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Depression, anxiety, and physical activity among antenatal women during COVID-19 pandemic

Siti Roshaidai Mohd Arifin[1], Seri Wardah Zulkifli[2], Khadijah Hasanah Abang Abdullah[3], Fathima Begum Syed Mohideen[3], Nurul Ain Hidayah Abas[4], Asma Perveen[4], Rohayah Husain[5], Khairi Che Mat[5], Karimah Hanim Abd Aziz[6], Edre Mohamad Aidid[6], Ramli Musa[7], Izazol Idris[8]
[1]Department of Special Care Nursing, Kulliyyah of Nursing, International Islamic University Malaysia, Pahang, Malaysia
[2]Thomson Hospital Damansara City, Selangor, Malaysia
[3]Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia, Negeri Sembilan, Malaysia
[4]Department of Psychology and Counselling, Faculty of Human Development, Sultan Idris University of Education, Perak, Malaysia
[5]Psychological Medicine Unit, Faculty of Medicine, Sultan Zainal Abidin University, Terengganu, Malaysia
[6]Department of Community Medicine, Kulliyyah of Medicine, International Islamic University Malaysia, Pahang, Malaysia
[7]Department of Psychiatry, Kulliyyah of Medicine, International Islamic University Malaysia, Pahang, Malaysia
[8]Department of Educational Studies, Faculty of Human Development, Sultan Idris University of Education, Perak, Malaysia

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ABSTRACT

The prevalence of mental health problems among antenatal women has escalated during the COVID-19 pandemic compared to the pre-pandemic period. Physical activity palys role to reduce depression and anxiety, which required to be studied further. This study aimed to assess the association between physical activity with depression and anxiety among antenatal women during the COVID-19 pandemic. This cross-sectional study applied convenience sampling to recruit 544 antenatal women from March to June 2021. Questionnaires including the Edinburgh postnatal depression scale (EPDS), state-trait anxiety inventory (STAI), and pregnancy physical activity questionnaire (PPAQ) were distributed via social media to determine the prevalence of depression, anxiety, and physical activity level. Data were analysed using descriptive statistics, chi-square, mann-whitney, and kruskal wallis tests. Out of 544 antenatal women, 24.1% of them had depressive symptoms and 82.4% had anxiety. Only 12.1% of the women were sufficiently active during the pandemic. There was no association between physical activity, depression, and anxiety. The high prevalence of depression and anxiety during the COVID-19 pandemic among Malaysian antenatal women underscores the urgent need for addressing this public health burden. Interventions to alleviate the symptoms should include strategies beyond physical activity, for example, a mobile application or telephone-delivered social support that is made easily accessible throughout the pandemic.

Corresponding Author:

Siti Roshaidai Mohd Arifin
Department of Special Care Nursing, Kulliyyah of Nursing, International Islamic University Malaysia
25200 Kuantan, Pahang, Malaysia
Email: roshaidai@iium.edu.my

1. INTRODUCTION

Pregnancy is well-known as a period of extreme change, either physically or emotionally. Some women are predisposed to a high risk of developing mental health problems such as depression and anxiety during the antenatal period [1]. The onset of depression and anxiety during pregnancy does not only affect the normal function of mothers as an individual, it may also influence birth outcomes and subsequently affect

a child's growth and development. Worse still, the women may suffer from postpartum depression [2]. In the literature, children of mothers with depression or anxiety have been shown to manifest epigenetic changes that underlie certain developmental origins of vulnerability to disease, such as diabetes. The placenta plays a vital role in controlling the exposure of the foetal brain to hormones and neurotransmitters. Altered function of the placenta has been reported among mothers who are anxious or depressed and it can affect brain development [3].

The emerging COVID-19 pandemic has led to an increase in the prevalence of depression and anxiety among pregnant women as highlighted in many studies [4]–[6]. For instance, Wu *et al*. [4] reported that pregnant women assessed after the COVID-19 pandemic outbreak was declared as a pandemic showed a significantly higher score of depressive symptoms (40.7%) when compared with those who were assessed before (15.0%). Similarly, the prevalence of anxiety among antenatal women also increased from a baseline of 29% to 72% during the COVID-19 pandemic [7]. Studies showed that pregnant women are at higher risk of depression and anxiety during the pandemic are due to limited access to healthcare providers, unsafe hospital environment, the fear of being infected if they go outside, and other drastic changes in their daily lives brought on by the COVID-19 pandemic [1], [7]–[10].

