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# Exercise Among Pregnant Females in Antenatal Clinic in Tabuk, Saudi Arabia, Prevalence and Barriers

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## ABSTRACT

Maternal mortality remains a significant global health concern, with physical inactivity being the fourth leading risk factor, contributing to 5.3 million premature deaths. This study aimed to assess the prevalence and impact of exercise among females in antenatal clinics and to study the barriers to exercise during pregnancy. This cross-sectional survey-based study was conducted in antenatal clinics in Tabuk C ity, Saudi Arabia, among pregnant women from September 2022 to December 2022 by using an electronic questionnaire. A total of 168 participants were included in the study. Ethical approval was obtained from the Institutional Review Board, and informed consent was also obtained from participants. The data were analysed using descriptive statistics and appropriate statistical tests. The study results revealed that the majority of participants were aged 27-35, with 42% being Saudi Arabian citizens. The majority were unemployed, with 43% having a monthly income between 5001 and 10,000 Saudi Riyals. Out of 168 participants, 70% had multiple children and had no abortion history, 51% participated in consistent exercise before pregnancy, and 92% had no medical issues. Energy expenditure varied, with mild activity being the most common. Household activities contributed the most, followed by sports. Obstacles to physical exercise included apprehensions, insufficient energy, fear of injury, joint or muscular pain, and lack of interest. The study highlighted the importance of promoting physical activity among pregnant women, emphasising the need for tailored interventions to improve maternal and fetal well-being.

## INTRODUCTION

Physical exercise is a planned and structured physical activity that is intended to improve one or more aspects of physical fitness. It is a crucial part of a healthy lifestyle and has a key role in preventing and managing many diseases (Ribeiro *et al.*, 2022). Physical inactivity is the fourth most important risk factor for mortality worldwide among the general population, accounting for about 9% or 5.3 million premature mortality worldwide (WHO, 2019). Considering the growing influence of inactivity on the incidence of diseases, the World Health Organization (WHO) has developed an international action plan with the goal of lowering physical inactivity by at least 10% by 2025 and 15% by 2030 (Organization, 2019). Pregnancy is an ideal time to begin exercising because it is linked to a stronger desire to establish a healthy lifestyle (Ribeiro *et al.*, 2022). Pregnant women were traditionally advised to avoid participating in physical activity because of potential health risks. The adverse effects of physical inactivity during pregnancy have become a major concern among this group of individuals (Al-Youbi & Elsaid, 2020). Among pregnant women, in particular, physical inactivity is identified as a distinct risk factor linked to a number of health issues such as immoderate weight gain, gestational diabetes, loss of voluntary control over urination, hypertension, anxiety and prenatal depression (Belachew *et al.*, 2023).

Despite the extensive distribution of guidelines, a notable issue persists: most pregnant women have sedentary lives, particularly during the third trimester of their pregnancy (Aljehani *et al.*, 2021). However, contemporary research has emphasised several advantages linked to consistent physical activity for the health of the mother and the fetus. Numerous guidelines support the integration of regular, moderate-to-intense exercise as a crucial component of preventive care for mothers, providing prescription guidelines and highlighting potential contraindications (Aljehani *et al.*, 2021). The main health measures specified in Healthy People 2010 emphasised the importance of increased physical activity for women's health, as it reduces the risk of gestational diabetes, pre-eclampsia, and excessive weight gain (Yong *et al.*, 2020).

Further, the American College of Obstetrics and Gynecology (ACOG) recommended continuing exercise routines before pregnancy and encouraging previously inactive women to engage in physical activity throughout pregnancy (Aljehani *et al.*, 2021). One of these is antenatal exercise, which is considered a tailored routine of physical movements designed for pregnant women aiming to promote holistic fitness throughout gestation (Avignon *et al.*, 2023). Antenatal workouts include respiration exercises, aerobic activities, core stability training, pelvic floor exercises, spinal care techniques, and postural guidance - specifically created to preserve cardiovascular capability and physical conditioning in expectant mothers. The main objective of antenatal clinics is to increase promotive and preventative health measures for expecting mothers (Lattof *et al.*, 2020). A study by Barakat *et al.* (2019) demonstrated that engaging in low-impact exertions of moderate intensity can prevent

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overweight, the development of gestational diabetes, and preterm birth (Barakat *et al.*, 2019). Furthermore, these physical activities were found to enhance stress coping mechanisms, facilitate neurobehavioral relaxation in the developing fetus, and aid maternal recovery subsequent to parturition (Barakat *et al.*, 2019).

