Journal of Nursing Informatics and AI in Global Practice and Research
Number 3, December 2025, Regional Government of Valencia Nursing Council (Spain) • ISSN: 3101-0164
https://www.journurs-cecova.com/diet-and-physical-activity-in-pregnant...

Diet and physical activity in pregnant women according to type of conception

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Received: 10 August 2025 **Accepted**: 5 November 2025

CONTRIBUTIONS OF THE AUTHORS

Introduction: **AIC, NOS, IRM.**
Methodology: **AIC, NOS, IRM.**
Results and discussion: **AIC, NOS, IRM.**
Conclusions: **AIC, NOS, IRM.**

Financing: The authors declare that they have not received any external financing to carry out this study.

Conflict of interest: The authors declare that they have no conflict of interest with any natural person, company or institution in this research project.

Generative AI declaration: The authors declare that they have not used Gen AI when writing this article.

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KEY WORDS: Pregnancy, Nutrition, Diet, Exercise, Reproductive techniques

ABSTRACT

The role of the midwife is fundamental in terms of health education and disease prevention in a specific and vulnerable period of a woman's life – pregnancy. The aim of this study is to find out about dietary habits and physical activity during pregnancy in women undergoing assisted reproductive techniques (ART) and in women who have conceived spontaneously. For this purpose, a descriptive cross-sectional study was carried out in 45 pregnant women at the Dr. Balmis General University Hospital in Alicante (HGUA in Spanish). The measuring instrument was the UMH version of the Food Frequency Questionnaire (FFQ) and the Pregnancy Physical Activity Questionnaire (PPAQ). Results were obtained on the amount and frequency of consumption of different food groups, on the amount and type of physical activity, and other data such as weight gain during pregnancy or the type of institution attended for pregnancy follow-up. In conclusion, the group of women who underwent ART were more physically active and had better eating habits than women who conceived spontaneously.

INTRODUCTION

During pregnancy, nutrition and physical activity are the factors that have the greatest impact on maternal and foetal health status (1). Excessive weight gain during pregnancy and obesity in the mother are associated with an increased risk of gestational diabetes, pre-eclampsia, postpartum weight retention, long-term obesity, diabetes mellitus and cardiovascular disease. For the baby, there is an increased risk of stillbirth, shoulder dystocia, preterm delivery, large-for-gestational age and childhood obesity (2). Pregnant women with no medical contraindications should be physically active during pregnancy. The minimum recommendations are 150 minutes of moderately intense physical activity each week, spread over three days per week, although there should be some activity every day. Activities should aim to improve aerobic endurance, mild muscular strength, balance and motor coordination, flexibility and pelvic floor work (3). Among the benefits of physical exercise during pregnancy are that it can significantly reduce the risk of placenta praevia, gestational diabetes, preterm birth and postpartum depression. In addition, physical exercise during pregnancy improves pain tolerance during childbirth, postpartum recovery and prevents excessive weight gain during pregnancy. It also increases the frequency of natural childbirth and a better score in the Apgar test for the newborn (4).

The diet of a pregnant woman should contain an appropriate and balanced energy intake of nutrients for the mother-child pair. The nutritional status of the woman at the start of pregnancy is assessed by calculating her BMI, which is essential for planning her weight gain during pregnancy and the diet and supplementation she will require. A healthy pregnant woman should not reduce her energy intake unless she is obese or gains excessive weight. A normal gain during pregnancy is between 11 and 16 kg. The recommendations for energy intake during the last six months of pregnancy are an increase of about 340-500 kcal/day and during lactation of about 500 kcal/day. Moreover, alcohol, tobacco and other drugs should be avoided during pregnancy (5).

Currently, one in six couples have fertility problems, defined as the inability to become pregnant for more than 12 months. As a result, more and more couples are resorting to ART to achieve pregnancy (6). Between 0.2% and 4.3% of births worldwide occur through ART (7).

Goal: to determine the dietary habits and physical activity of women who have become pregnant via ART and of women who have conceived spontaneously.

