Physical Activity and Depression during Pregnancy: A Scoping Review

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ABSTRACT

Objective: This review aimed to identify the effect of physical activity in reducing depression symptoms during pregnancy through scoping review.

Material and Methods: A scoping review of English academic journals was conducted using three electronic databases (Scopus, EBSCOHost and Science Direct) from 2015 to 2019. The research articles related to any type of physical activity or exercise during pregnancy for depression were included, while review and articles on pregnancy-related diseases such as gestational diabetes mellitus, hypertension, and mental disorder were excluded.

Results: Among 123 articles of the search results of electronic databases, only 14 articles were eligible. The sample size ranged from 36 to 18,040 participants, aged 18 to 45 years old. Most of the studies involving pregnant women in their second and third trimesters who practice physical activity regularly showed a reduction in depression and anxiety level.

Conclusions: Physical activity during pregnancy reduces depressive symptoms and may prevent depression. Studies focusing on the effect of physical activity on depression during pregnancy and its impact on the mother’s mental health are necessary for Malaysia and Asian countries.

KEY WORDS

pregnancy, physical activity, exercise, depression, depressive symptoms

INTRODUCTION

According to the World Health Organization, more than 30 million of world populations suffered from depression throughout the world (WHO 2020). Depression during pregnancy and severe mental health issues are correlated with a high risk of pregnancy complications. Deligiannidis and Freeman (2014) reported that 18% of pregnant women have depressive symptoms. In Malaysia, based on The National Health Morbidity Survey (2015), the prevalence of depression among adults was 7.5%. Factors that are likely to contribute to depression include economic, acculturation, and social challenges encountered by these pregnant women, that enhance their possibility of depression, and thereby the potential of beginning and recurring of depressive episodes during pregnancy. Since depression during pregnancy increased the risk of pregnancy complications such as pre-eclampsia, post-partum depression, along with childbirth complication, therefore it is essential to determine methods in preventing depression and reducing depressive symptoms (Szegda et al., 2018).

In order to earn health and lowered the risk of complications during pregnancy, the Canadian Guideline for Physical Activity throughout Pregnancy 2019 recommended that all healthy pregnant women should regularly practise at least 150 minutes, 3 days weekly of moderate-intensity physical activity throughout pregnancy (Mottola et al., 2018). Physical activity during pregnancy not only has outstanding cardiovascular effects of aerobic exercise but also reduces the risk of pregnancy obesity, hypertension, change in mental health and is widely studied in preventive research (Cohen et al., 2013).

Based on Malaysian Clinical Practice Guideline Management for Major Depression Disorder (2019) (Malaysia, 2019), exercise may be offered as an adjunct treatment in moderate to severe depression. The use of pharmacotherapy for major depression disorders (MDD) may be decreased by physical-related activity than psychotherapy. Several studies (Campolong et al., 2018; El-Rafie et al., 2016; Schuch et al., 2016) have proved that both aerobic and anaerobic exercises have a significant role in reducing depressive symptoms, while the positive effect of resistance training was only seen in research. The exercise was subsequently taken into account for the treatment of MDD in the most recent treatment guidelines of the American Psychiatric Association (Campolong et al., 2018; El-Rafie et al., 2016; Schuch et al., 2016) have. Positive feedback from others, an improved sense of self-worth, distraction from negative thinking, increased social contact and improvements in endorphin and monoamine levels are included in the exercise mechanism (Cohen et al., 2013).

Physical activity is considered a proper approach to physical and emotional health improvement and maintenance. There is even evidence by Connolly et al. (2014) that demonstrated both mother and child bene-
fitted from physical activity during pregnancy and may have a favourable impact on adverse effects during pregnancy and delivery. This same study has also highlighted that physical activity is correlated with a lower risk of pregnancy-related circumstances such as gestational diabetes and preeclampsia for both pre-pregnancy and gestational periods (Connolly et al., 2014).

Hence it is necessary to provide strong evidence-based suggestions and maximize the benefits and effectiveness of physical activity approach, physical activity dose-response relationships, and health outcomes, and perhaps to determine global trends and adequate measurement of pregnancy physical activity. This is supported by Herbell and Zauszniewski (2019) who stated that physical activity may benefit pregnant women in reducing stress level as well as enhancing mental health. Thus, the objective of this review was to identify the effect of physical activity in reducing depressive symptoms during pregnancy through a scoping review.

**METHODS**

This scoping review was conducted to attain the effect of physical activity to reduce depressive symptoms during pregnancy. The methodological framework used in this scoping review consisted of five phases as proposed by Arksey and O’Malley (2005) which are identifying the research questions, study selection, charting the data, and collating, summarizing and reporting the results. A flow chart based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA 2009) shows the flow of studies from search to final selection (Figure 1). There was no requirement for protocol and ethics approval in this review as it was solely relied on publicly available information.

