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Physical activity levels of pregnant women at the time of diagnosis with gestational diabetes attending a tertiary care hospital in Lucknow City, Uttar Pradesh

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ABSTRACT

Background: Gestational Diabetes Mellitus (GDM) is one of the pregnancy complications characterized by carbohydrate intolerance that develops or is discovered during pregnancy. Physical inactivity and excessive gestational weight gain have been identified as independent risk factors for maternal obesity and pregnancy-related disorders, such as gestational diabetes. Awareness of the significance of physical activity for bodily and psychological health is vitally essential. The woman and her family members need to be swayed to change with time and let go of their myths and false cultural perceptions that exercise can harm the baby.

Objective: To determine the physical activity pattern of pregnant women at the time of diagnosis with GDM.

Materials and Methods: 188 pregnant women diagnosed with gestational diabetes mellitus was selected for the study. Pregnancy Physical Activity Questionnaire was used to calculate the duration; frequency, intensity, and type of physical activity during current gestational period. An average weekly energy expenditure in Metabolic Equivalent of Task (MET-h-week) was calculated. Demographic data including age, socioeconomic status, parity, literacy and working status were collected.

Results: Data was analysed on 188 pregnant women diagnosed with GDM. The physical activity of moderate intensity was less performed by the pregnant women. None of the pregnant women were involved in vigorous type of physical activity. Only light intensity activities were performed by the study participants.

Conclusion: The study concluded light intensity activity was commonly carried by pregnant women thus a low level of physical activity was observed during the pregnancy.

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1. Introduction

Gestational Diabetes Mellitus (GDM) is one of the pregnancy complications characterized by carbohydrate intolerance that develops or is discovered during pregnancy. It occurs in pregnant women whose pancreatic activity is insufficient to overcome the insulin resistance associated with pregnancy, leading in hyperglycemia.¹ It does not rule out the likelihood that undiagnosed glucose intolerance

developed before or at the same time as the pregnancy.² Gestational diabetes is a transient condition that resolves once the baby is born. India has the second-highest prevalence of patients with type 2 diabetes mellitus worldwide. In 2019, about 17.8 million of the 20.9 million pregnancies that were linked to hyperglycaemia were attributed to GDM, worldwide. There were more than 5 million cases of GDM in India alone.³ In India, the prevalence of GDM varies from place to place because there are different methods to diagnose it, difference in socioeconomic status, and different eating habits. GDM

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poses a substantial health risk for the future onset of type 2 diabetes mellitus. This might contribute to the total growth in the diabetes burden in the country, however GDM remains a neglected concern, especially in developing countries. Thus, from the perspective of primary prevention it is very vital to understand that GDM is clearly a risk factor for development of diabetes in future. Therefore, it is important to understand the activity level of the pregnant women in India so that timely intervention can be targeted to this vulnerable population. In 2002-2003, a random survey was done in different cities in India. The total prevalence of GDM was found to be 16.55 percent. In another study done in Tamil Nadu, 17.8% of women in cities, 13.8% of women in semi-urban areas, and 9.9% of women in rural areas were found to have GDM.^{4,5} Physical inactivity and excessive gestational weight gain have been identified as independent risk factors for maternal obesity and pregnancy-related disorders, such as gestational diabetes.⁶⁻⁸ Women with unhealthy lifestyles should consider pre-pregnancy and pregnancy as a chance to develop healthier behaviours. Regular physical exercise before conception has been associated with a decreased risk of gestational diabetes.⁸ As per The American College of Obstetricians and Gynaecologists (ACOG's) recent guidelines, a patient-tailored exercise regimen leading to moderate-intensity activity for at least 20–30 minutes per day on most or all days of the week should be devised and modified as medically required. Women who were sedentary prior to pregnancy should increase their physical activity more gradually. Women who were regular exercisers prior to pregnancy and who have healthy pregnancies should be able to participate in high-intensity exercise regimens, such as running and aerobics (unless contraindicated in the pregnancy), without experiencing detrimental consequences.⁹

Conservative beliefs and myths that pregnancy and exercise are hazardous for the expecting mother and the foetus, many women are reluctant to participate in prenatal exercise programs out of concern that it would harm both the foetus and themselves. Furthermore, cultural beliefs also have a significant impact on the same.¹⁰ Since ancient times, pregnant women in our nation have been expected to rest or perform minimal activity. Awareness of the significance of physical activity for bodily and psychological health is vitally essential. According to a study, Indian women are less physically active and more obese than men.^{11,12} The fact that pregnant women tend to be less active and eat for two further reinforces this perception. The importance of exercise for pregnant women is mostly obscure among Indian women.^{13,14}

The objective of the present study was to estimate physical activity levels of among pregnant women at the time of diagnosis with GDM attending a tertiary care hospital.

