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**Annals of Clinical and Analytical Medicine**

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**Prevalence of Exercise and its Determinants among Pregnant Women Attending Antenatal Care Clinic in Al-Kaakiah Primary Health Care Center in Makkah: A Cross-sectional Study**Reem Filfilan <sup>(1)</sup> \*, Nehal Damanhour <sup>(2)</sup>*(1) Family Medicine Resident R2, Saudi Board of Family Medicine, Makkah, Saudi Arabia**(2) Family Medicine consultant, Saudi Board of Family Medicine, Saudi Arabia*

Received 26/12/2020; revised 4/1/2021

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**\*Corresponding author**

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**Abstract**

**Introduction:** Pregnancy is a special period of time, where the mother is taking care of herself as well as her fetus. Since exercise could prevent many complications may occur during pregnancy, like gestational diabetes, it's important to assess the engagement and awareness about physical activity during pregnancy. This study aimed to evaluate the prevalence of physical exercise and its determinants among pregnant women attending antenatal care clinic.

**Methods:** This is a cross sectional study recruited pregnant adult women attending ANC clinic in Al-Kaakiah PHC center in Makkah. Those who were not eligible to be followed in PHCC or had contraindication to exercise according to ACOG guidelines were excluded from this study. The sample size equals 104 selected randomly from 11 PHCCs. A self-administered questionnaire was used to collect data from pregnant women. The questions investigated sociodemographic variables, reproductive factors, and patterns of exercise. The descriptive statistics such as frequencies, percentages were calculated to summarize nominal and ordinal data, while mean, median and standard deviation or the range to describe numerical variables. Chi-squared test was applied to evaluate the association between the determinants and the engagement in physical exercise.

**Results:** A total sample of 105 pregnant women, the majority of women aged 26-35 years old (62.9%), while only 14.3% were at age group older than 35. About 77% of pregnant women had no comorbidities and only 33% had comorbidities, namely, anemia, cervical insufficiency, and gestational diabetes. The prevalence of physical exercise during pregnancy was 57.1% which most commonly involved running and swimming. Age, BMI, income, educational level, and nationality were not significantly associated with physical exercise during pregnancy. Presence of walking path in neighborhood was significantly related to physical exercise during pregnancy. Pregnancy factors such as gestational age, previous miscarriage, awareness about physical exercise pregnancy were not significantly related to practicing during pregnancy.

**Conclusions:** The prevalence of physical activity among pregnant women was inadequate with running and swimming being the most common exercises. This study identified the target group for educational campaigns which include pregnant housewives who has no walking path in the neighborhood.

**Keywords:** Physical exercise, Pregnancy, Comorbidities, Activity, Obese, Gestational diabetes

## Introduction

According to WHO has defined physical activity is any bodily movement produced by skeletal muscles that require energy expenditure. Exercise is planned, structured, repetitive, and purposeful [1].

Regular exercise during uncomplicated pregnancy can improve gestational weight control, protect against gestational diabetes mellitus, pre-eclampsia, and postpartum depression [2]. The prevalence of physical activity among healthy pregnant women in Ireland, only (21.5%) women met the current American College of Obstetricians and Gynecologists (ACOG) and the Royal College of Obstetricians and Gynecologists (RCOG) recommend 30 minutes of daily moderate-intensity physical activity for pregnant women, and (11.7%) reported no physical activity at all. Overall, almost one-quarter of the women (24%) said walking (including both brisk and easy paces) for more than 30 minutes on 5 or more occasions in an average week [3].

Another study about the prevalence of physical activity in the US showed a lower rate between pregnant women than non-pregnant women (15.8% vs 26.1%). Walking was the most common leisure activity for pregnant women, followed by activities such as swimming, weight lifting, and aerobics [4]. ACOG said that “bed rest is not effective for the prevention of preterm birth and should not be routinely recommended.” Prolonged bed rest or limited physical activity in pregnant women are at risk of venous thromboembolism, bone demineralization, and deconditioning [5].