**Identifying the research questions**

The review or research question for the scoping review was determined before identifying relevant studies. The focus of this review was to explore the outcomes of physical activity in improving depressive symptoms during pregnancy. Three key terms identified through the review question were physical activity, depressive symptoms, and pregnancy.

**Identifying relevant studies**

This review used three electronic databases, namely Scopus, EBSCOHost and Science Direct for articles searching. A simple search using the key terms physical activity and depressive symptoms was performed in the databases mentioned above to determine keywords (synonyms). Keywords were also obtained from the MeSH database. The key terms and keywords obtained as listed in Table 1 were used in Scopus, EBSCOHost and Science Direct databases to search for the articles.

The Boolean operator of AND was used to combine key terms and keywords (1 AND 2 AND 3) during articles search. The number of studies available and selected based on the key terms and keywords search is shown in Table 1. The search for the scientific literature covered articles published between 1st January 2015 and 31st December 2019. No limiters or facets were used, and search strategies were adapted for each database. For each search strategy, the search terms, the number of results retrieved and screened, and the date of the search were recorded. This review of the literature was completed over two months ending in March 2020.

**Study selection**

A scoping review of English academic journals based on Arksye and O’Malley’s (2005) methodological framework was conducted using electronic databases (Scopus, EBSCOHost, and Science direct) from 2015 to 2019. The research articles related to any type of physical activity or exercise during pregnancy for depression were included, while review and articles on pregnancy-related diseases such as gestational diabetes mellitus, hypertension, and mental disorder were excluded.

Using the key descriptors, 123 articles were available through database searching. A review of the abstract revealed 26 duplicates, not relevant (n = 33), 34 were either post-partum or not pregnant and 16 were associated with other diseases. Therefore, a total of 109 were excluded as they did not meet the inclusion criteria of this review. A total of 14 full-text version of the articles were selected with each of the article being reviewed and confirmed as appropriate by the authors.

1. Charting the data

   Summaries of each article were developed related to the author, publication year, country, type and study method, findings and also the limitation of studies.

2. Collating, summarizing and reporting the results

   Evaluations of the review on the framework were summarized and report findings were analysed in Table 2.

**RESULTS**

Among 123 articles of the search results of electronic databases, Scopus (n = 39), EBSCOHost (n = 44) and science direct (n = 31); only fourteen studies as shown in Figure 1 met our selection criteria after the screening, of which includes cohort studies (n = 4), and intervention studies (n = 10) for antenatal depression which is the majority of these researches (71%). The sample size ranged from 36 to 18,040 partici-

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**Table 1: The number of studies available and selected based on the key terms and keywords search**

<table>
<thead>
<tr>
<th>Key term search</th>
<th>Number of studies available (selected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(pregnancy OR pregnant) AND (‘physical activity’ OR ‘physical activities’) AND (‘depressive symptoms’ OR ‘depressive symptom’ OR ‘depressive disorder’)</td>
<td>44 (7)</td>
</tr>
<tr>
<td>(pregnancy OR pregnant) AND (exercise OR exercises) AND (‘depressive symptoms’ OR ‘depressive symptom’ OR ‘depressive disorder’)</td>
<td>39 (2)</td>
</tr>
<tr>
<td>(pregnancy OR pregnant OR prenatal OR antenatal OR perinatal) AND (‘physical activity’ OR ‘exercise OR fitness’)</td>
<td>40 (5)</td>
</tr>
<tr>
<td>(pregnancy OR pregnant OR prenatal OR antenatal OR perinatal) AND (‘physical exercise’)</td>
<td>43 (5)</td>
</tr>
<tr>
<td>(pregnancy OR pregnant OR prenatal OR antenatal OR perinatal) AND (‘physical activity’ OR ‘depressive symptoms’)</td>
<td>41 (5)</td>
</tr>
<tr>
<td>(pregnancy OR pregnant OR prenatal OR antenatal OR perinatal) AND (‘physical exercise’) AND (‘depressive symptoms’)</td>
<td>42 (5)</td>
</tr>
</tbody>
</table>

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**Figure 1. Flow chart of scoping review (based on Moher et al., 2009)**
Physical Activity and Depression during Pregnancy

Physical activity may deter the occurrence of depression, which is especially crucial in communities with elevated depression prevalence and elevated vascular health implications in the second and third trimesters of pregnancy (Waerden et al., 2013). A study in Brazil proved that pregnant women who engage in physical activity have lower depression score than those without physical activity (Coll et al., 2019; Moraes et al., 2016).

Similarly, a randomized controlled trial by Vargas-Terrones et al. (2018) in Spain verified that exercise may lower the prevalence of depression in late pregnancy and also postpartum. By using the per-protocol analysis, only 18.6% of women were identified as depressed in the exercise group compared to the control group at 38 gestational weeks (35.6%).