2. Materials and Methods

The present descriptive observational study was carried out on 188 pregnant women with GDM who attended antenatal OPD at Queen Mary Hospital at King George's Medical University, Lucknow, Uttar Pradesh between November 2021 to June 2022. All the study participants were treated with lifestyle modification (diet regimen, physical activity, and counselling). The pregnant women were diagnosed with GDM as per the Diabetes in Pregnancy Study Group in India (DIPSI) criteria¹⁵ i.e., blood glucose greater than or equal to 140 mg/dl two hours after 75-grams oral glucose administration, regardless of the previous meal timing. The study participants were selected by consecutive sampling method as per the inclusion and exclusion criteria. The inclusion criteria for the study participants were pregnant women who were diagnosed with GDM according to DIPSI criteria and those who were living within a 15-kilometer radius of KGMU, Lucknow. The exclusion criteria were pregnant women diagnosed with Type 1 & Type 2 Diabetes Mellitus before their current pregnancy, GDM cases with spontaneous or recurrent abortion, GDM cases on corticosteroids and treating obstetrician did not find the pregnant women fit for study because of any obstetric complication. The data collection was started after the clearance from Institutional Review Board, KGMU, Lucknow, Uttar Pradesh India (110th ECM II B-PhD/P2) and written consent was obtained from the study participants. The pregnant women diagnosed with GDM were interviewed using a pretested semi structured interview schedule that included details on sociodemographic variables, past and present obstetric history. Socioeconomic status was assessed using modified Kuppaswamy socioeconomic scale. A portable weighing scale with a 125 kg capacity and a 0.5 kg sensitivity was used to measure weight. Before each measurement, it was set up on a level surface and made sure it was balanced at zero. To ensure precise measurements, the patients were weighed barefoot, in minimal clothes, looking forward, and with their body weight uniformly distributed over both feet. The individual was weighed to the closest 100 gms. The height was measured using a wall-mounted stadiometer with the measurement adjusted to the closest 1 cm. The pre-pregnancy weight (kg) or first trimester weight (if pre-pregnancy weight was not available) was used to compute the Body Mass Index (BMI). The pregnant women in this study had their physical activity levels evaluated at the time of their GDM diagnosis.

2.1. Physical activity assessment

The Pregnancy Physical Activity Questionnaire (PPAQ), a standardized questionnaire, was used to determine physical activity. It was developed by Lisa Chasan-Taber to quantify the entire level of activity. The PPAQ has been validated

for estimating physical activity among pregnant women in India with excellent reliability and validity.¹⁶ It is a semi-quantitative questionnaire that asks the respondents to report on the time spent participating in 32 activities, including household/caregiving (13 activities), occupational (5 activities), sports/ exercise (8 activities), transportation (3 activities), and inactivity (3 activities). We followed the calculation guidelines described by Chasan-Taber et al., to deduct the daily energy expenditure and classify the participants into different metabolic equivalent (MET) categories: sedentary (<1.5 METs), light (1.5<3.0 METs), moderate (3.0–6.0 METs), or vigorous (>6.0 METs). The duration of time spent in each activity was multiplied by its intensity, specified by the original author, to arrive at a measure of average weekly energy expenditure (MET-h•week⁻¹) attributable to each activity.¹⁷

2.2. Statistical analysis

Data was analysed by SPSS version 24. Continuous data were presented as Mean ± Standard Deviation or Median and Interquartile Range (IQR) depending on the normality of data distribution. Independent sample t test and Man Whitney test was applied. A p value less than <0.05 was considered as significant. The result of different activities level is expressed in METh/week in all the tables and figures.

3. Results

A total of 188 study participants were enrolled. The mean age of the study participants was 28.5years± 4.2. Most of the study participants were graduate (52.1%) and 47.3 percent belonged to lower middle class. Majority (89.9%) of the study participants were homemaker and 64.4 % belonged to nuclear family. More than half of the of pregnant women were multipara (51.6%) and 36.6 & had at least one living children.