It was stated that obese and overweight females when getting pregnant, they became under higher risk of complication during their pregnancy as well as her baby as a result of their increased weight [6]. There is a high prevalence of obesity among pregnant Saudi women, in a study from Aseer region from Saudi Arabia [7]. It was found that most of the pregnant women who attended primary health care center were either obese or overweight. Another retrospective Saudi study reported that both overweight and obesity were common among pregnant women (more than 52%) [6]. This reflects the importance of practicing physical activities and may reflect the low

prevalence of physical activity. The information about the physical activity level and another lifestyle among Saudi adult women are lacking. A study from Jeddah, Saudi Arabia reported that there was a high prevalence of abdominal obesity, general obesity and physical inactivity in the female with reproductive age with no significant association between physical activity and type of obesity [8]. However, the high prevalence of physical inactivity may be associated with increased weight and other factors. Another Saudi study reported that there was a high level of inactivity among Saudi women with an association between physical activity and health beliefs [9].

Pregnancy is a special period of time, where the mother is taking care of herself as well as her fetus. Since exercise could prevent many complications may occur during pregnancy, like gestational diabetes, it's important to assess the engagement and awareness about physical activity during pregnancy. Moreover, the researcher noticed during her training in antenatal care clinic that a lot of pregnant women do not exercise during pregnancy. This study aimed to evaluate the prevalence of physical exercise and its determinants among pregnant women attending antenatal care clinic.

## Methods

This is a cross sectional study recruited pregnant adult women attending ANC clinic in Al-Kaakiah PHC center in Makkah during study period from DD to DD 2020. Exclusion criteria were women with contraindication to exercise according to ACOG guidelines. Those who were not eligible to be followed in PHCC (previous still birth, history of 3 or more consecutive spontaneous abortion, birth of wt. of last baby <2500g or >4500g, last pregnancy hospital admission of eclampsia/pre-eclampsia) were excluded from this study.

The estimated number of pregnant ladies attending ANC clinic in four weeks duration was found to be 120. The sample size was calculated by Raosoft statistical program, and the result was 92. Moreover, A 10% added to overcome the expected number of defaulters and non-responders and possible number of those not eligible to follow up in PHCC and those contraindications to exercise. Therefore, the sample size equals 104. Out of eleven PHCCs located in Al-

Kaakiah sector, Al-Kaakiah PHCC was selected randomly by random sampling technique using a random number generator. Convenient sampling was applied at the selected PHC in order to cover the largest number of pregnant women in the limited timeline provided.

A self-administered questionnaire was used to collect data from pregnant women. The questions investigated sociodemographic variables (age, nationality, smoking, nutritional status, Body mass index (BMI), level of education, occupational status and socioeconomic status. Moreover, questions about reproductive factors (gravidity, parity, GDM, and ANC follow up visits), in addition to patterns of exercise (exercise frequency, time, place, duration of the exercise) were included in the questionnaire. The questionnaire was constructed by the researcher and validated by 2 consultants in the same field, then it was tested during the pilot study. Piloting carried out in 12 pregnant women attending Al-Eskan PHCC, with the application of the full methodology and analysis of results. The method, the feasibility, and duration were assessed and necessary changes were made.

The researcher distributed the questionnaire to participants during waiting time for their appointments at the waiting area. The researcher introduced herself to the participant and explained briefly what the research is about and what does the questionnaire contain. Answering the questionnaire may take around 10 minutes.

The researcher obtained written consent from the participant which included; the participant has the right to choose either to participate in the research or not, she has the choice to withdraw anytime without any consequences, all her information is confidential and will be used only in the research purposes.

Permission from the Directorate of Health Affairs of the Holy Capital (IRB Committee) and approval from the joint program of family and community medicine in Makkah were obtained before data collection.

Data were entered and analyzed by Statistical Package of Social Science SPSS, version 26. The descriptive statistics such as frequencies, percentages were calculated to summarize nominal and ordinal data, while mean, median and standard deviation or the range to describe numerical variables. Chi-

squared test was applied to evaluate the association between the determinants and the engagement in physical exercise. Any P-value < 0.05 was considered as an indication for a statistically significant association or difference.