It is well documented that good social support, sufficient sleep, and regular physical activity are associated with lower mental distress and better mental health among pregnant women [7]. Pregnant women without contraindication are recommended to stay physically active throughout their pregnancy as regular exercise is beneficial to their health. A recent study reported a 67% of reduction in the odds of antenatal depression by performing regular physical activity [11]. This was further supported by an online survey conducted by Davenport *et al*. [7] in which pregnant women who engaged in at least 150 minutes of moderate-intensity physical activity during the COVID-19 pandemic reported significantly lower rates of anxiety and depression compared to those who did not.

Notwithstanding, the public health measures by the Malaysian governments to curb the spread of the novel SARS-CoV-2 virus had caused major lifestyle changes among the general population [12]. In Malaysia, there was a series of movement control order (MCO). The first series of lockdown was from 18 March 2020 until 3 May 2020 and followed by repeated series until the end of 2021 [13]. The lockdowns resulted in 36.3% of Malaysians with reduced physical activities [12]. In addition, in the urban and suburban areas, flats are common residential and there is limited space within the house. Moreover, one house might have as many as five or more households [14]. Culturally and due to financial burden, some live as an extended family within a small house. All these factors may have an impact on the emotions and physical activities of pregnant mothers, particularly during the lockdown This overcrowding, other than spreading the virus, exacerbates the emotional impact of COVID-19 on pregnant mothers. Consequently, for risk communication with the public, the Ministry of Health Malaysia works in hand with the Malaysian national security council (NSC) to inform on the daily updated information about COVID-19 via social media [13]. But, for the emotional and feasibly, the physical activity for antenatal mothers, a key management to reach the community is needed to reduce possible risk of suicide.

However, the prevelance of depression and anxiety among pregnant women in Malaysia during COVID-19 pandemic is unknown. Furthermore, there is limited data on whether physical activity is associated with depression and anxiety among Malaysian pregnant women, especially during the COVID-19 pandemic. Hence, this online survey aimed to assess the association of physical activity with the levels of depression and anxiety among pregnant women during the COVID-19 pandemic. The results of this study help the policy makers to initiate relevant strategies and intervention (such as health education) for maternal mental health during the pandemic. The findings cater for the need of the developing countries to focus on important interventions, particularly on the emotional aspects for maternal mental health during the pandemic.

2. RESEARCH METHOD

A cross sectional study design was used to assess the association between depression, anxiety, and physical activity among pregnant women during the COVID-19 pandemic. The sample size was calculated using OpenEpi with a 77.5% of the anticipated frequency of anxiety, 5% confidence limits, and 95% confidence level, the required sample size was 268. In order to address potential non-response, the sample size was inflated by 100% [15], resulting in a sample size of 536 antenatal women. A total of 544 pregnant women were recruited across Malaysia via different platforms of social media to complete an online survey. The inclusion criteria for the participants were: i) Women who are/had been pregnant during the COVID-19 pandemic; ii) Malaysian; iii) Currently staying in Malaysia; and iv) Age between 18 to 45. Pregnant women with a known history of psychiatric problems, those who were single mothers, with obstetrics or medical complications were excluded from the study.

The self-administered questionnaire consisted of four parts: Part A, B, C, and D. Part A captured sociodemographic data such as age, race, religion, state, number of pregnancies, occupational status, monthly salary, and marital status. Part B assessed the depressive symptoms by using the Malay version of the Edinburgh depression scale (EPDS). The EPDS was developed by Cox *et al*. [16] and consisted of ten items rated on a four-point Likert scale ranging from 0 (never) to 3 (always). Part C evaluated the presence and severity of the anxiety state (how anxious a person is feeling at a particular moment) and trait (how prone a person is to anxiety) using the validated Malay version of the state trait anxiety inventory (STAI) [17]. It consists of 40 questions on a four-point Likert scale ranging from 1 to 4 with equal numbers of questions assessing both the state and trait subscales. Part D measured the level of physical activity among pregnant women during the COVID-19 pandemic using the validated Malay version of the pregnancy physical activity questionnaire (PPAQ) [18]. The questionnaire was developed by Chasan *et al*. [19] and evaluated the time spent by participants on 32 activities, including household or caregiving (13 activities), occupational (five activities), sports or exercise (eight activities), transportation (three activities), and inactivity (three activities). All data were analysed using the IBM SPSS version 24.