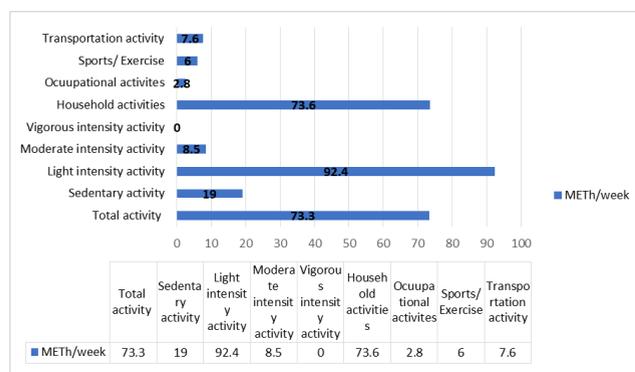


Figure 1: Intensity and type of physical activity of pregnant women

Figure 1 shows the overall physical activity pattern of the study participants with total activity level of 73.3 METh/week. They physical activity level of the study participants were mainly of light intensity type (92.4 METh/week) followed by household type of activities (73.6METh/week). None of the pregnant women were engaged in vigorous intensity activity.

Table 1 shows the mean activity level of the study participants belonging to different socioeconomic status. Pregnant women with GDM in upper and upper middle class had total activity level of 103±29. 2 METh/week and 93.4 ± 22.8 and 94.3± 22.5 MET h/week of those in lower middle and upper lower and lower socioeconomic class respectively. The total activity level was significantly higher among women belonging to upper and upper middle class (p=0.03) and they were also significantly involved in light intensity activities (79.6 ± 24.9; p=0.005).

Table 2 shows the physical activity pattern of pregnant with GDM in nuclear & joint family. The total activity level of the study participants in joint family was 101.7 ± 23.8 METh/week and that in nuclear family was 94.5 ± 26.0METh/week, but the difference was not statistically significant. On the other hand, women who belonged to joint family were more engaged in household activities (68.4 ± 17.9 METh/week) as compared to those residing in nuclear family (62.4 ± 18.5 METh/week) and the difference was statistically significant (p=0.03).

Table 3 shows the total activity level of working study participants (117.4 ± 32.7METh/week) was more than the homemakers (94.8 ± 23.5 METh/week) and this was found to be statistically significant (p=<0.001). The activity pattern of working group of the study participants were also significantly more in domains like light intensity, occupational and transportation activity

Table 4 shows multipara women were more involved in domestic chores (67.7 ± 16.9 METh/week) than primipara women (61.1 ± 19.5 METh/week; p=0.03) and the total physical activity level of multipara women were found to be more than primipara women but there was no significant difference between them. None of the pregnant female in this study were involved in vigorous level activity.

No significant association was found between age, pre-pregnancy body mass index, family history of diabetes mellitus, blood glucose level at the time of diagnosis of GDM, religion, period of gestation, history of abortion and physical activity level of pregnant women diagnosed with GDM.

4. Discussion

This study assessed the physical activity pattern of pregnant women diagnosed with gestational diabetes mellitus. The total physical activity score obtained in this study was 73.3 met hours/ week (10.4 METh/day) which is very less compared to the findings of other studies conducted by

Table 1: Activity level of pregnant women categorised as per socioeconomic class (N=188)

Factor	Socioeconomic status			p-value [¥]
	Upper & Upper Middle (N=64)	Lower Middle (N=89)	Upper Lower & Lower (N=35)	
Total Activity, mean ± SD	103.7 ± 29.2	93.4 ± 22.8	94.3 ± 22.5	0.036
By intensity				
Sedentary, mean ± SD	20.5 ± 9.6	18.2 ± 9.6	18.8 ± 10.6	0.37
Light Intensity Activity, mean ± SD	79.6 ± 24.9	68.6 ± 19.3	70.3 ± 16.2	0.005
Moderate Intensity Activity [€] , median (IQR)	6.4 (3.2, 9.6)	6.4 (3.2, 9.6)	6.4 (5.7, 9.6)	0.6
By type				
Household Activities, mean ± SD	66.4 ± 17.7	62.9 ± 19.5	65.3 ± 17.0	0.49
Sports/ Exercise, mean ± SD	5.9 ± 2.6	6.1 ± 2.6	6.2 ± 2.3	0.88
Transportation, median [€] (IQR)	8.8 (3.4, 10.0)	8.8 (3.4, 10.0)	8.8 (3.4, 8.8)	0.47

