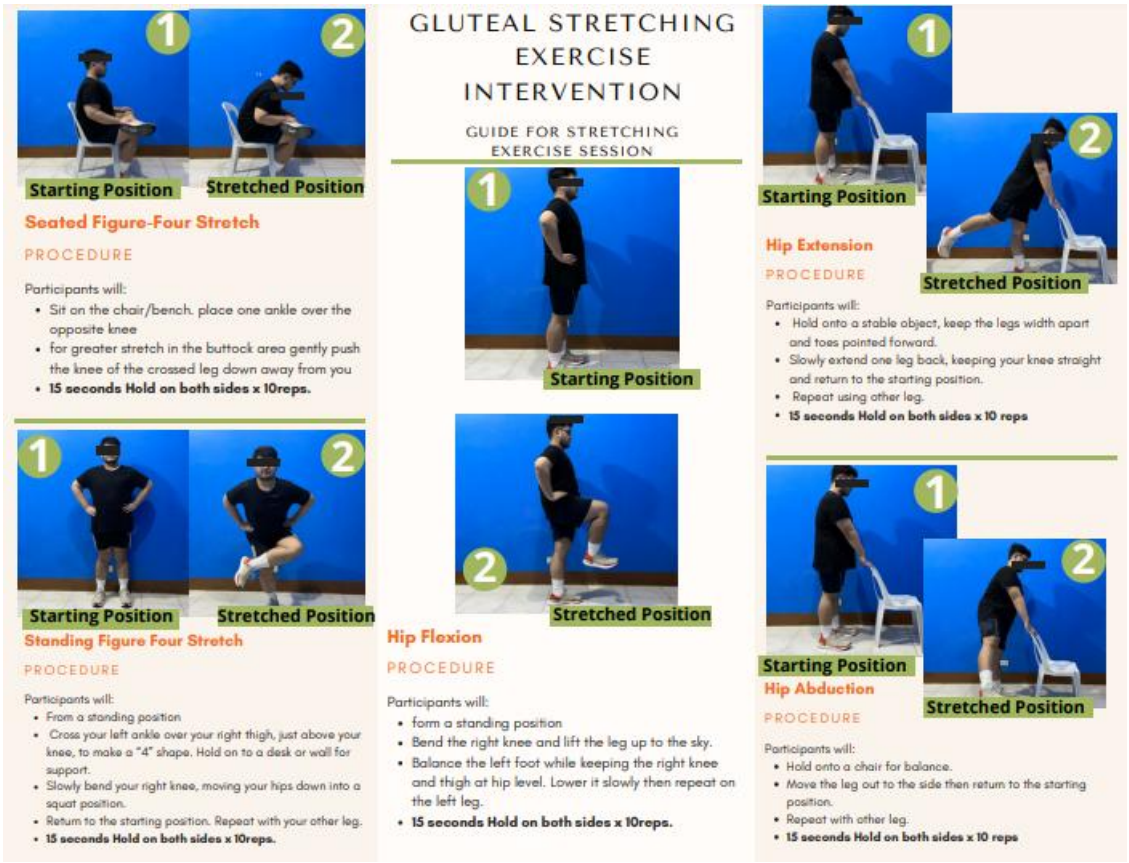
Lower extremity function is scored by:

Perceived function	Points
Extreme Difficulty or Unable to Perform Activity	0
Quite a Bit of Difficulty	1
Moderate Difficulty	2
A Little Bit of Difficulty	3
No Difficulty	4

Total points	Interpretation
Maximum score of 80	Very High Function
Minimum score of 0	Very low Function

Interventions

The exercises that were performed in the intervention included the following: (1) Seated figure-four stretch, (2) Standing figure-four stretch, (3) Hip Flexion, (4) Hip Extension, and (5) Hip Abduction. All stretching exercises had perimeters of holding the stretch for 15 seconds for 10 repetitions with a 10 second rest between each set. This gluteal stretching exercise intervention was distributed through Facebook Messenger in a PDF format that served as a guide for the respondents. These gluteal stretching exercises were performed via telerehabilitation using Google Meet which was done three times a week, synchronously.