Upon obtaining ethical approval from the IIUM research ethical committee (IREC2021-KON/62), the survey link was shared publicly via social media platforms such as WhatsApp, Facebook, Instagram, and Twitter. The participants were informed about the study purpose and provided with online informed consent. All information about the study, consent form, and the questionnaire were distributed in Google Form.

3. RESULTS

This study achieved a response rate of 100% with complete responses from 544 participants. The participants were aged between 20 and 45 years, with a mean (SD) of 31.7 (4.7). The majority of them were Malays [97.1% (n=528)] and Muslim [98.5% (n=536)]. Out of 544 participants, 32.2% (n=175) of the pregnant women were primigravida, 55.9% (n=304) were multigravida, and 11.9% (n=65) were grand-multigravida.

A total of 78.9% (n=429) of the participants were employed. Approximately half (n=263, 48.3%) of the participants were from the middle 40 income group. Of all the participants, 89.5% (n=487) of them were married and living together. Table 1 shows the sociodemographic background of the participants.

Table 1. Sociodemographic background

Variable	Category	n	%
Race	Malay	528	97.1
	Chinese	6	1.1
	Indian	4	0.7
	Others	6	1.1
Religion	Muslim	536	98.5
	Hindu	4	0.7
	Christian	2	0.4
	Buddhist	2	0.4
Number of pregnancies	Primigravida	175	32.2
	Multigravida	304	55.9
	Grand multipara	65	11.9
Occupational status	Employed	429	78.9
	Unemployed	115	21.1
Monthly salary	<RM 4850	217	39.9
	RM 4851 – RM 10 970	263	48.3
	>RM 10 971	64	11.8
Marital status	Married and living together	487	89.5
	Married but living apart	57	10.5

Table 2 shows the prevalence of depression, anxiety, and the level of physical activity. Among the 544 antenatal women, 24.1% had depressive symptoms, while 75.0% to 82.4% had a high level of anxiety. The level of physical activity shows that only 12.1% of antenatal women were sufficiently active during the COVID-19 pandemic. The association between depression, anxiety, and physical activity was tested using Chi-Square. Based on Table 3, there was no association between depression and anxiety with physical activity among antenatal women during the COVID-19 pandemic ($p>0.05$).

Table 2. Prevalence of depression and anxiety and physical activity

Variable	Category	n	%
Depression	Depression	131	24.1
	No depression	413	75.9
State anxiety	No/low	5	0.9
	Moderate	91	16.7
	High	448	82.4
Trait anxiety	No/low	8	1.5
	Moderate	128	23.5
	High	408	75.0
Physical activity	Sufficiently active	66	12.1
	Insufficiently active	478	87.9

Source: Primary data

Table 3. Association between depression and anxiety with physical activity

		Physical activity		x^2-statistic (df)	p-value
		Insufficiently active (%)	Sufficiently active (%)		
Depression	No depression	362 (87.7)	51 (12.3)	0.075 (1)	0.784
	Depression	116 (88.5)	15 (11.5)		
Anxiety	No/low	5 (100)	0 (0.0)		
	Moderate	84 (92.3)	7 (7.7)	2.825 (2)	0.243
	High	389 (86.8)	59 (13.2)		