[¥]Independent Sample T-test; [€]Mann Whitney U test

Table 2: Activity level of pregnant women categorised as per the type of family (N=188)

Factor	Family		p-value [¥]
	Nuclear (N=121)	Joint (N=67)	
Total Activity, mean ± SD	94.5 ± 26.0	101.7 ± 23.8	0.062
By intensity			
Sedentary, mean ± SD	19.0 ± 10.2	19.3 ± 9.2	0.8
Light Intensity Activity, mean ± SD	71.7 ± 22.9	74.4 ± 18.4	0.41
Moderate Intensity Activity [€] , median (IQR)	6.4 (3.2, 9.6)	6.6 (3.2, 9.6)	0.2
By type			
Household Activities, mean ± SD	62.4 ± 18.5	68.4 ± 17.9	0.031
Sports/ Exercise, mean ± SD	6.0 ± 2.6	6.3 ± 2.6	0.43
Transportation [€] , median (IQR)	8.8 (3.4, 10.0)	8.8 (3.4, 8.8)	0.053

[¥]Independent Sample T-test; [€]Mann Whitney U test

Table 3: Activity level of pregnant women categorised as per occupation (N=188)

Factor	Occupation		p-value [¥]
	Homemaker (N=169)	Working (N=19)	
Total Activity, mean ± SD	94.8 ± 23.5	117.4 ± 32.7	<0.001
By intensity			
Sedentary, mean ± SD	18.4 ± 9.5	25.4 ± 10.5	0.003
Light Intensity Activity, mean ± SD	69.7 ± 18.4	98.6 ± 28.6	<0.001
Moderate Intensity Activity, median (IQR)	6.4 (3.2, 9.6)	6.4 (3.2, 9.6)	0.78
LI and above, mean ± SD	76.4 ± 19.6	92.0 ± 30.1	0.002
By type			
Household Activities, mean ± SD	64.3 ± 18.3	66.4 ± 20.1	0.63
Occupational Activity, median [€] (IQR)	0.0 (0.0, 0.0)	24.2 (9.0, 30.1)	<0.001
Sports/Exercise, mean ± SD	6.0 ± 2.6	6.4 ± 2.6	0.54
Transportation, median [€] (IQR)	8.8 (3.4, 10.0)	10.0 (7.3, 14.0)	0.014

[¥]Independent Sample T-test; [€]Mann Whitney U test

Table 4: Activity level of pregnant women categorised as per the parity (N=188)

Factor	Parity		p-value [¥]
	Primiparous (N=91)	Multiparous (N=97)	
Total activity, mean ± SD	94.3 ± 28.9	99.7 ± 21.5	0.15
By intensity			
Sedentary, mean ± SD	18.2 ± 9.7	19.9 ± 9.9	0.26
Light intensity activity, mean ± SD	70.4 ± 23.6	74.8 ± 19.0	0.16
Moderate intensity activity [€] , median (IQR)	6.4 (3.2, 9.6)	6.4 (5.7, 9.6)	0.29
By type			
Household activities, mean ± SD	61.1 ± 19.5	67.7 ± 16.9	0.014
Sports Exercise, mean ± SD	5.7 ± 2.5	6.4 ± 2.6	0.089

[¥]Independent Sample T-test; [€]Mann Whitney U test

Shabnam Nadeem et al. (23.75 METh/day), Dawit et al. (20.2 METh/day), Smith KM et al. (25.4 METh/day), and Chandonnet N et al. (29 METh/day). This difference may be because of different tool used to assess the physical activity level.^{18–21} In addition, women in this study were more engaged in household activities (73.6METh/week) and intensity wise they were more involved in doing light intensity activities (92.4 METh/week). Miranda et al. in their study has also shown that pregnant women had larger preponderance of energy expenditure in light and sedentary activities and lower energy expenditure in moderate and vigorous activities.²² Studies have reported that Indian women are more obese and less physically active than males.¹¹ Pregnancy adds to this view, when expecting women are least active and consume a diet for two. Indian women have very little awareness regarding the importance of physical activity during pregnancy. A study done by Alka Pawalia et al. found poor adherence to the physical activity level among pregnant women.²³ Anjana et al. reported that only around 10% of women fulfilled the recommendations for physical activity in pregnancy.²⁴