## Results

A total sample of 105 pregnant women, attending antenatal care clinic, were included in this study. The majority of women aged 26-35 years old (62.9%), while only 14.3% were at age group older than 35. More than half of the women (55.2%) were housewives in comparison to 8.6% students and 36.2% employee. About 62% of the respondents have graduated from university while approximately 5% had less than high school education. Saudis respondents accounted for 83.8%. regarding income, 23.8% had a high income (10,000) SR while 42% had no any regular type of income. Regarding lifestyle factors, prevalence of smoking and obesity was 6.7% and 12.4%, respectively. About 54% of the respondents said they have a walking path in neighborhood (table 1).

Table 2 demonstrates factors related to pregnancy and clinical state of the respondents. About 52% of women were pregnant in 2nd trimester, while 14.3% and 33.3% were pregnant at first and third trimesters, respectively. The percentage of women with regular follow-up visits during pregnancy was 88%. Mean number of children per women was  $1.32 \pm 1.48$ , with 41% of women was at the first pregnancy and only 10.45 had more than three children. Three quarters of women have not experienced miscarriage and the majority of remaining women had experience miscarriage only once. About 77% of pregnant women had no comorbidities and only 33% had comorbidities, namely, anemia, cervical insufficiency, and gestational diabetes which were reported by 6.7%, 6.7% and 4.8% of the respondents. The mean number of water glasses taken by the respondents daily was  $2.63 \pm 0.9$  with 52.4% of the respondents drink more than 4 glasses per day.

Patterns of physical activity among pregnant women was demonstrated in table 3. The daily activity of pregnant women ranged from house

**Table (1): Demographic and background characteristics of the respondents (n = 105)**

Variables	Frequency	Percent (%)
<b>Age</b>		
18-15	24	22.9
26-35	66	62.9
36-45	15	14.3
<b>Occupation</b>		
House wife	58	55.2
Student	9	8.6
Employee	38	36.2
<b>Educational level</b>		
Elementary certificate	4	3.8
Intermediate certificate	1	1.0
High school	35	33.3
University degree	65	61.9
<b>Nationality</b>		
Saudi	88	83.8
Non-Saudi	17	16.2
<b>Income</b>		
Less than 3000 SR	14	13.3
3000 - 10000 SR	22	21.0
More than 10000 SR	25	23.8
I don't have salary	44	41.9
<b>Smoking</b>		
Yes	7	6.7
No	98	93.3
<b>BMI</b>		
Underweight	8	7.6
Normal weight	55	52.4
Overweight	24	22.9
Obese	13	12.4
<b>Have walking path in neighborhood</b>		
Yes	57	54.3
No	48	45.7

activity such as housekeeping and child care (70.5%), gardening (24.8%) to work with physical efforts (8.6%). More than half of women (53.3%) stated that they had information about exercising during pregnancy. Among those who had knowledge, the source of knowledge was doctors, social media, and nurses in 25%, 25% and 14.3%.

The prevalence of physical exercise during pregnancy was 57.1% among the respondents. Moreover, about 30% were warming up before doing physical exercise. Running was the most common type of physical exercise that was reported by 43.8% of the respondents followed by swimming (29.5%), jumping (15.2%). Basketball, horse riding, football, and diving was the least common physical exercise which reported by only two respondents (1.9%). Regarding the intensity of exercising, swimming and running has the highest duration which could last for more than one hour (table 4).

Association between physical exercise and background factors was demonstrated in table 5. Age, BMI, income, educational level, and nationality were not significantly associated with physical exercise during pregnancy. The percentage of students who practice during pregnancy (88.9%) was significantly higher than that among employee (63.2%) and housewives (48.3%) with  $p$  value= 0.047. Interestingly, all pregnant smokers exercised during pregnancy in comparison to only 54.1% of non-smokers pregnant women ( $p= 0.018$ ). Presence of walking path in neighborhood was significantly related to physical exercise during pregnancy ( $p= 0.001$ ).

Pregnancy factors such as gestational age, previous miscarriage, awareness about physical exercise pregnancy were not significantly related to practicing during pregnancy as demonstrated in table 6. However, factors such as doing gardening, housekeeping, and child care were significantly associated with physical exercise during pregnancy ( $p<0.001$  and 0.019, respectively). Although the percentage of women who practice during pregnancy was higher in those who reported TV (100%), medical sites (71.4%), and nurses (62.5%) as the main source of knowledge than other women, the differences were not statistically significant ( $p=0.184$ ).