Source: Primary data

4. DISCUSSION

In this study, 24.1% of antenatal women showed depressive symptoms. This finding is consistent with previous studies in Belgium and China in which 25.3% and 29.6% of the antenatal women surveyed had depression during the COVID-19 pandemic [4], [20]. However, other studies from Turkey and Canada reported a higher prevalence of depression with 35.4% and 37%, respectively [5], [21]. However, these two studies were conducted in the early stages of the COVID-19 pandemic when there was still very limited information on the spread of COVID-19 and a general lack of understanding of its infectivity [9]. In the earlier phase of the pandemic, the number of daily cases and mortality was very high. Many countries struggled with rapidly depleting medical resources with no vaccines or drugs were available at that particular time. It was also unclear whether the global fight against the disease will be successful and if normal life can ever be restored [22]. Such uncertainties have led to the increase of depressive symptoms among the general population, especially antenatal women. Our study was conducted a year after the onset of the pandemic, at a time when the vaccine is available. The prevalence of depression was two times higher than a Malaysian study on depression among antenatal women that was conducted prior to the pandemic. In the cross-sectional study that included 911 antenatal women, Nasreen *et al*. [23] reported that 12.2% of the women had depressive symptoms.

In addition, this study also revealed that as high as 75.0% to 82.4% of antenatal women had a high level of anxiety. Our result was higher compared to previous studies conducted in Canada and Italy [1], [5], [7]. Davenport *et al*. [7] reported that 72% of antenatal women in Canada experienced moderate to a high level of anxiety while Saccone *et al*. [1] stated that 68% of antenatal women in Italy had a high level of anxiety. The difference in the prevalence could be attributed to the differences in culture, religion, sociodemographic, and geographical backgrounds. All these factors may affect the way that women react and adapt during the pandemic, thus the different results in the studies. Furthermore, the increasing number of COVID-19 cases could also affect the women's level of anxiety. They were more likely to become more anxious if the cases kept on increasing in their country. Prior to the pandemic, only 8.4% of women in Malaysia experienced symptoms of anxiety [23]. However, the prevalence reported in this study was ten times higher. Therefore, this present study provided strong evidence that the COVID-19 pandemic has led to an increased level of anxiety among antenatal women, likely stemming from excessive worries of COVID-19 transmission, movement restriction, lack of knowledge, and possible harms on the pregnancy [6], [24].

In terms of physical activity, this study found that only 12.1% of antenatal women were sufficiently active (total physical activity of more than 600 minutes per week) during the COVID-19 pandemic. Similarly, Davenport *et al*. [7] also found that only 23.5% of antenatal women in Canada met or surpassed the recommended 150 min of moderate-intensity physical activity per week during the physical isolation period set by the government. In addition, the level of physical activity was extremely low than before the pandemic in which between 52% to 65.7 % of antenatal women were sufficiently active according to three studies [26]-[28]. The main reason behind the reduced activity could be the need to limit movement and to maintain social distancing to curb the spread of the COVID-19 pandemic. Any outdoor physical activities

that involve mass gatherings such as sports and social activities were also restricted, further restricting antenatal women from performing physical activity, hence the low level of physical activity recorded.

It is well established that antenatal women who engaged in regular physical activity have better mental health and they are also less likely to experience depression or anxiety [5], [7], [25]–[28]. However, this present study was unable to support these findings. Our result did not detect any association between physical activity and anxiety symptoms. Possible reasons for the contradicting finding could be due to the fact that this study was conducted during the COVID-19 pandemic, during which everyone must comply with movement restrictions. People are not allowed to go to the gym or any recreational areas to perform physical activity. Antenatal women especially feel extreme anxiety to meet other people due to the fear of being infected, thus resulting in a low level of physical activity and a high level of anxiety. At the same time, antenatal women would be more inclined to spend more time indoors. Indoor activities including household chores, child care, and other activities at home could also attribute to an increased risk of depressive symptoms during the antenatal period, unlike outdoor physical recreational activities [29], [30]. Subsequently, the reduced time of outdoor physical activity may increase the risk of depression and anxiety among antenatal women.

5. CONCLUSION

COVID-19 pandemic has contributed to an increased prevalence of depression and anxiety among antenatal women. Even among antenatal women who were physically active, preventive measures taken during the movement-controlled order (MCO) in Malaysia to curb the spread of COVID-19 have caused them to limit their outdoor activities. While they could continue with indoor activities, it might not convey the same impact in reducing the symptoms of depression and anxiety as compared to outdoor activities. A prolonged period of self-quarantine and work from home during MCO might have further limited any positive impact of indoor physical activities in reducing depression and anxiety among antenatal mothers. Therefore, healthcare practitioners such as nurses must consider other interventions beyond physical activity that can reduce depression and anxiety during the pandemic. For instance, digital intervention such as mobile application, telephone-delivered or online-based social support can be made accessible for antenatal women throughout the pandemic.