MATERIAL AND METHOD

A descriptive cross-sectional study was carried out in which 45 pregnant women (30 who had become pregnant spontaneously and 15 with ART) in different months of gestation were surveyed at the Dr. Balmis General University Hospital in Alicante (HGUA in Spanish). The sample was selected by non-probabilistic convenience sampling. Data was collected from June 2023 to January 2024 using the 'Pregnancy Physical Activity Questionnaire (PPAQ)' and the 'Frequency of Consumption Questionnaire (FCQ), UMH version'. In addition, sociodemographic variables (age, weight at the start and end of pregnancy, height, BMI, level of education, marital status, type of family, attendance at childbirth classes and main source of information during pregnancy) and clinical variables (gestational age at delivery, previous miscarriages, type of birth termination, serious pathologies, type of conception, consumption of toxic substances and medication during pregnancy) were all collected.

The UMH version of the PPAQ is specific for pregnant women and consists of 101 items grouped into 7 different food groups and questions regarding vitamin and mineral supplements. The Spanish version of the PPAQ is a brief, reliable and easy-to-interpret questionnaire that classifies pregnant women with regard to their physical activity (8). It consists of 36 questions in 5 different blocks: personal data, activities at home, travel, sports or leisure activities and activities at work (9). Both questionnaires were completed by the women after they had been informed of the purpose of the research and their informed consent had been obtained.

The statistical package used was Stata Statistical Software: Release 13. College Station, TX: StataCorp LP, considering that statistically significant differences exist in cases where the significance value is less than 0.05. The student's t-test was used to compare quantitative variables and Pearson's chi-square test for qualitative variables.

RESULTS

Table 1: Main sample characteristics

	Number of participants (N=45) (%)	Spontaneous conception (n=30) (%)	Assisted Reproductive Techniques (n=15) (%)
SOCIODEMOGRAPHIC			
Age [M (SD)]*	34.4 (5.7)	32.6 (5.4)	38.1 (4.7)
Civil Status			
Married	12 (26.7)	8 (26.7)	4 (26.7)
Has couple	21 (46.7)	13 (43.3)	8 (53.3)
Divorced	1 (2.2)	1 (3.3)	0 (0)
Single	11 (24.4)	8 (26.7)	3 (20)
Level of studies			
Primary	1 (2.2)	1 (3.3)	0 (0)
Secondary	2 (4.4)	2 (6.7)	0 (0)
A-levels equivalent	7 (15.6)	6 (20)	1 (6.7)
Vocational Training	9 (20)	7 (23.3)	2 (13.7)
University	26 (57.8)	14 (46.7)	12 (80)
Type of family*			
Biparental	38 (84.5)	29 (96.7)	9 (60)
Single parent	5 (11.1)	1 (3.3)	4 (26.7)
Two single parent families	2 (4.4)	0 (0)	2 (13.3)
OBSTETRIC-GYNECOLOGICAL			
Previous miscarriages*			
Yes	14 (31.1)	6 (20)	8 (53.3)
No	31 (68.9)	24 (80)	7 (46.7)
Classification of newborn at birth			
Preterm	3 (6.7)	2 (6.7)	1 (6.7)
Full term	42 (93.3)	28 (93.3)	14 (93.3)
End of gestation			
Caesarean	6 (13.3)	3 (10)	3 (20)
Euthyroid	33 (77.4)	24 (80)	9 (60)
Instrumented	6 (13.3)	3 (10)	3 (20)
Gravid pathology*			
Hypertensive syndrome of pregnancy	3 (6.7)	1 (3.3)	2 (13.3)
Gestational diabetes	6 (13.3)	1 (3.3)	5 (33.3)
Others (Arrhythmia, asthma and anti-phospholipid syndrome)	3 (6.7)	1 (3.3)	2 (13.3)
None	33 (73.3)	27 (96.7)	6 (40)
Pre-pregnancy BMI			
Underweight (<18.5)	2 (4.4)	1 (3.3)	1 (6.7)
Normal weight (18.5-24.9)	31 (68.9)	21 (70)	10 (66.7)
Overweight (25.0-29.9)	7 (15.6)	5 (16.7)	2 (13.2)
Obese (≥ 30.0)	4 (8.9)	3 (10)	1 (6.7)
Morbidly obese (≥40.0)	1 (2.2)	0	1 (6.7)
Weight gain during pregnancy			
Appropriate	14 (31.1)	8 (26.6)	6 (40)
Underweight	25 (45.5)	16 (53.4)	9 (60)
Overweight	6 (13.4)	6 (20)	0 (0)