Even so, the contradictory result was shown in a study in 2018 to assess the association between physical activity and depression symptoms among Latina pregnant women (Szigedi et al., 2018). The Pregnancy Physical Activity Questionnaire (PPAQ) and Edinburgh Postnatal Depression Scale (EPDS) were used in this study to assess the physical activity and depressive symptoms in early and late pregnancy, respectively. Although the results showed that most of the participants engaged with physical activity in their daily life (56%), there was no association between physical activity during pregnancy with depression.

**DISCUSSION**

Psychiatry and related disciplines have been concerned over women with symptoms of depression during pregnancy and in the months following birth for more than a decade (Schetter et al., 2015). While pregnancy should be a period of happiness and excitement, psychological distress is experienced by 10 to 20 percent of pregnant women. Depression not only affect the mother but also their unborn child. The impacts include growth and development interruption and foetal maturation (Schetter et al., 2015; Yusuff et al., 2015). There are only a few treatments for depression during pregnancy as most of the patient usually prefer non-pharmacological treatment since they are afraid that the medication might affect their baby (Szigedi et al., 2018). For this reason, physical activity is considered to be one of the alternatives not only to reduce the depressive symptoms among pregnant women but also have a favourable impact on adverse effects during pregnancy and delivery (Connolly et al., 2014). In this review, most of the studies involving second and third trimester pregnant women who are physically active showed a significant reduction in depression and anxiety level (Campolong et al., 2018; de Wit et al., 2015; Eichler et al., 2019; Kusaka et al., 2016; Perales et al., 2015; Rodriguez-Ayllon et al., 2019; Schetter et al., 2015; Szigedi et al., 2018; Vargas-Terrones et al., 2018).

Even a little of physical activity during pregnancy may decrease the severity of depression and the frequency of depression, as the findings of this review clearly indicate. Taniguchi et al. (2016) reported in their study that even routine, low-intensity exercises during pregnancy can greatly reduce depression symptoms in pregnant women as the risk of depression increase in the third trimester of pregnancy (Waerden et al., 2019). Physical activity improves physical and mental health through down-regulating HPA and sympatho-vagal nervous system (SNS) (Ross et al., 2010). Research by Szigedi et al. (2018) stated that physical activity may deter the occurrence of depression, which is especially crucial in communities with elevated depression prevalence and elevated risk of antenatal depression. It is presumed that exercise and physical activity deter depression and decrease depressive symptoms by altering neurotransmitter and depression-related hormone levels.

According to Kusaka et al. (2016), yoga as another form of physical activity enhanced the mental health and decreased depression symptoms in pregnant women in second and third trimesters. It is in mind that the risk of developing depressions in pregnancy is not only lower for women with regular physical activity during pregnancy, but also postpartum women (Vargas-Terrones et al., 2018). In addition, studies of Vargas-Terrones et al. (2014) suggested that women who have a sedentary lifestyle are more likely to develop depressive disorders, as compared to those who are active during both pregnancy and postpartum periods. El-Rafie et al. (2016) also acknowledged the importance of physical activity during pregnancy as an alternative treatment for depression.

Multiple studies have suggested that good quality of life (QOL) during pregnancy can be achieved by improving health awareness with enough exercise levels (Campolong et al., 2018; Moraedy et al., 2017). The research by De Wit et al. (2015), reported that obese pregnant women who lack physical activity due to constict movement often have a depressed mood, which affects their quality of life. Another study in Lebanon by Mourady et al. (2017) proved that regular practice of physical activity throughout pregnancy promotes quality of life and stimulate both physical and mental health of mother and baby. The findings revealed that depression is linked with poor quality of life, insomnia and sedentary lifestyle. Improvement in quality of life reduced the depressive symptoms among pregnant women.

However, although physical activity should be practised during the pregnancy, other than having a healthy lifestyle (Daley et al., 2014), seeking advice from professionals is a must not only for a better result but also to avoid any incident that can hurt both mother and baby. Physical activity supervised by professionals like physiotherapists and exercise physiologists contributes to the greatest improvements in depressive symptoms and physical health (Broberg et al., 2017).

There are a few limitations that can be pointed out in this review. First, the data of physical activity level in most studies were less accurate as it is self-reported by the participant, whereas a direct measurement would give more accurate data (Evenson et al., 2012). Second, there are only a few studies were done in Asian countries. Most of the Asian women seems to have taboo in doing physical activity during pregnancy concerning the safety of their baby without knowing the benefit of physical activity (Fadziali et al., 2016). Thus, the study focusing on the effect of physical activity on depression during pregnancy and its impact on the mother's mental health among Malaysians and Asian women could be considered in the future for better references.