Some limitations in terms of sample bias may arise from this study due to the use of convenience sampling in the distribution of online surveys. As a cross-sectional study, the findings obtained cannot be generalised to the whole population. Thus, larger sample size is needed, ideally via a random sampling method, to obtain more accurate data on the physical activity, depression, and anxiety among antenatal women during the COVID-19 pandemic. Lastly, a qualitative study is warranted to obtain a deeper understanding of the insights of antenatal women regarding their experiences of dealing with depression or anxiety.

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BIOGRAPHIES OF AUTHORS

Siti Roshaidai Mohd Arifin is an Assistant Professor at Kulliyyah of Nursing, International Islamic University Malaysia. She obtained her Bachelor's Degree from University Science Malaysia, Master's Degree from University of Malaya, and PhD from University of Stirling, United Kingdom. She has keen interest in issues related to maternal mental health, postnatal wellbeing, and qualitative study. She was awarded with the High Impact Responsible Research Awards (Medical and Health Sciences) in the IIUM Takrim 2020 and the recipient of Top 30 Contributors to IIUM's Research Performance in 2021 and 2020. She can be contacted at email: roshaidai@iium.edu.my.

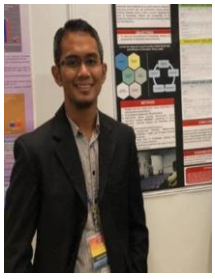
Seri Wardah Zulkifli has obtained a Bachelor Degree in Nursing from International Islamic University Malaysia. She is currently working as a Registered Nurse (RN) at Thomson Hospital Kota Damansara and working in Maternity ward. She has deep interest in any topics related to maternal mental health. She has also conducted a study along with her supervisor on the psychological well-being of antenatal women. She can be contacted at email: seri2498@gmail.com.

Khadijah Hasanah Abang Abdullah is a senior lecturer in Psychiatry, at the Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia (USIM). She practices in USIM Specialist Clinic and Hospital Ampang, Selangor, Malaysia. She obtained her Bachelor of Medicine and Bachelor of Surgery (MBChB) from The University of Manchester, United Kingdom and Doctor of Psychiatry from Universiti Kebangsaan Malaysia. She is the Head of the Psychiatry Unit in the Faculty of Medicine and Health Sciences, USIM. She is also active in non-governmental organizations where she holds the position as Assistant Treasurer for Islamic Medical Association of Malaysia (IMAM) and the Vice President for Green Crescent Malaysia (GCM). She can be contacted at email: k.hasanah@usim.edu.my.

Nurul Ain Hidayah Abas is an Associate Professor at Department of Psychology and Counseling, Sultan Idris Education University (UPSI). She obtained her Bachelor's Degree from University Malaysia Sarawak, Malaysia; Master's Degree from University of Wisconsin, USA; and Doctoral Degree from Phillips University Marburg, Germany. She has keen interest in issues related to organizational behavior and their psychological well-being. She is now the Acting Director of International and Mobility Center UPSI and has held several other administrative positions including Deputy Dean and Coordinator for Research Ethics. She is also a Chief Editor for Journal of Research, Policy & Practice of Teachers & Teacher Education, and Working Editor for Humanitas Journal, Indonesia and BITARA. She can be contacted at email: nurulain@fpm.upsi.edu.my.

Rohayah Husain is an Associate Professor in Psychiatry, at the Faculty of Medicine, Universiti Sultan Zainal Abidin, Terengganu. She is a graduate of University Kebangsaan Malaysia (UKM) medical doctor and Master of Medicine (Psychiatry) from University Science Malaysia (USM). She teaches undergraduate MBBS degree in the field of Psychiatry as well as supervising postgraduate students in the field of Psychiatry and Mental Health. She has held several administrative positions in the university including Deputy Dean and Head of Clinical Department of Faculty of Medicine. She can be contacted at email: rohayah@unisza.edu.my.