A study in the Aseer region of Saudi Arabia revealed a high prevalence of obesity among Saudi women (Wahabi *et al.*, 2023). Over 52% of these women were overweight or obese, highlighting the need for increased physical activity. Consequently, a study in Jeddah, Saudi Arabia, found a significant occurrence of abdominal and general obesity and physical inactivity among females in their reproductive years (Filfilan & Damanhouri, 2020). A study by Dereje *et al.* (2023) evaluated antenatal physical exercise among pregnant women in several regions. The results revealed that the ratio of women engaging in adequate physical activity was 39% in Iran (Abedzadeh *et al.*, 2022), 14.6% in Norway , 18% in India (Abedzadeh *et al.*, 2022), and 10.2% in Nigeria .

Moreover, in Ethiopia, existing research focused on health facilities managed by the government has shown that only 8.4% and 11.7% of pregnant women followed the recommendations of the ACOG (Janakiraman *et al.*, 2021). Another study by Abeer *et al.* 2020 examined the awareness level among pregnant women in Saudi Arabia (Alaglan *et al.*, 2020). The results demonstrated that the majority of women, 86%, believed that participating in physical activity during pregnancy is crucial. Of the women surveyed, over half, 75%, stated that they engage in physical activity while pregnant. Other studies indicate that women are more likely to reduce the duration of their activity rather than start exercising during pregnancy (Grenier *et al.*, 2021). Consequently, a study by Chen *et al.* (2021) suggested that doctors should be trained to manage obesity during pregnancy, promoting a healthy lifestyle through regular physical activity. Motivational counselling can help overcome apprehensions about exercise. Maternal exercise reduces premature birth, abnormal fetal growth, type 2 diabetes, and cardiovascular disorders post-birth (Chen *et al.*, 2021).

Further, maintaining a healthy Body Mass Index (BMI) is beneficial for mothers and babies. In contrast, Barakat *et al.* (2021) demonstrated the link between unhealthy lifestyles and negative childbirth outcomes, including prolonged labour pain, increased caesarean delivery risks, and additional health risks for pregnant women and newborns, emphasising the importance of physical activity (Barakat, 2021). Awareness regarding physical activity during pregnancy can be raised by mass media exposure, sociodemographic distribution of women partners, healthcare practitioner recommendations, books, magazines, television, and the availability of supportive facilities (Janakiraman *et al.*, 2021). However, studies revealed a lack of research on the percentage of pregnant women with awareness and understanding of physical activity despite their diverse social, cultural, and educational backgrounds, causing them to be reluctant to exercise (Kraus, 2023).

Therefore, the study aimed to assess the prevalence and impact of exercise among females in antenatal clinics and to study the barriers to exercise during pregnancy.

## MATERIALS AND METHODS

### Study Design and Study Population

This cross-sectional survey-based study was conducted in Tabuk city, Saudi Arabia, among pregnant women from September 2022 to December 2022. The study involved a cohort of 168 participants who experienced pregnancy and were expecting.

### Ethical Approval

Ethical approval was obtained and the reference number was (NCBE-KACST, KSA: H-07-TU-077).