In our study women who belonged to upper and upper middle socioeconomic class were more physically active. This finding is in line with results shown by Shabnam Nadeem et al. in Pakistan.¹⁸ The possible explanation of this could be that women of upper socioeconomic class had better educational level compared to the lower middle and lower socioeconomic group participants thus having a better understanding of benefits of being active during pregnancy. However, Ragna et al. in their study observed that high or low socioeconomic status group is more physically active remains unclear.²⁵

As shown by the results of this study, women in joint families were more physically active than those in nuclear family. Similar result was obtained by Shabnam Nadeem in Pakistan who showed women expended more energy on domestic and caregiving duties.¹⁸ This similarity might be is due to culture of joint family which is still prevailing in our country in which in addition to caring for their own family, women must also look after their elderly relatives. Working women in the study were more physically

active than homemakers. They were more engaged in performing light intensity activity. This finding corroborates with the results of Dawit et al.¹⁹ In contrast, pregnant working women in Pakistan preferred engaging in sedentary activities at work.^{18,19} In this study multiparous women were more physically active compared to primipara women and they were mostly engaged in household activities. Similar results were shown by Sharifha et al.¹² First time pregnant women might be extra careful and they are also instructed by their elders in the family to avoid physical activity to avoid miscarriage. However, Miranda et al. did not find any association between physical and parity of women.²² Tiredness at the end of the day after performing all the household duties and fear of doing any specific exercise as it may harm the child were the two most common reason cited by the study participants for their low activity.

As a limitation, the data on physical activity level of pregnant women was obtained from a single center thus generalizability of the result cannot be done. The pattern of activity and exercise was determined by using a questionnaire, which might lead to information bias. Another limitation is that the data was collected only for the current trimester of the pregnancy. This time span is insufficient to cover the whole pregnancy.

5. Conclusion

This study showed that the major physical activity carried out by the pregnant women was of light intensity type and they were mostly engaged in household works. Performance of moderate level activity was also found to be very low and none of the pregnant women were found to be engaged in vigorous intensity activity. None of the pregnant women in this study were aware that activities like jogging, antenatal exercise, swimming, dancing etc. can be performed during pregnancy unless contraindicated.

6. Recommendation

In our culture, religious taboos, and limitations on physical activity during pregnancy are ubiquitous. It must be addressed with care through awareness campaigns and

family counseling. It is crucial to reassure pregnant women that moderate-intensity physical exercise can be conducted throughout pregnancy without harm to either the mother or the fetus if performed in line with the applicable recommendations.

7. Conflict of Interest

The authors have no conflicts of interest associated with the material presented in this paper.