The mean age was 34.4; the mean age was higher in women who had undergone ART (38.1). In both groups, the marital status ‘has a couple’ and university education were predominant. Eighty per cent of women in the ART group had a university education compared to 46.7 per cent of women with spontaneous pregnancy. The predominant family type was two-parent. Miscarriages were more frequent in the ART group (53.5%). The classification of the newborn in both groups was ‘at term’ in 93.3% of the women - preterm deliveries were 6.7%. The percentage of non-eutocic deliveries (instrumental delivery and caesarean section) was twice as high in the ART group (40%) as in the spontaneous pregnancy group (20%). Ten per cent of women in the spontaneous pregnancy group had no pathology compared to 60 per cent of women in the ART group, where gestational diabetes predominated as the main pregnancy-related pathology. Forty per cent of women in the ART group had an appropriate weight gain compared to 26.6% of women in the spontaneous pregnancy group. None of the women in the ART group had excess weight gain in contrast to 20% of the women with spontaneous pregnancy, who did (table 1). Maternal education attendance was 66.7% of the sample; the prevalent attendance in both groups was at a public centre; 80% in women in the spontaneous pregnancy group and 60% in the ART group (table 2).

Table 2: Attendance at maternal education classes

Number of participants (N=45)		Spontaneous conception (n=30) (%)	Assisted Reproductive Techniques (n=15) (%)
Attendance at maternal education n (%)			
No	15 (33.3)	12 (40)	3 (20)
Yes	30 (66.7)	18 (60)	12 (80)
Training centre n (%)			
Public	33 (77.3)	24 (80)	9 (60)
Private	2 (4.4)	1 (3.3)	1 (6.7)
Both	10 (22.2)	5 (16.7)	5 (3.3)

DIET

66.7% of women consumed milk daily in the spontaneous pregnancy group compared to 46.7% in the ART group. In terms of protein, both groups consumed eggs between one and three times a week on a regular basis. Chicken was consumed one to three times a week by 66.7% in the spontaneous pregnancy group and 73.3% in the ART group. Beef and pork were consumed one to three times a week by 70% in the spontaneous pregnancy group and 60% in the ART group. Seafood products were consumed daily by 40% of the ART women, compared to 16.7% in the spontaneous pregnancy group. 50% of women who had become pregnant spontaneously consumed processed meats one to three times a week, while 53.3% of the ART group reported consumption of less than once a week or never.

Vegetables were consumed mostly on a daily basis by 90% in the spontaneous pregnancy group and 93.3% in the ART group. Pulses were consumed mostly one to three times a week in the spontaneous pregnancy group (53.3%) and less than once a week or never in the ART group (46.7%). Fruits were consumed daily by 86.7% in the ART group, compared to 70% in the spontaneous pregnancy group. Nuts were consumed daily by 46.7% in the ART group, compared to 40% in the spontaneous pregnancy group. Carbohydrates were consumed daily by 80% of women in the spontaneous pregnancy group compared to 60% in the ART group. 20% of women in the spontaneous pregnancy group consumed pastries and sugars on a daily basis compared to 13% in the ART group. 6.7% of women in the ART group reported consuming alcoholic beverages on a daily basis. Caffeinated coffee and/or tea were practically not consumed in pregnancy by 60% of women in both groups. Olive oil for dressing was consumed by 100% of women in the ART group and 93.3% in the spontaneous pregnancy group. Vitamin complexes were consumed by 86.7% of women in the ART group and 66.7% in the spontaneous pregnancy group. 33.3% of women in the ART group reported going on a diet during pregnancy, of which 26.6% reported gestational diabetes and 6.6% reported an ovo-lacto-vegetarian diet (table 3).