## Discussion

It is clear from the literature that physical exercise is recommended for pregnant women in the absence of absolute contraindications. Exercise is safe and beneficial for mother and fetus because it leads to better control of gestational weight and diabetes with improvement in urinary problems. The evidence

**Table (2): Distribution of the pregnancy and clinical characteristics among the respondents**

Variables	Frequency	Percent (%)
<b>Follow-up of Pregnancy in ANC Clinics</b>		
Regular	92	87.6
Not regular	13	12.4
<b>Current gestational age</b>		
First trimester	15	14.3
Second trimester	55	52.4
Third trimester	35	33.3
<b>Number of children</b>		
None	43	41.0
1-3	51	48.6
4-6	11	10.4
<b>Previous miscarriage</b>		
Yes	Yes	Yes
No	No	No
<b>Number of previous miscarriages</b>		
0	79	75.2
1	18	17.1
2	7	6.7
3	1	1.0
<b>Comorbidities</b>		
Gestational diabetes	5	4.8
Anemia	7	6.7
Vaginal bleeding	1	1.0
Cervical insufficiency	7	6.7
Previous premature birth	1	1.0
Placenta previa after 26 weeks of pregnancy	2	1.9
Current premature birth	1	1.0
None	81	77.1
<b>How many glasses of water do you drink a day?</b>		
1 -2	10	9.5
3 -4	40	38.1
5 - 6	34	32.4
More than 6	21	20.0

supports that healthy pregnant women should practice a light or moderate physical activity at least

3 times per week. However, there is no a well-established evidence about physical exercise among women with chronic diseases such hypertension [10]. This study aimed to evaluate the prevalence of exercise and its determinants among pregnant women attending antenatal care clinic.

The current study found that the percentage of women who did physical exercise during pregnancy was 57.1% among the respondents. However, self-reported physical exercise was not judged to well established criteria for physical exercise such as ACOG guidelines. Differently, in the United States, the percentage of women who physically exercise during the 3rd trimester of pregnancy was higher than that reported in this study with 93% practiced for at least one time per week [2]. About 60% of Japanese 3rd trimester women do physical exercise or sports [11]. In Brazil, only a quarter of pregnant women continue to exercise during pregnancy while about a half of women decrease or stop exercising during pregnancy [12].

A previous Saudi study found 41.6% of pregnant women were highly aware about exercising during pregnancy and all of them regularly do physical exercise [13]. A higher percentage of women in Qassim region engaged in physical activity (75%) [14].

In Germany, a 50% reported unchanged physical exercise behavior and most of them did not exercise during pregnancy, while those who exercised before pregnancy were more likely to exercise during pregnancy [15]. Similar reduction of physical activity with pregnancy was reported by 60% of British pregnant women in a longitudinal study included more than 9889 participants [16]. Although Nigeria is a developing country, a high level of engagement in the physical activity (84.7%) reported among pregnant women [17]. Thus, engagement in physical activity among pregnant women is not related to the economic status of the country. Type of physical exercise seems to be more related to the availability of resources. For example., engagement in the swimming depends on availability of swimming facilities.

In the present study, about 77% of pregnant women had no comorbidities and only 33% had comorbidities, namely, anemia, cervical

insufficiency, and gestational diabetes which were reported by 6.7%, 6.7% and 4.8% of the respondents. The most common comorbidities in American women were hypertension and gestational diabetes [2], while the most common comorbidities among German pregnant women were arterial hypertensin, asthma, gestational diabetes and mental illness [15].

In the current study, running was the most common type of physical exercise that was reported by 43.8% of the respondents followed by swimming (29.5%), jumping (15.2%). Basketball, horse riding, football, and diving was the least common physical exercise which reported by only two respondents (1.9%). Differently, the most common type of physical exercise among British pregnant women was brisk walking, which was exercised once per week by 73.7% of women and more than 2 hours by 46.2% of the women. The second most frequently reported exercise was swimming, which was practiced by 41.2% of British women [16]. Aerobic and stretching were the most common physical exercises reported among 43.5% and 33.4% of Nigerian women, while the swimming was the least practiced exercise [17]. Saudi women in Qassim region preferred to do walking as the most common type of physical exercise [14].