### Inclusion and Exclusion Criteria

The study included pregnant women of any age who naturally conceived a fetus and with no previous miscarriage experience. Conversely, the exclusion criteria included pregnant females who had chronic systematic illnesses such as cardiorespiratory disease, diabetes mellitus, chronic renal disease, and medication-dependent hypertension. Furthermore, participants suffering from the inflammatory joint disorder and chronic musculoskeletal problems that hindered their capacity to engage in daily physical activity were not included in the study. Similarly, the study excluded women with contraindications to exercise, such as cervical insufficiency, twin or higher pregnancies, placenta previa beyond 26 weeks, premature labour, preeclampsia, or pregnancy-induced hypertension, as well as those with cardiovascular or respiratory diseases and severe anaemia.

### Sample Size and Calculation

The sample size was calculated using an online sample size calculator, Raosoft (Raosoft, http://www.raosoft.com/samplesize.html), with a 5% margin error and 95% confidence level. Based on an average population size of 450 and a predicted average response rate of 50% for most of the questions, the sample size was calculated to identify an unknown number of physically active women. The sample size was determined to be N= 208 through calculation. There was a drop-off of 40 participants, and a total of 168 participants were included in the study.

### Data Collection

The study employed a four-part interview questionnaire. The first section collected socio-demographic and clinical data in order to establish a baseline. Section 2 examined the exclusion criteria in order to confirm eligibility. Section 3 utilised a modified Arabic version of Lisa Chasan-Pregnancy Taber's Physical Activity Questionnaire (PPAQ), a validated tool, to evaluate and measure physical activity levels among pregnant participants in the Arabic-speaking community. Furthermore, section 4 analysed possible barriers to participation in physical activity.

**Data Analysis**

The collected data were entered into an Excel spreadsheet and analysed using the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 22.0. descriptive statistics were calculated, which included frequencies and percentages for categorical variables, whereas, mean, standard deviation, median, and interquartile ranges for continuous variables. The data was analysed using suitable statistical tests, with a p-value of <0.05 considered statistically significant.

## RESULTS AND DISCUSSION

The results section displays data analysis and statistical interpretations based on data collection. A total of 168 participants were included in the study, with the age group of 27-35 accounting for 42% of the majority. The majority of participants were Saudi nationals: 93%, 62% held a bachelor's degree, 62% were unemployed, and 43% reported a monthly income between 5001 and 10,000 Saudi Riyals, as shown in Table 1. Moreover, 70% of the participants reported having two or more children. Approximately 55% of participants had not experienced any abortions, while 30% were in their first trimester and 35% were in the third trimester. Regarding physical activity, more than half 51% of participants reported engaging in regular exercise before pregnancy, and a significant proportion of 92% stated that they had no medical complications that would hinder their ability to exercise, as shown in Table 2.

The energy expenditure assessed in MET-h/day for total activity ranged from a minimum of 0 to a maximum of 96.1. The median and mean values were 37.1 and 38.7, respectively. When categorising energy expenditure based on intensity, mild activity had the highest mean at 17.6 ±8.4, with a median of 16.2, while vigorous exercise had the lowest contribution at 3.2±5.5. When classified by the type of activity, household activities showed the highest mean at 18.6±8.8, followed by sports at 9.6±9.3. In contrast, transportation had the least contribution at 4.5±4.2, as shown in Table 3. Regarding the barriers to exercise, having enough activity (97%), lack of energy (94%), concern about the child (90%), concern about pregnancy complications (89%), fear of injury (86%) and muscle contraction with movement (78%), joint or muscle pain (67%) and do not like exercise (30%) were reported as common barriers, as shown in Figure 1.

**Table 1:** Demographic Characteristics of Participants (n = 168)

| Characteristics | Frequency | Percentage |
|---|---|---|
| **Age** | | |
| 18-26 years | 47 | 28% |
| 27-35 years | 71 | 42% |
| 36 and above | 50 | 30% |
| **Nationality** | | |
| Non-Saudi | 12 | 7.1% |
| Saudi | 156 | 93% |
| **Education Level** | | |
| No Formal Education | 13 | 7.7% |
| High School | 42 | 25% |
| Bachelor | 104 | 62% |
| Above Bachelors degree | 9 | 5.4% |
| **Employment Status** | | |
| Employed | 54 | 32% |
| Un-Employed | 104 | 62% |
| Student | 10 | 6.0% |
| **Monthly Income** | | |
| Less than 3000 SAR | 17 | 10% |
| 3001-5000 SAR | 41 | 24% |
| 5001-10000 | 72 | 43% |
| 10001-20000 SAR | 32 | 19% |
| More than 20000 SAR | 6 | 3.6% |