Table 3: Dietary habits n (%)

		Daily	4-6 times a week	1-3 times a week	<once a week or never
Dairy products					
Milk	S	20 (66.7)	4 (13.3)	0 (0)	6 (20)
	ART	7 (46.7)	2 (13.3)	1 (6.7)	5 (33.3)
Other dairy products	S	16 (53.3)	12 (40)	2 (6.7)	0 (0)
	ART	9 (60)	1 (6.7)	3 (20)	2 (13.3)
Sugared dairy products	S	2(6.7)	2 (6.7)	14 (46.7)	12 (40)
	ART	1 (6.7)	0 (0)	5 (33.3)	9 (60)
Proteins					
Eggs	S	5 (16.7)	4 (13.3)	21 (70)	0 (0)
	ART	2 (13.3)	1 (6.7)	9 (60)	3 (20)
Chicken	S	2 (6.7)	3 (10)	20 (66.7)	5 (16.7)
	ART	1 (6.7)	1 (6.7)	11 (73.3)	2 (13.3)
Veal and pork	S	3 (10)	1 (3.3)	21 (70)	5 (16.7)
	ART	1 (6.7)	1 (6.7)	9 (60)	4 (26.7)
Processed meat	S	4 (13.3)	2 (6.7)	15 (50)	9 (30)
	ART	1 (6.7)	0 (0)	6 (40)	8 (53.3)
Sea products	S	5 (16.7)	9 (30)	13 (43.3)	3 (10)
	ART	6 (40)	2 (13.3)	6 (40)	1 (6.7)
Fruit, vegetables and pulses					
Vegetables	S	27 (90)	2 (6.7)	1 (3.3)	0 (0)
	ART	14 (93.3)	1 (6.7)	0 (0)	0 (0)
Pulses	S	3 (10)	5 (16.7)	16 (53.3)	6 (20)
	ART	2 (13.3)	0 (0)	6 (40)	7 (46.7)
Fruit	S	21 (70)	8 (26.7)	1 (3.3)	0 (0)
	ART	13 (86.7)	2 (13.3)	0 (0)	0 (0)
Nuts	S	12 (40)	3 (10)	10 (33.3)	5 (16.7)
	ART	7 (46.7)	2 (13.3)	3 (20)	3 (20)
Carbohydrates					
Carbohydrates	S	24 (80)	6 (20)	0 (0)	0 (0)
	ART	9 (60)	5 (33.3)	1 (6.7)	0 (0)
Sweets					
Pastries	S	6 (20)	7 (23.3)	13 (43.3)	4 (13.3)
	ART	2 (13.3)	3 (20)	7 (46.7)	3 (20)
Sugar	S	7 (23.3)	3 (10)	5 (16.7)	15 (50)
	ART	2 (13.3)	1 (6.7)	4 (26.7)	8 (53.3)
Drinks					
Alcohol	S	0 (0)	0 (0)	3 (10)	27 (90)
	ART	1 (6.7)	0 (0)	0 (0)	14 (93.3)
Coffee with caffeine/tea	S	7 (23.3)	0 (0)	5 (16.7)	18 (60)
	ART	3 (20)	1 (6.7)	2 (13.3)	9 (60)
Soft drinks/juices	S	1 (3.3)	0 (0)	8 (26.7)	21 (70)
	ART	1 (6.7)	0 (0)	3 (20)	11 (73.3)
Others					
Salt	S	14 (46.7)	2 (6.7)	10 (33.3)	4 (13.3)
	ART	7 (23.3)	3 (20)	2 (13.3)	3 (20)
Sauces	S	0 (0)	3 (10)	14 (46.6)	13 (43.3)
	ART	0 (0)	1 (6.7)	6 (40)	8 (53.3)
Fried food	S	1 (3.3)	1 (3.3)	7 (23.3)	21 (70)
	ART	1 (6.7)	0 (0)	3 (20)	11 (73.3)
Oil		Olive oil	Other oils		
Dressing	S	28 (93.3)	2 (6.7)		
	ART	15 (100)	0 (0)		
Cooking	S	21 (70)	9 (30)		
	ART	13 (86.7)	2 (13.3)		
Vitamins		Yes	No		
Spontaneous p.		20 (66.7)	10 (33.3)		
ART		13 (86.7)	2 (13.3)		
Diet*		Yes	No		
Spontaneous p.		0	30 (100)		
ART		5 (33.3)	10 (66,7)		
Type of diet		Diabetes	Ovo-lacteo-vegetarian		
Spontaneous p.		0	0		
ART		4	1		