About 12% of the respondents were obese which was slightly lower than 15% reported in American pregnant women [2]. We found body mass index not significantly associated with physical exercise during pregnancy. Similar results were reported among American women at the 3rd trimester of pregnancy [2].

More than half of women (53.3%) stated that they had information about exercising during pregnancy. Among those who had knowledge, the source of knowledge was doctors, social media, and nurses in 25%, 25% and 14.3%. Similarly, about 72% of American pregnant women reported that they received advices regarding physical exercise from healthcare providers [2]. Moreover, 48% of German women received advice about physical exercise from medical practitioners, while one third have information from magazines and internet [15]. These sources of knowledge were reported to be sufficient to make 90% German women informed.

In the present study, age, educational level and income were not significantly associated with physical exercise during pregnancy among the

**Table (3): Patterns of physical activity reported by the respondents**

Variables	Frequency	Percent (%)
<b>Activity during work or study</b>		
Not an employee	59	56.2
Sitting in the office the whole time.	27	25.7
Most of the time at work either standing or walking - Does not require much physical effort.	10	9.5
The workplace requires an apparent physical effort including handling heavy things and using tools.	8	7.6
The workplace requires intense physical activity, Including handling heavy things.	1	1.0
<b>Housekeeping and child care</b>		
None	31	29.5
Less than 30 min	8	7.6
30 min to hour	18	17.1
Much more	48	45.7
<b>Care of the garden</b>		
None	79	75.2
Less than 30 min	17	16.2
30 min to hour	7	6.7
Much more	2	1.9
<b>How many times per week you do physical activity?</b>		
None	None	None
1 – 2 in week	20	19.0
3 – 4 in week	34	32.4
5 – 7 in week	33	31.4
<b>Do you have information about exercising during pregnancy?</b>		
Yes	56	53.3
No	49	46.7
<b>Source of knowledge about exercising during pregnancy</b>		
Nurse	8	14.3
Doctors	14	25
Medical sites	7	12.5
TV	7	12.5
Books	6	10.7
Social media	14	25

respondents which is similar to the results reported among American pregnant women [2]. However, a large-scale longitudinal study found significant association between physical activity and each of age and education among British women [16]. Women with high education (some university) were more likely to do intense physical activity than women with lower education. Similarly, highly educated Nigerian pregnant and nursing women were more likely to exercise than less educated women (secondary school or less) [17].

A study conducted in Riyadh, Saudi Arabia, found non-significant relation between age and physical activity [13]. However, high education was significantly related to more awareness and subsequently more engagement in physical activity in Saudi women [13]. Age of Saudi women in Qassim region was found significantly higher physical activity among younger age than that among older age group [14].

In the present study, occupation was significant determinant of physical activity with higher percentage of students exercised than employee or housewives. Moreover, occupation was a significant predictor in pregnant British women [16]. The findings of this study revealed that all pregnant smokers exercised during pregnancy in comparison to only 54.1% of non-smokers pregnant women ( $p=0.018$ ). Similar findings were reported among American women where smokers were two times more exercising than non-smokers during pregnancy [2]. Furthermore, British smoker women were more likely to exercise than non-smokers [16].

The limitations of this study included limited sample frame which involved mainly pregnant women regularly attending WHC while only 12% were not regular attendants. The accessibility to women with irregular antenatal follow-up is apparently low in this study, which limits the generalization of the finding. The second limitation is dependence on self-reported physical activity with lack of predetermined criteria to defined what should be considered as light, moderate and intense physical activity.

## Conclusions

The prevalence of physical activity among pregnant women was inadequate with less than half of women did not exercise during pregnancy. Running was the most common type of physical exercise followed by swimming, jumping, and basketball. Age, BMI, income, educational level, and nationality were not significantly associated with physical exercise during pregnancy. Pregnant women who were students, smokers, or had a walking path in neighborhood exercised significantly more than housewives, non-smokers and those had no walking path in the neighborhood.

## Conflict of interests:

The authors declared no conflict of interests.

