ANTENATAL EXERCISE PROGRAMME USING MOTION-BASED GAMES: A PILOT STUDY AMONG EXPECTANT MOTHERS IN SELECTED RURAL AREAS IN THE PHILIPPINES

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Abstract

A structured exercise programme was designed that incorporates motion-based video games to decrease anxiety and depression among pregnant women. A pilot study determined its viability. Methods: A 2-group pre- post-test experiment was done on 16 pregnant women who met study criteria. Eight underwent the structured exercise programme twice a week for a month (intervention), and eight did not (control). The State Trait Anxiety Inventory (STAI) and the Hospital Anxiety and Depression Scale (HADS) were adapted and used to determine participants' anxiety and depression scores, respectively. Results: Significant improvement in the participants' mean anxiety 48.50 to 42.88 (p=0.029) and depression 11.50 to 7.63 (p=0.022) scores were found after the exercise programme. No changes were noted in the control group, HADS (p=0.196) and STAI (p=0.714) confirming the strength of the scores of the experimental group. Conclusion: The results suggest the exercise programme can be a valid approach to decrease anxiety and depression among pregnant women. We recommend replication of this study to other geographical areas with more samples to establish generalizability.

Keywords: Anxiety; depression; antepartum; exergames; motion-based; eHealth.

Introduction

Physiological and structural adaptations during pregnancy are natural yet challenging episodes, as they are accompanied by serious health concerns and complications that can lead to changes in the mental state of some women. It has been reported that up to 19% of women experience depressive symptoms at some point during pregnancy,[1] while 17.7% manifest anxiety symptoms.[2] Pregnant women may be particularly disadvantaged, as these symptoms may interfere with their ability to self-care during pregnancy. Previous literature also emphasises that these symptoms may have detrimental effects on the foetus and newborn.[3-6]

There is substantial literature showing that exercise serves as a commendable solution to ease, if not totally eradicate, several health concerns during pregnancy. However, there are few studies about the amount and type of exercise appropriate for pregnant women. Traditionally, pregnant women have been advised to restrict intense exercise due to concerns for the health of the mother and her foetus, which include overheating, impaired delivery of oxygen and nutrients to the foetus, and premature labour. A recent study showed that many women opt to continue exercise programmes during pregnancy due to awareness of its beneficial effects on health.[7]

The increasing impact of technological advances is evident in several aspects of exercise programmes. Presently, the new trend in exercise involves the use of motion-based gaming consoles like Xbox Kinect. As this applies information and communication technologies (ICT) for Health this is an example of eHealth. The Xbox Kinect provides an interesting way to exercise as it tracks the person's movement and

allows their actions to be translated to an on-screen avatar.

No study could be found showing adverse effects of moderate intensity exercise to the mother or foetus during pregnancy.[8] This supports investigation of the effect of motion-based game exercise on anxiety and depression levels among pregnant women, which is yet to be explored. This pilot study aimed to evaluate the viability of applying motion-based exercise in decreasing the anxiety and depression level among pregnant women in their last trimester. There is an increasing need to advance our understanding on how technologies can function as an adjunct to medical treatments in addressing perinatal distress.

Methods

A study was designed to assess whether the exercise programme could become a valid programme to reduce anxiety and depression among pregnant women in selected rural areas in the Philippines. Sixteen (16) participants were randomly selected using computer-generated numbers from a pool of pregnant women who met study selection criteria: 1) aged 23 years and above, 2) in their second or third trimester, 3) normal (not at-risk) pregnancy - as certified by the city obstetric-gynaecologist (OB/GYN), and 4) willing to participate in the study for a month. Participants were randomly divided into intervention and control groups.

The pilot study was conducted in a comfortable and enclosed room provided by the local health facility. Informed consent was obtained and a briefing provided to participants prior to the study. Participants were then given a set of pre-tests that included the State Trait Anxiety Inventory (STAI)[9] and the Hospital Anxiety and Depression Scale (HADS).[10] The intervention group then underwent a series of motion-based exercise activities twice a week for one month. The control group received the usual health teaching about pregnancy and prenatal check-ups. At the end of the month, the same set of tests were given to both groups.

Motion-based exercise
The motion-based exercise programme was designed with the assistance of an OB/GYN (Table 1). A session normally lasted for an hour, which included breathing exercises, breaks, exposure to three Xbox Kinect games, and health monitoring. Lectures about

pregnancy were also given. The programme was validated by the municipal OB/GYN.

Table 1. Antepartum motion-based exercise programme.