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References

- Alesi S, Ghelani D, Rassie K, Mousa A. Metabolomic Biomarkers in Gestational Diabetes Mellitus: A Review of the Evidence. *Int J Mol Sci.* 2021;22(11):5512.
- Thanawala U, Divakar H, Jain R, and MMA. Negotiating Gestational Diabetes Mellitus in India: A National Approach. *Medicina (Kaunas).* 2021;57(9):942.
- Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045. *Diabetes Res Clin Pract.* 2019;157:107843. doi:10.1016/j.diabres.2019.107843.
- Zargar AH, Sheikh MI, Bashir MI, Masoodi SR, Laway BA, Wani AI, et al. Prevalence of gestational diabetes mellitus in Kashmiri women from the Indian subcontinent. *Diabetes Res Clin Pract.* 2004;66(2):139–45.
- Bhavadharini B, Mahalakshmi MM, Anjana RM, Maheswari K, Uma R, Deepa M, et al. Prevalence of Gestational Diabetes Mellitus in urban and rural Tamil Nadu using IADPSG and WHO 1999 criteria (WINGS 6). *Clin Diabetes Endocrinol.* 2016;2(1):8. doi:10.1186/s40842-016-0028-6.
- Davies GA, Wolfe LA, Mottola MF, Mackinnon C. Exercise in pregnancy and postpartum period. *Can J Appl Physiol.* 2003;28(3):330–41.
- Wolfe LA, Davies GAL. Canadian guidelines for exercise in pregnancy. *Clin Obstet Gynecol.* 2003;46(2):488–95.
- Berghella V, Saccone G. Exercise in pregnancy! *Am J Obstet Gynecol.* 2017;216(4):335–7.
- Birsner ML, Gyamfi-Bannerman C. Physical Activity and Exercise During Pregnancy and the Postpartum Period: ACOG Committee Opinion, Number 804. *Obstet Gynecol.* 2020;135(4):178–88.
- Mbada CE, Adebayo OEO, Awotidebe TO, Faremi FA, Oginni MO, Ogundele AO. Practice and pattern of antenatal and postnatal exercise among Nigerian women: A cross-sectional study. *Int J Women's Health Reprod Sci.* 2015;3(2):93–8.
- Pradeepa R, Anjana RM, Joshi SR, Bhansali A, Deepa M, Joshi PP, et al. Prevalence of generalized & abdominal obesity in urban & rural India- the ICMR-INDIAB study (Phase-I). *Indian J Med Res.* 2009;142(2):139–50.
- Nor SFS, Idris IB, Isa ZM. Physical inactivity in early pregnancy and the determinants in an urban city setting of Kuala Lumpur, Malaysia. *BMC Public Health.* 2022;22(1):93.
- Sujindra E, Bupathy A, Suganya A, Praveena R. Knowledge, attitude, and practice of exercise during pregnancy among antenatal mothers. *Int J Educ Psychol Res.* 2015;1(3):234.
- Nayak C, Paes R, Gupta L, Kumar C, Narayan VK, Thunga A, et al. Knowledge, Perception, and Attitude of Pregnant Women Towards the Role of Physical Therapy in Antenatal Care-A Cross Sectional Study. *Online J Health Allied Sci.* 2015;14(4):6.
- Diagnosis & Management of Gestational Diabetes Mellitus. New Delhi: Ministry of Health and Family Welfare; 2018. Available from: https://nhm.gov.in/New_Updates_2018/NHM_Components/RMNCH_MH_Guidelines/Gestational-Diabetes-Mellitus.pdf.
- Chowdhury S, Singh J. Reliability and Validity of the Indian Version of the Pregnancy Physical Activity Questionnaire (PPAQ). *Int J Curr Res Mod Educ.* 2017;2:89–92.
- Chasan-Taber L, Schmidt MD, Roberts DE, Hosmer D, Markenson G, Freedson PS. Development and validation of a pregnancy physical activity questionnaire. *Med Sci Sports Exerc.* 2004;36(10):1750–60.
- Nadeem S, Khatoon A, Rasheed S, Munim TF. The physical activity patterns among pregnant women at a tertiary care hospital in, Pakistan. *Pak J Med Sci.* 2022;38(4):904–9.
- Gebregziabher D, Berhe H, Kassa M, Berhanie E. Level of physical activity and associated factors during pregnancy among women who gave birth in Public Zonal Hospitals of Tigray. *BMC Res Notes.* 2019;12(454). doi:10.1186/s13104-019-4496-5.
- Smith KM, Campbell CG. Physical Activity during Pregnancy: Impact of Applying Different Physical Activity Guidelines. *J Pregnancy.* 2013;2013:165617. doi:10.1155/2013/165617.
- Chandonnet N, Saey D, Alm eras N, Marc I. French Pregnancy Physical Activity Questionnaire Compared with an Accelerometer Cut Point to Classify Physical Activity among Pregnant Obese Women. *PLoS One.* 2012;7(6):e38818.
- Miranda LA, Moura AD, Kasawara KT, Surita FG, Moreira MA, Nascimento SLD. Exercise and Physical Activity Levels and Associated Factors among High-Risk Pregnant Women. *Rev Bras Ginecol Obstet.* 2022;44(4):360–8.
- Pawalia A, Kulandaivelan S, Savant S, Yadav VS. Home Based Exercise Intervention in Pregnant Indian Women: Effects on Weight and Obesity Markers. *Rom J Diabetes Nutr Metab Dis.* 2018;25(2):131–9.
- Anjana RM, Sudha V, Lakshmi Priya N, Anitha C, Unnikrishnan R, Bhavadharini B, et al. Physical activity patterns and gestational diabetes outcomes - The wings project. *Diabetes Res Clin Pract.* 2016;116:253–62.
- Stalsberg R, Pedersen AV. Are Differences in Physical Activity across Socioeconomic Groups Associated with Choice of Physical Activity Variables to Report? *Int J Environ Res Public Health.* 2018;15(5):922.

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