**p<0,05*

PHYSICAL ACTIVITY

A higher percentage of women who had become pregnant spontaneously (46.7%) spent >1 hour per day caring for others, compared to 26.6% in the ART group. The time spent walking to go from one place to another was greater in ART pregnant women. In terms of driving time there were no major differences between the groups; the percentages were similar. Eighty per cent of women who underwent ART exercised more than 1 hour per day, compared to 53.3% in the spontaneous pregnancy group. 46.7% of women who had undergone ART exercised more than 30 minutes in the preparatory classes, compared to 33.3% of women in the spontaneous pregnancy group. The time spent sitting down was very similar in both groups. 36.7% of women in the spontaneous pregnancy group and 33.3% of ART women did not actively work. Forty per cent of both groups spent more than one hour a day in active work (table 4).

Table 4: Physical activity n (%)

		None	<30 min	30 min-1 hour	>1 hour
Caring for others	S	14 (46.7)	1 (3.3)	1 (3.3)	14 (46.7)
	ART	9 (60)	1 (6.7)	1 (6.7)	4 (26.6)
Housework	S	0 (0)	0 (0)	0 (0)	30 (100)
	ART	0 (0)	0 (0)	0 (0)	15 (100)
Leisure (sitting)	S	1 (3.3)	1 (3.3)	4 (13.4)	24 (80)
	ART	0 (0)	0 (0)	1 (6.7)	14 (93.3)
Walking (from one place to another)	S	4 (13.3)	7 (23.3)	11 (36.7)	8 (26.7)
	ART	4 (26.6)	1 (6.7)	4 (26.7)	6 (40)
Driving	S	5 (16.7)	13 (43.3)	8 (26.7)	4 (13.3)
	ART	3 (20)	7 (46.7)	2 (13.3)	3 (20)
Physical exercise	S	1 (3.3)	2 (6.7)	11 (36.7)	16 (53.3)
	ART	0 (0)	0 (0)	3 (20)	12 (80)
Prenatal exercise class	S	15 (50)	5 (16.7)	7 (23.3)	3 (10)
	ART	6 (40)	2 (13.3)	3 (20)	4 (26.7)
Working sitting down	S	14 (46.7)	1 (3.3)	2 (6.7)	13 (43.3)
	ART	6 (40)	1 (6.7)	1 (6.7)	7 (46.6)
Active work	S	11 (36.7)	3 (10)	4 (13.3)	12 (40)
	ART	5 (33.4)	2 (13.3)	2 (13.3)	6 (40)

DISCUSSION

In our study, the mean age of the pregnant women in the spontaneous pregnancy group was 32.6, which coincides with the mean Spanish age calculated by the National Institute of Statistics (INE in Spanish) for 2022. By way of contrast, the mean age of our ART group was 38.1, which coincides with the study by Rujas et al. (10), who found that 70% of women undergoing ART were aged between 30 and 39. The results of our study are similar to those of Ballesta in terms of the level of education completed, which was higher in the group of women undergoing ART (11). The BMI at the beginning of pregnancy in 68.9% of the women in our study was normal weight. This was similar to that obtained in Vila's study, where 61.4% of the women started pregnancy at a normal weight. In relation to weight gain, there was a higher percentage of pregnant women with a weight gain below the recommended level (45.5%), which contrasts with the Vila study, in which excess (34.9%) is more frequent than deficit weight gain (26.6%) (12).