Table 1 shows a diverse group of participants, with (42%) aged between 27-35 years and (93%) Saudi nationals. A significant proportion had a bachelor's degree (62%), while a smaller fraction had higher education qualifications (5.4%). Employment status varied, with (32%) employed, (62%) unemployed, and (6%) students. Monthly income distribution showed that (43%) had earnings between 5001-10000 SAR, while (19%) reported incomes between 10001-20000 SAR. This demographic analysis provides an understanding of the study population.

**Table 2:** Obstetric Characteristics of Participants (n = 168)

| Characteristics | Frequency | Percentage |
|---|---|---|
| **Number of Pregnancy** | | |
| Less than 3 | 50 | 30 |
| 3 and More | 114 | 68% |
| Missing | 4 | 2.4% |
| **Number of Children** | | |
| Less than 2 | 48 | 29% |
| 2 and more | 117 | 70% |
| Missing | 3 | 1.8% |
| **Abortion** | | |
| No | 93 | 55% |
| Yes | 69 | 41% |
| Missing | 6 | 3.5% |
| **Gestational Age of the Current Pregnancy** | | |
| First Trimester | 50 | 30% |
| Second Trimester | 59 | 35% |
| Third Trimester | 59 | 35% |
| **Do you have any disease that could affect your participation in exercise?** | | |
| No | 155 | 92% |
| Yes | 13 | 7.7% |
| **Were you on regular exercise before becoming pregnant?** | | |
| No | 82 | 49% |
| Yes | 86 | 51% |

Table 2 indicates that the majority of participants (68%) experienced multiple pregnancies, with a significant portion (70%) having more than two children. Out of the total 168 participants, (41%) reported having an abortion, while (35%) were in their third trimester of pregnancy. Remarkably, (92%) of the participants did not experience any medical complications that hindered their physical activity during pregnancy. When examining their activity history prior to pregnancy, a nearly equal distribution was observed, with 51% of participants engaging in regular exercise and 49% not engaging in regular exercise. These findings provide valuable insights into the prenatal health and activity patterns of the participants.

Table 3 presents the distribution of physical activity levels among participants, highlighting an average activity level of 38.7 MET-h/day. The range of total activity levels varied from 0 to 96.1 MET-h/day, with 25% of participants recording levels below 22.9, 50% below 37.1, and 75% below 51.5. Notably, sedentary activity averaged 1.5 MET-h/day, while light exercise showcased the highest

**Table 3:** Energy Expenditure Measured in MET-h/day According to Total Activity, Intensity Level, and Type of Activity (n=168)

| **Percentile** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Percentile** | **Percentile** | **Percentile** | **Percentile** | **Percentile** | **Percentile** | **Percentile** | **Percentile** |
| Total Activity | 38.7 | 19.7 | 0 | 96.1 | 22.9 | 37.1 | 51.5 |
| **By Intensity** | | | | | | | |
| Sedentary Activity | 1.5 | 0.95 | 0 | 3 | 0.75 | 1.5 | 2.5 |
| Light/Mild Activity | 17.6 | 8.4 | 0 | 41.5 | 11.2 | 16.2 | 22.9 |
| Moderate Activity | 16.4 | 11.2 | 0 | 53.4 | 8.2 | 14.7 | 21.7 |
| Vigorous Activity | 3.2 | 5.5 | 0 | 28.8 | 0 | 0 | 3.5 |
| **By Type** | | | | | | | |
| Househol/ Caregiving | 18.6 | 8.8 | 0 | 43.5 | 12.6 | 17.6 | 24 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Occupation | 5.97 | 6.7 | 0 | 28.8 | 0 | 4.8 | 8.9 |
| Sports/Exercise | 9.6 | 9.3 | 0 | 42.93 | 3.9 | 6.6 | 13.3 |
| Transportation | 4.5 | 4.2 | 0 | 21.3 | 1.3 | 4 | 6.4 |