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**Table (4): Types and intensity of physical exercise during pregnancy**

Variables	Frequency	Percent (%)
<b>Do you do physical exercise during pregnancy?</b>		
Yes	60	57.1
No	45	42.9
<b>Do you warm up before physical exercise?</b>		
Yes	31	29.5
No	74	70.5
<b>Swimming</b>		
None	74	70.5
Less than 30 min	19	18.1
30 min to hour	11	10.5
Much more	1	1.0
<b>Running</b>		
None	59	56.2
Less than 30 min	25	23.8
30 min to hour	18	17.1
Much more	3	2.9
<b>Tennis</b>		
None	102	97.1
Less than 30 min	3	2.9
<b>Jumping</b>		
None	89	84.8
Less than 30 min	12	11.4
30 min to hour	2	1.9
Much more	2	1.9
<b>Aerobic</b>		
None	90	85.7
Less than 30 min	7	6.7
30 min to hour	8	7.6
<b>Basketball</b>		
None	103	98.1
30 min to hour	2	1.9
<b>Football</b>		
None	103	98.1
Less than 30 min	2	1.9
<b>Horse riding</b>		
None	99	94.3
Less than 30 min	6	5.7
<b>Diving</b>		
None	103	98.1
Less than 30 min	2	1.9
<b>Ride bike</b>		
None	91	86.7
Less than 30 min	10	9.5
30 min to hour	4	3.8

**Table (5): Association between physical exercise and background factors**

Variables	Physical exercise during pregnancy		Chi-square	P value
	Yes	No		
<b>Age</b>				
18-15	14	10	0.79	0.674
	58.3%	41.7%		
26-35	39	27		
	59.1%	40.9%		
36-45	7	8		
	46.7%	53.3%		
<b>BMI</b>				
Underweight	5	3	1.5	0.688
	62.5%	37.5%		
Normal	35	20		
	63.6%	36.4%		
Overweight	12	12		
	50.0%	50.0%		
Obese	7	6		
	53.8%	46.2%		
<b>Nationality</b>				
Saudi	49	39	0.47	0.491
	55.7%	44.3%		
Non-Saudi	11	6		
	64.7%	35.3%		
<b>Occupation</b>				
House wife	28	30	6.1	0.047*
	48.3%	51.7%		
Student	8	1		
	88.9%	11.1%		
Employee	24	14		
	63.2%	36.8%		
<b>Smoking</b>				
Yes	7	0	5.6	0.018*
	100.0%	0.0%		
No	53	45		
	54.1%	45.9%		
<b>Income</b>				
Low income (<10,000)	46	34	0.02	0.895
	57.5%	42.5%		
High income (>10,000)	14	11		
	56.0%	44.0%		
<b>Education</b>				
< high school	2	3	0.63	0.649
	40.0%	60.0%		
High school or higher	58	42		
	58.0%	42.0%		

<b>Have walking path in neighborhood</b>				
Yes	39	18	6.48	0.011*
	68.4%	31.6%		
No	21	27		
	43.8%	56.3%		

**Table (6): Association between physical exercise and maternal factors**

Variables	Physical exercise during pregnancy		Chi-square	P value
	Yes	No		
<b>Trimester</b>				
First	8 53.3%	7 46.7%	0.22	0.896
Second	31 56.4%	24 43.6%		
Third	21 60.0%	14 40.0%		
<b>Previous miscarriage</b>				
Yes	13 46.4%	15 53.6%	1.8	0.181
No	47 61.0%	30 39.0%		
<b>Information of exercising during pregnancy</b>				
Yes	33 58.9%	23 41.1%	0.16	0.693
No	27 55.1%	22 44.9%		
<b>Housekeeping and child care</b>				
Yes	51 68.9%	23 31.1%	14.2	<0.001*
No	9 29.0%	22 71.0%		
<b>Gardening</b>				
Yes	20 76.9%	6 23.1%	5.52	0.019*
No	40 50.6%	39 49.4%		
<b>Source of knowledge about exercising during pregnancy</b>				
Nurse	5 62.5%	3 37.5%	7.52	0.184
Doctors	6 42.9%	8 57.1%		
Medical sites	5 71.4%	2 28.6%		
TV	7 100.0%	0 0.0%		
Books	3 50.0%	3 50.0%		
Social media	7 50.0%	7 50.0%		

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