Statistical Treatment of Data

To perform the statistical treatment, the averages of the respondents' VAS and LEFS score was obtained. Paired sample T-test was used to analyze data to numerically compare the pretest and posttest scores in terms of the respondents' rated pain and lower extremity functions.

RESULTS

The profile of the respondents in terms of age and amount of hours spent sitting has been presented in Table 1. Within the data presented, results showed that the 21-year-old age group represents the smallest group of the study at 16%, and the 20-year-old age group represents the most at 52%. Concerning the number of hours sitting, it was found that a six-to-seven hour duration was the most infrequent at 8%. Durations of two to three hours and four to five hours were both the highest with 32%. Moreover, Table 2 shows the pretest scores of the respondents before the implementation of the gluteal stretching exercise program. Data gathered revealed that moderate pain is the most common rated pain experienced having a frequency of 13, mild pain having a frequency of 10 indicates that it is 2nd most common rated pain and severe pain is the least experienced with a frequency of two (2) and the mean rated pain is 44.60 (moderate pain) with a standard deviation of (SD= ±19.33), On the other hand, the pretest values of the respondents' Lower Extremity Functional Scale (LEFS) shows that the minimum score is 43 and the maximum score is 80, having a mean of 70.84 with a standard deviation of (SD= ±10.08). The post test scores of the respondents were described in Table 3.

Within the data presented, it is observed that the most common rated pain is mild, having a frequency of 13 and nine (9) respondents experienced no pain and the least experienced pain is moderate, with a frequency of three (3) and the mean rated pain is 15.60 (mild pain) with a standard deviation of (SD= ±17.52). Meanwhile, the posttest values of the respondents' Lower Extremity Functional Scale (LEFS) shows that the minimum score is 31 and the maximum is 80, having a mean of 73.32 and a standard deviation of (SD= ±10.51). Comparison of pretest and post test scores were presented in Table 4. Statistics showed that , the respondents' mean VAS score before the exercise program is 46.60 and their mean VAS score after the exercise program is 15.60, having a computed t - value of 7.066 signifying that there is a significant difference on the respondents' VAS score before and after the treatment. On the other hand, the respondents' mean LEFS score before the exercise program is 70.84 and their LEFS score after the exercise program is 73.32, implying that they have a consistent high function when it comes to lower extremity activities. It has a computed t - value of -.961 signifying that there is no significant difference on the LEFS score before and after the exercise program.

Table 1. Respondent's Profile

	Frequency	Percentage
AGE		
19 years old	8	32
20 years old	13	52

21 years old	4	16
TOTAL	**25**	**100**
NUMBER OF HOURS SPENT SITTING		
2-3 hours	8	32
4-5 hours	8	32
6-7 hours	2	8
8 hours and above	7	28
TOTAL	**25**	**100**

Table 2. Respondent's VAS and LEFS Score Before the Exercise Program

VAS	**FREQUENCY**
No pain	0
Mild pain	10
Moderate pain	13
Severe pain	2
Mean rated pain score	44.60
STD DEVIATION	19.33

LEFS SCORE	**VALUE**
Minimum	43
Maximum	80
Mean	70.84
STD DEVIATION	10.08

Table 3. Respondent's VAS and LEFS Score After the Exercise Program

VAS	**Frequency**
No pain	9
Mild pain	13
Moderate pain	3
Severe pain	0
Mean rated pain score	15.60
STD DEVIATION	17.52

LEFS SCORE	**VALUE**
Minimum	31
Maximum	80
Mean	73.32
STD DEVIATION	10.51

Table 4. Difference Between the Respondent's VAS and LEFS Score Before and After the Exercise Program

Profile	Statistical Test	Mean	Test Statistics	Sig	Interpretation
VAS Score					
Before the treatment	Paired sample t-test	46.60	t = 7.066	0.000	Significant
After the treatment		15.60			
LEFS Score					
Before the treatment	Paired sample t-test	70.84	t = -.961	0.346	Not Significant
After the treatment		73.32			