average at 17.6 MET-h/day. Moderate activity recorded an average of 16.4 MET-h/day, whereas vigorous activity displayed the lowest average at 3.2 MET-h/day. Home and caregiving activities exhibited the highest average at 18.6 MET-h/day. These findings offer a comprehensive analysis of participants' daily physical activity patterns, illustrating the varying intensity levels and types of physical activity engaged in by the participants.

Consequently, barriers to exercise during pregnancy are shown in Figure 1.

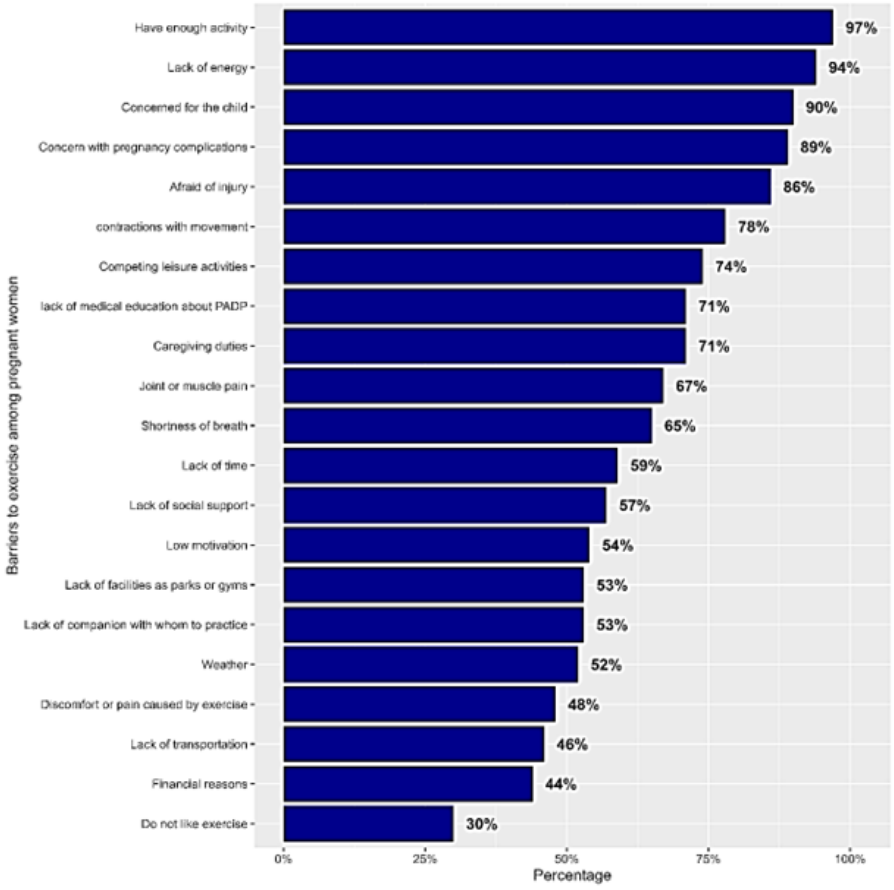


**Figure 1:** Barriers to Exercise during Pregnancy

Figure 1 illustrates the main challenges identified by participants regarding their involvement in physical activity. These obstacles encompass perceived inadequacy, lack of energy, concerns related to childcare, and fears. Additionally, financial considerations, discomfort, and adverse weather conditions are among the other barriers reported.