The births of the women in our sample were 93.3% at full term, which coincides with the percentage given by the INE for 2022 (93.4%). However, even though our study showed the same rates of preterm birth in both groups of women, the Ballesta-Castillejos study concludes that preterm births are more frequent in the ART group (11). In reference to the type of delivery, 77.4% of the sample had a eutocic delivery, similar to the data obtained by the INE for 2022 (74%). 13.3% had a caesarean delivery, which contrasts with the INE (26%). The ART group had had more previous miscarriages, more instrumentalised deliveries, more caesarean sections and more pathologies during pregnancy. These results coincide with the Ballesta-Castillejos study, whose group of women undergoing ART are more likely to have gestational pathology and complications during childbirth. Ballesta's study shows a higher attendance by the ART group in maternity and/or childbirth preparation classes (11). In our study we reached the same conclusion.

A meta-analysis of 35 studies found that most observational studies about pregnant women identified two types of dietary patterns: a healthy pattern, characterised by a diet rich in whole grains, fruits, vegetables and lean meat; and an unhealthy pattern, characterised by a higher intake of processed meat, fatty foods and refined carbohydrates (13).

Most of the literature published in relation to women undergoing ART associates dietary patterns with ART results, either preconceptionally (14) or postconceptionally (15). This association is also shown in a group of women with primary infertility (16, 17). The studies identified about pregnant women assessing dietary habits with CFA (18, 19) make no distinction in the method of conception; it is either spontaneous or by means of ART.

According to several authors, between 20% and 40% of pregnant women exercise according to the recommendations of the American College of Obstetricians and Gynecologists (ACOG), 150 minutes per week, regardless of the type of conception by which the pregnancy was achieved (20). In our study we observed that 100% of the population who had an ART pregnancy and 90% of the sample who had a spontaneous pregnancy exercised between 30 minutes and more than one hour a day. The data obtained in our study does not therefore coincide with the aforementioned studies.

It has not been possible to discuss the results of other authors with any kind of accuracy in comparison to those obtained in the present study, as these results refer to women included in both groups (ART and spontaneous conception). No studies have been found on the frequency of consumption of specific foods or the prevalence of physical exercise for two populations with specific characteristics, such as women undergoing ART and women who have become pregnant spontaneously. This fact highlights future lines of research in order to establish relationships with dietary patterns and physical activity in both groups of women and to discover the particular needs of each population and thus adjust the subsequent handling thereof.

CONCLUSIONS

Women pregnant with ART are older, have completed university studies, and have had a higher number of previous miscarriages and pregnancy-related pathology. The rates of caesarean sections and instrumental deliveries are higher compared to spontaneous pregnancies. The ART group had better dietary habits as they consumed more seafood, olive oil, vegetables, fruit and nuts on a daily basis. The spontaneous pregnancy group consumes carbohydrates, processed meats, pulses, sweetened dairy products, pastries, sugars, alcoholic beverages, caffeinated coffee, tea, soft drinks, juices, salt, sauces and fried foods more frequently. The ART group tends to follow some type of specific diet during pregnancy, a fact that is related to weight gain, as this group is in an appropriate or deficit range. Women with spontaneous pregnancies showed both deficit and excess weight changes. The women in the ART group spent more time walking to get from one place to another and exercising both in general and during the preparatory classes. Women in the spontaneous conception group tended to spend their leisure time sitting or in the care of others. As far as maternal education is concerned, women with ART pregnancies are more likely to attend. The centre of choice is the public one in both groups.

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