DISCUSSION

In this study which aimed to determine the effectiveness of gluteal stretching exercise, it was hypothesized that the gluteal stretching exercise will not produce difference on the respondents' rated pain and lower extremity functions. To ascertain this data, three (3) research questions were raised and by the use of standardized questionnaire before and after the program, statistical data was later then compared. The first question focused on knowing the respondents' rated pain and lower extremity functions prior to implementation of the gluteal stretching intervention, which revealed that the respondents' gluteal pain before the gluteal stretching exercise intervention ranged from mild pain to severe pain with a mean VAS score of 44.60. On the other hand, the respondents' LEFS score has a mean value of 70.84, indicating that their lower extremity is close to very high function. The second question asked was targeted to know the post test scores of the respondents' rated pain and lower extremity functions after the implementation of the gluteal stretching exercise intervention which shows that the respondents' gluteal pain before the gluteal stretching exercise intervention ranged from mild pain to severe pain with a mean VAS score of 44.60.

On the other hand, the respondents' LEFS score has a mean value of 70.84, indicating that their lower extremity is close to very high function. The third question aims to compare the pre test and post test scores of the respondents' rated pain and lower extremity functions, results show that in VAS score there is a significant difference between pretest and posttest scores. This indicates that the gluteal stretching exercise intervention was found effective in improving the respondents' rated pain, thus an alternative hypothesis for VAS is accepted. Additionally, the LEFS score presented no significant difference between pretest and posttest scores after the gluteal stretching exercise intervention as the baseline data showed that it was already high to begin with and the gluteal stretching exercise did not produce any difference, thus null hypothesis for LEFS is accepted. Previous studies have shown the importance of physical activity as concluded by the study of Horst et al. (2007), stating that physical activity

throughout childhood and adolescence is vital for achieving and maintaining optimal bone strength, as well as contributing to proper skeletal growth, while the study of Gisella (2017), states that physical activity has shown to provide pain-relieving properties, that it should be part of one's daily routine. Furthermore, the study revolved in providing a mix of stretching exercises through telerehabilitation that was aimed to target the muscles involved in prolonged sitting, specifically in the gluteal region. The pain experienced was assessed using the Visual Analog Scale (VAS score), while the functionality of the lower extremity was evaluated using the Lower Extremity Functional Scale (LEFS), the exercise program was given once a day after the participating students were sitting for at least 90 minutes from online classes. The study affirmed that stretching exercise does provide benefits when it comes to prolonged sitting in terms of improving pain experienced in the gluteal area which is brought by online classes as it was shown that the pain experienced after participating in the program for four weeks was lessened. Meanwhile, it was found that the said stretching exercises did not give any advantages in terms of lower extremity functions as it was seen that the respondents have an already high functioning lower extremity even before the exercise. By using a different outcome measure in evaluating the lower extremity functions of future respondents, future researchers may find more success in discovering new results.

CONCLUSIONS

Durations of two to three and four to five hours were the most amount of time spent sitting that influenced the respondents' rated pain. Additionally, the amount of time spent sitting did not affect their lower extremity functions as their LEFS scores remained consistent. Prolonged sitting affected the respondents' Visual Analogue Scale (VAS) scores. Meanwhile, it did not affect the respondents' Lower extremity functions as their LEFS scores suggested that they have high function. Findings of the study have shown that gluteal stretching exercise intervention was an effective intervention in decreasing the rated pain of the respondents, additionally, gluteal stretching exercise intervention does not show significant difference when it comes to the respondents' lower extremity functions. Visual Analog Scale (VAS) showed significant improvement between the pretest and post-test scores of the participants after participating in the gluteal stretching exercise intervention, while the Lower Extremity Functional Scale (LEFS) did not yield significant changes as suggested by the pretest and posttest scores of the respondents after participating in the gluteal stretching exercise intervention. The researchers, therefore, conclude that gluteal stretching exercise is effective in gluteal pain due to prolonged sitting among online class students.

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