**Discussion**

Maternal mortality is still a major worldwide health issue, and the health sector must give this issue immediate attention in order to reduce death and morbidity (Group & Division, 2019). According to research conducted by Wang *et al.* (2017), it was recommended that pregnant women engage in moderate exercise sessions of at least 15 minutes in duration undertaken 3-5 times weekly in order to maintain a healthy gestation (Wang *et al.*, 2017). Such physical activity was posited to aid in preserving a favourable body weight and lowering the likelihood of developing gestational diabetes mellitus while also enhancing mental and emotional wellness (Janakiraman *et al.*, 2021). Prior studies found that these antenatal physical exertions yielded significant improvements in fetal health parameters and led to expedited labour progress marked by shortened delivery times and mitigated back discomfort (Jarni *et al.*, 2021). However, additional findings revealed that nearly 60% of pregnant individuals reported a sedentary lifestyle, a rate higher than the 30% prevalence observed in the general adult population. Moreover, antenatal care has been shown to be paramount for maximising health outcomes and well-being amongst expectant mothers and developing fetuses (Kaur *et al.*, 2021).

Additionally, engaging in physical activity has been shown to be paramount for sustaining complete wellness and minimising pregnancy-associated complications (Artal,

2016). Notable disagreement persists regarding the impact of physical exertion on expectant individuals classified as overweight or obese (Du *et al.*, 2019). These mothers demonstrate a reduced incidence of such antenatal physical activity compared to women exhibiting healthy body weight, thereby increasing susceptibility to adverse consequences (Johansson *et al.*, 2014). Numerous studies have conclusively demonstrated the unfavourable outcomes associated with maternal obesity and overweight during pregnancy, such as an elevated likelihood of stillbirth and neonatal mortality (Du *et al.*, 2019). Furthermore, obesity and excessive weight in mothers have been linked to physical health issues affecting both mothers and neonates, including preeclampsia, macrosomia, and gestational diabetes (Du *et al.*, 2019). Studies suggest that consistent physical exercise is essential for fostering well-being among women, particularly throughout the periods preceding conception, during pregnancy, and the early postpartum stages, with minimal accompanying risks (Du *et al.*, 2019). Low-impact home-based physical activity undertaken individually may confer greater benefits for women struggling with poor body image as compared to group exercise programs. However, engaging in exercise that does not involve supporting one's body weight is anticipated to reduce strain on ligaments and joints (Seneviratne *et al.*, 2016).

Moreover, a recent study conducted in Brazil revealed that 23% of women engage in physical activity when pregnant, with half of them reducing or quitting their exercise routines due to pregnancy (Alaglan *et al.*, 2020). According to a study conducted in the United States, 29% of women participated in physical activity before and during pregnancy, while an additional 4% started exercising during pregnancy (Harris *et al.*, 2015). Significantly, these percentages are higher in comparison to the overall Saudi population, where approximately 12% adhered to the recommendations for physical activity, as indicated by a nationwide survey (Bcheraoui *et al.*, 2016). Considering the widespread inactive way of life, it is plausible that women maintain a sedentary lifestyle during pregnancy (Nascimento *et al.*, 2012). The need of regular physical activity in maintaining the balance of social, emotional, and physical health is becoming more widely acknowledged by medical professionals (Al-Youbi & Elsaid, 2020). The majority of people failed to meet the recommended levels of physical activity as outlined by established guidelines. Prior studies have indicated a significant occurrence of excessive gestational weight gain among pregnant women in Saudi Arabia (Al-Youbi & Elsaid, 2020). This condition is believed to be linked to a deficiency in understanding the correlated health hazards during pregnancy.

Additionally, a study by Ghadi & Tarek (2020), assessed the understanding of physical activity requirements among pregnant women in Saudi Arabia and identified factors contributing to their lack of activity (Al-Youbi & Elsaid, 2020). Pregnancy is crucial for managing body weight, maximising health outcomes for both mother and fetus and developing enduring health habits. Moreover, physical activity patterns change during pregnancy, and several studies suggest that healthcare practitioners should provide comprehensive education on the safety and benefits of engaging in physical activity to promote health and weight management (Hayman *et al.*, 2020). The study found that 58.4% of pregnant women lack awareness and involvement in physical activity, while 50.67% understand the requirements. Only 15.8% adhere to exercise standards. A US study found that 32% of pregnant women met necessary levels during early pregnancy but decreased to 12% as the pregnancy progressed (Ruifrok *et al.*, 2014).