Karimah Hanim Abd Aziz is an Assistant Professor at Kulliyyah of Medicine, International Islamic University Malaysia. She obtained her Medical Degree and Master and Doctorate in Public Health from Universiti Sains Malaysia. She has keen interest in issues related to maternal and child health and physical activities and exercise especially among pregnant mothers. Currently, she is holding several administrative positions in kulliyyah and university including Academic Quality Assurance Liaison, Head of Medical Education Unit and Deputy Head of Department of Department of Community Medicine. She has published in various indexed journals, secured several grants, as a Principal Investigator, and a co-researcher, and has reviewed journal articles. She can be contacted at email: karimahanim@iium.edu.my.



Edre Bin Mohammad Aidid is graduated from IIUM in 2011 (MBBS or bachelor of medicine & bachelor of surgery) and subsequently offered his services as house officer and medical officer in Ministry of Health Malaysia. He then pursued Master in Public Health and Doctorate in Public Health in Universiti Putra Malaysia, completing his specialist training in 2018. He is a public health medicine specialist and epidemiologist. His career involves consultation on epidemiological studies, evidencebased medicine, biostatistics and Geographical Information System. He has vast experience delivering talks and workshops in the fields mentioned. He can be contacted at email: edreaidid@iium.edu.my.

Ramli Musa is a consultant psychiatrist at Department of Psychiatry, International Islamic University Malaysia (IIUM). He was the founder chairman of Pahang Mental Health Association (PAMHEC) and the advisor for Parents Support Group (Persatuan Ibubapa Anak-anak Istimewa Pahang) (PIANiS); an NGO for parents with special children support group. He can be contacted at email: drramli@iium.edu.my.

Fathima Begum Syed Mohideen is a senior lecturer in Family Medicine, at the Faculty of Medicine and Health Sciences Universiti Sains Islam Malaysia (USIM). She is a Family Physician in USIM Specialist Clinic Malaysia and Medical Officer in charge of USIM Haemodialysis Center. She obtained her Bachelor of Medicine and Bachelor of Surgery (MBBS) from the International Islamic University of Malaysia, Doctor of Family Medicine and certificate in Haemodialysis from the National University of Malaysia. She has the experience of working in primary care for the past 18 years, handling postnatal mothers. She can be contacted at email: fathima@usim.edu.my.

Khairi Che Mat is senior lecturer at Faculty of Medicine, University Sultan Zainal Abidin, Malaysia. He obtained his medical degree from Universiti Kebangsaan Malaysia and pursued his interest in psychiatry with a Master of Medicine (Psychiatry) at Universiti Sains Malaysia. He also had an attachment on psychotherapy at St Vincent's Hospital/University of Melbourne. He had completed a Diploma in Hypnotherapy at London College of Clinical Hypnosis, Kuala Lumpur. He can be contacted at email: khairicm@unisza.edu.my.

Asma Perveen is a senior lecturer at the Faculty of Human Development, Universiti Pendidikan Sultan Idris (UPSI). She obtained her PhD in Clinical Psychology from University of Karachi, Pakistan. She has seven years experience as Clinical Psychology in different fields of Mental health organizations and seven years experience in teaching and research in Clinical Psychology. Her research focused on mental health interventions. She has expertise in clinical assessment of psychological disorders and management. She can be contacted at email: asmaperveen@fpm.upsi.edu.my.

Izazol Idris, BEd (Sc), MEd, PhD is a senior lecturer at the Faculty of Human Development, Universiti Pendidikan Sultan Idris (UPSI). She obtained her Bachelor of Science Education from Universiti Pendidikan Sultan Idris and PhD in Psychometric and Evaluation from Universiti Sains Malaysia (USM). She has 14 years experience in teaching higher education, as well as supervising postgraduate students in the field of quantitative research, psychometrics, and programme evaluation. She has published in various indexed journals and secured several research grants as a Principal and co-researcher, focusing on the model-testing by Structural Equation Modeling and scale development from both Classical Test and Rasch Model perspectives. She can be contacted at email: izazol@fpm.upsi.edu.my.