**CONCLUSION**

Although Malaysia has lower cases of antenatal depression compared to western countries, however, it is in the increasing trend that demands grave attention for the significant alternative intervention to improve the mental health status of the pregnant women. The latest study by Nasreen et al. in 2018 proved that the antenatal depression prevalence in Malaysia was increased to 12.2% from 8.6% in 2013 (Fadzil et al., 2013). As discussed in this review, physical activity during pregnancy reduces depressive symptoms and may prevent depression. Also, exercise not only reduce the level of both anxiety and depression, but also the overall quality of life. Therefore, physical activity throughout the pregnancy should be recommended for patients with depression as an alternative treatment for those who refuse pharmacological interventions.

Since there were limited studies done in Asian countries, especially Malaysia, more future studies focusing on the effect of physical activity on depression during pregnancy and its impact on mother's mental health are required to ensure a healthy pregnancy for all mothers. It is necessary to provide strong evidence-based suggestions and maximize the benefits and effectiveness of physical activity approach towards health outcomes, and perhaps to determine the global trends and adequate measurement of pregnancy physical activity.

**ACKNOWLEDGEMENT**

The authors would like to express our gratitude to those who have
<table>
<thead>
<tr>
<th>Author</th>
<th>Type of study</th>
<th>Methods</th>
<th>Findings</th>
<th>Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waerden et al. (2019)</td>
<td>Prospective cohort study</td>
<td>Subject: 18,040 Age: &gt; 18 years Tools: ELFE: PPAQ during 1st trimester pregnancy, EDEN: BQ during 1st trimester pregnancy, EPDS during 1st postpartum year in both cohorts</td>
<td>Risk of depression increase in the third trimester of pregnancy</td>
<td>Less accurate as it is self-reported by participant.</td>
</tr>
<tr>
<td>Rodriguez-Ayllon et al. (2019)</td>
<td>Cross sectional study-intervention</td>
<td>Subject: 124 of 161 early pregnancy Mean Age: 32.9 ± 4.7 years Tools: PARmed-X mental health questionnaires - 10-item Connor-Davidson Resilience Scale, CES-D questionnaire, Positive and Negative Affect Schedule, STAI-T, TMMS, physical fitness test, accelerometers (9 days)</td>
<td>Physically active mother has lower depressive symptoms in second trimester of pregnancy.</td>
<td>High drop-out rates - Participants psychometric properties not extensively tested</td>
</tr>
<tr>
<td>Vargas-Terrones et al. (2018)</td>
<td>Randomized Control Trial</td>
<td>Subject: 124 intervention (IG = 70), control (CG = 54) Age: &gt; 18 years Tools: Intervention: 60 min, 3 days weekly exercise program throughout pregnancy CES-D (12-16 weeks), at 38 weeks pregnancy and 6 weeks postpartum.</td>
<td>The prevalence of depression low in late pregnancy and postpartum mother that practice exercise during pregnancy</td>
<td>Big size difference between the groups - Difference in dropout between the groups</td>
</tr>
<tr>
<td>Daley et al. (2018)</td>
<td>Randomized Control Trial</td>
<td>Subject: 784 Age: 16-50 years Tools: EPDS, 14 session combining treadmill exercise, PA consultation</td>
<td>Increase physical activity do not prevent depression in pregnant smokers</td>
<td>High drop out - No objective assessment of physical activity behaviour</td>
</tr>
<tr>
<td>Shakeel et al. (2018)</td>
<td>Prospective cohort study</td>
<td>Subject: 643 Age: &gt; 18 years Tools: EPDS Sense Wear Pro3 Armband (SWA)</td>
<td>Women with ≥ 150 MVPA minutes/week had lower risk for depression</td>
<td>Limited cases of PPDS. - The SWA does not measure water activities. - Used multiple imputations due to missing data for SWA</td>
</tr>
<tr>
<td>Szegda et al. (2018)</td>
<td>Prospective cohort study</td>
<td>Subject: 820 Mean Age: 21.6 ± 4.9 years Tools: PPAQ, EPDS</td>
<td>No association between physical activity in pregnancy with either minor or major depression.</td>
<td>The Spanish version not validated - No information on pre-pregnancy depression history and diet history</td>
</tr>
<tr>
<td>Campolong et al. (2018)</td>
<td>Prospective cohort study</td>
<td>Subject: 578 Age: 18-45 years Tools: PPAQ, QOL before, during pregnancy, EPDS (28 weeks gestation)</td>
<td>High quality of life for sufficient exercise (150 min/week) No significant differences in depressive symptoms at 28 weeks pregnancy compared the effects of exercise during pregnancy to usual care</td>
<td>Less accurate as it is self-reported by participant.</td>
</tr>
</tbody>
</table>
CONFLICT OF INTEREST

The author(s) declare(s) no potential conflicts of interests.

REFERENCES