The present study examined the exercise among pregnant females in antenatal clinics and the prevalence and barriers of physical inactivity. This study aimed to investigate and analyze the energy expenditure of pregnant women measured in MET-h/day, considering total activity, intensity level, and type of activity. These findings offer valuable insights into the exercise habits of pregnant women within the study population. The obstetric characteristics of the participants provide essential insights into their reproductive history and current pregnancy status. The majority of participants had three or more pregnancies (68%), and most had two or more children (70%). The results align with previous studies in Arab countries, indicating a preference for larger families demonstrated by Salam *et al.* (2023). Notably, a high percentage of women with three or more pregnancies suggests a significant presence of multiparous women in the sample, who may have distinct exercise patterns compared to primiparous women (Salam & Potty, 2023).

However, the prevalence of abortion among participants was 41%, significantly higher than reported in previous studies (Al-Ebadi *et al.*, 2021). This high prevalence underscores the importance of considering the physical and emotional aspects of previous pregnancy losses when designing exercise programs for pregnant women (Moradinazar *et al.*, 2020). Regarding energy expenditure by type of activity, studies have consistently reported higher energy expenditure for physically demanding activities such as household chores and sports or exercises (Azo & AKBAY, 2016). The present study findings align with these previous studies, confirming that household and caregiving activities require substantial energy expenditure. Also, the mean energy expenditure for occupation-related activities in the present study was similar to previous literature, which indicates that occupational activities fall into the light energy expenditure (Newton Jr *et al.*, 2013).

This difference could be attributed to variations in occupational demands or differences in participant demographics across studies. The study evaluated energy expenditure patterns based on total activity, intensity level, and activity type. It revealed significant variability across different activities and intensity levels. In contrast, other differences may be due to participant characteristics, activity protocols, or measurement methods. The

findings contribute to the growing knowledge of energy expenditure and can inform future research and interventions for promoting physical activity and maintaining energy balance. Moreover, when comparing these findings with the existing literature, several consistent barriers to exercise among pregnant women were identified as lack of facilities, financial instability, lack of interest, fear of harm during pregnancy, muscle and joint pain, inability to work, and lack of awareness regarding the importance of physical activity among pregnant women (Rockliffe *et al*., 2021). Previous studies have consistently reported concerns about the safety of exercise for the developing fetus and potential pregnancy complications as significant barriers to physical activity during pregnancy (Ahmadi & Amiri-Farahani, 2021). However, the lack of facilities such as parks or gyms (53%) and lack of a companion to exercise with (53%) were reported at higher frequencies in the current study compared to previous studies in which it has been identified as enabler rather than barrier (Ahmadi & Amiri-Farahani, 2021). Furthermore, financial reasons (44%) and disliking exercise (30%) emerged as notable barriers in the current study. However, physical activities, including mandatory exercise sessions, have been proven to improve pregnant women's physical activity levels, potentially reducing gestational weight gain, boosting self-efficacy in exercise, and reducing pregnancy-related discomfort and sadness, as well as mitigating gestational weight gain (Lott *et al*., 2019).

## CONCLUSION

In conclusion, this study conducted a thorough investigation of physical activity levels among pregnant women in Tabuk, Saudi Arabia. The results of this study contribute to the global conversation surrounding the promotion of physical activity during pregnancy. Furthermore, these findings have the potential to influence the development of targeted interventions and strategies aimed at fostering a healthier lifestyle for pregnant women in the region.

### Limitations and Strengths

- The cross-sectional design of the study and the exclusion criteria employed may limit the generalizability and applicability of the findings to pregnant women with chronic systemic illnesses.
- Nevertheless, the study's notable strengths lie in its diverse participant group, meticulous data collection, analysis of energy expenditure, and identification of barriers to exercise during pregnancy.
- This comprehensive study provides valuable insights that can inform healthcare practitioners and policymakers in their decision-making processes.

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