	Time	Activity
Day 1		
Session total: 1 hr 30 min	25 min	Orientation to pilot study and Informed consent
	30 min	Health assessment Pre-test: STAI + HADS
	5 min	Warm up + breathing exercise
	10 min	Xbox Kinect: Leedmees
	5 min	Break
	10 min	Xbox Kinect: Self-Defence Training Camp - Balance Exercise
	5 min	Cool down + health monitoring
Days 2-7		
Session total: 1 hour	5 min	Health assessment
	10 min	Lecture
	5 min	Warm up + breathing exercise
	10 min	Xbox Kinect: Leedmees
	5 min	Break
	10 min	Xbox Kinect: Self-Defence Training Camp - Balance Exercise
	10 min	Xbox Kinect: Disney Adventure
	5 min	Cool down + health monitoring
Day 8		
Session total: 1 hr 30 min	5 min	Health assessment
	10 min	Lecture
	5 min	Warm up + breathing exercise
	10 min	Xbox Kinect: Leedmees
	5 min	Break
	10 min	Xbox Kinect: Self-Defence Training Camp - Balance Exercise
	10 min	Xbox Kinect: Disney Adventure
	5 min	Cool down + health monitoring
	30 min	Post-test: STAI + HADS

Research Measures
Two tests of anxiety and depression were used, STAI and HADS. The STAI is a widely used tool to measure anxiety, and was developed by psychologists Spielberg, Lushene, Vagg and Jacobs in 1983. The STAI questionnaire consists of 20 items, which can be graded using a 4-point Likert scale.[10] HADS was de-

veloped by Zigmond and Smith (1983). The questionnaire consists of 14 items comprising two subscales of seven items. Each component is measured on a scale of 0 (not at all) to 3 (very much).[11]

The study was approved by the ethics committee of the institution. The medical practitioner and the head of the city also granted permission for the pilot study. The entire study was conducted with the assistance of an OB/GYN medical practitioner from the municipal health office. Tokens were given to the participants for successful completion of the exercise programme.

Data Analysis

Statistical analysis was by two tailed paired t-tests with alpha set at 5% using SPSS version 22.

Results

Data analysis showed significant improvement in the participants' anxiety and depression scores after participating in the exercise programme (Table 2). In the intervention group the scores improved significantly after exercise. HADS (p=0.022) and STAI (p=0.029).

Table 2. Pre and post-test scores of HADS and STAI for intervention and control groups (* p<0.05).

Groups		Mean	
		Pre-test	Post-test
Control	HADS	9.87	8.50
	STAI	56.00	53.88
Intervention	HADS	11.50	7.63*
	STAI	48.50	42.88*

Discussion

This pilot study assessed whether an exercise programme using motion-based games was effective in improving anxiety and depression in pregnant women. The structured programme used an Xbox Kinect for the motion-based games, and spanned 1 month. The pre-test and post-test scores are good indications that the exercise programme can be used to improve anti-partum anxiety and depression.

Many factors are believed to contribute to the success of the programme, and were classified as intrinsic – that is the physiologic processes that occur within a person's body, and extrinsic – that is the experiential effects that a motion-based game provides to the participants. Existing research underpins the benefits of physical activity to reduce anxiety. Studies have reported that physical activity is indirectly associated with the risk of symptoms of depression and anxiety.[11,12] People of different ages and situations who participated in various types of exercise programme have been seen to have improvements in their mental health related quality of life. Additionally, the precise relationship between mental health-related quality of life and physical activity may lie in the complex process of human physiology.[13] This includes increases in norepinephrine transmission, serotonin, and endorphins.

Motion-based games, particularly 'exergames', combine physical exertion with casual gaming.[14] These types of games have been documented to boost the experience of physical activities.[15] Games provide personal reinforcement to players.[11] When the player practices autonomy[11,16] – that is choosing the game they typically enjoy – they easily get engaged and finally immersed in gaming.[13,17,18] The main process behind this exercise programme is the concomitant physical exertion or exercise and gaming; participants are exerting effort to exercise, yet their consciousness is dwelling in the content of another activity (i.e., the game). This is easy to promote since a wide variety of exergames are available in the market, and players can choose to play them at home, alone, or in groups.[11]

Conclusion

This study aimed to test the effects of a motion-based exergame programme on the anxiety and depression scores of pregnant women from selected rural areas of the Philippines. Results revealed that participants from the intervention group improved their anxiety and depression. The study should be replicated in other geographic areas and with larger samples to establish generalisability of the approach.

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Conflict of interest: the authors declare no conflicts of interest.

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