Original Research Article

A study of blood pressure levels and other factors that contribute to a good pregnancy outcome

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ABSTRACT

Background: The aim of this study was to investigate the awareness of blood pressure before and during pregnancy by pregnant women as well as the factors of pathological increase and if woman is going to adapt to the new situation changing their lifestyle and food habits during pregnancy   .
Methods: The study was conducted on 318 pregnant women to assess their knowledge and attitude about pregnancy and the development of high-risk pathology who had visited the Public Obstetric Hospital of Athens "Elena Venizelou", from December 2019 to August 2020. Then were given a pre-designed structured questionnaire on socio-demographic, variable knowledge and attitude about health and pregnancy.
Results: According to the study it was found that a proportion watching their diet (61%), limiting smoking (29% smoker, 12% of them smokes minimum), but a large number of them were unaware of preeclampsia (46%) and especially whether an increase in blood pressure occurs in preeclampsia (45%), leg edema (56%) and albuminuria (74%), while 77% of them ignore what is albuminuria and this is directly linked to the level of education, age and nationality.
Conclusions: The study concludes that a large number of the sample ignores the complications of pregnancy and the development of these predisposing factors. The main disadvantage of this study is that there was not a random sample of people asked. Thus, in the future it is proposed that a similar survey should be conducted in various nursing institutions.

Keywords: Blood pressure, Complications of pregnancy, Preeclampsia-eclampsia

INTRODUCTION

Several of the anatomical changes that occur pregnancy aim to create an ideal environment for fetal development, preparation for childbirth, the maternity ward and lactation.[1]

These anatomical changes affect the cardiovascular as well as the respiratory system which are directly related to the good outcome of the pregnancy.[2] A significant change in the cardiovascular system during pregnancy is the gradual increase of the cardiac supply where in the 20th-24th week of pregnancy it increases by 30-50% in relation to the values before pregnancy and therefore in the volume of circulating blood, there is a decrease in

systemic vascular resistance by 21% but also in pulmonary vascular resistance up to 34% while during childbirth the pain causes tachycardia and the requirements for oxygen consumption are tripled.[3-8] In the respiratory tract there is an increase in minute ventilation, alveolar as well as oxygen consumption and a decrease in the partial pressure of Pa CO_2 as well as the functional residual capacity.[5,9]

Complications such as gestational diabetes high blood pressure (BP) that lead to hypertension and the development of preeclampsia-eclampsia and HELLP syndrome with serious consequences for the mother and fetus may develop during pregnancy.[10-18]

Predisposing factors for the development of hypertension are obesity, gestational diabetes, chronic hypertension, kidney disease etc.[19] Proper measurement of blood pressure is important in its early diagnosis and treatment.

In mild hypertension, proper nutrition, weight reduction, smoking and general predisposing factors are recommended, while in severe hypertension, medication is required.[20-26] Preeclampsia is a heterogeneous pregnancy-specific multisystemic disorder characterized by hypertension, lower extremity edema, and proteinuria.[15,17,27] Predisposing factors are genetic, maternal, gynecological as well as coexisting conditions.[24,28]

It is initially treated with medication although the only treatment is to induce labour. Other factors that negatively affect the development of pregnancy are obesity (poor diet), smoking, caffeine consumption and generally the sex and the lifestyle.[12,24,29-39]

Lifestyle and habits such as smoking, caffeine consumption and poor diet that lead to weight gain (obesity) negatively affect the course of pregnancy.[10,28,37-41]

For this reason, it was considered appropriate to investigate the awareness of blood pressure before and during pregnancy as well as other factors related to the good outcome of pregnancy.

Aim

The aim of this study was to investigate the awareness of BP before and during pregnancy by pregnant women and the hypertension relationship with the development of pathological conditions that endanger the life of the expectant mother and the fetus, the disposition of pregnant women to adapt to the new data by changing eating habits and lifestyle and most importantly, whether they themselves are interested in learning about the new condition they will be in the next 9 months and what this condition presupposes as well as after childbirth.

METHODS

This was a cross-sectional study conducted by the department of physiotherapy at Public Gynecological Obstetric Hospital of Athens "Elena Venizelou" from December 2019 to August 2020.

A total of 318 pregnant women age 31,37±5,72 years with a range of 29 years minimum=17 and maximum=46 years, participated in this study during attendance at a scheduled appointment with their personal doctor to assess their knowledge and attitude about pregnancy and the development of high-risk pathology.

Inclusion criteria

Pregnant women without pathological problems.

Exclusion criteria

All pathological diseases as well as autoimmune diseases except diabetes or gestational diabetes.

The study was approved by the hospital scientific council and the ethical committee. Then were given a predesignated structured questionnaire which included questions on socio-demographic details like age, citizenship, education, profession, and the number of births. The participants were also asked types of questions that could help us to assess their knowledge and attitude of health during pregnancy.

Statistical analysis

The responses were entered in Excel spreadsheet program and later analyzed using SPSS software. Statistical analysis of results was performed using step wise multiple regression, as the dependent variable was selected as a question of the questionnaire and as an independent variable was selected responses to demographic data. The statistical study of each question was analyzed in the results.

RESULTS

The results of the questionnaire show that many but not the majority of pregnant women adapt to the new situation and adapt a new way of life by paying attention to their diet 61%, reducing smoking, 29% of smokers and of them smoke a little 12 %, however, a large percentage ignores what preeclampsia is 46% and especially if preeclampsia shows an increase in blood pressure 45%, swelling of the lower extremities 56% and albuminuria 74% while a percentage of its order 77% ignores what is albuminuria 74% and it is directly related to the level of education age and nationality.

Statistical analysis

The statistical analysis selected for the present study was the step wise multiple regression. This is a way of

selecting variables to predict a specific dependent variable based on statistical criteria.

It therefore determines which dependent variable is the best variable forecast, which is the second best, cok. Predictive variables are added until a variable adds an additional explanation of the criterion variance.

Therefore, one question of the questionnaire was selected as a dependent variable each time, while the answers of the demographic data (age, nationality, education and children) were selected as independent variables.

Question 1. Knowledge of blood pressure before pregnancy

The statistical analysis first recorded the age which was responsible for 12.7% of the variation in blood pressure before pregnancy (B=-0.025, p<0.001). The level of education was then added, and was related to an additional 2.3% of the variance (B=-0.057, p=0.003).

This means that both variables have a negative correlation with the dependent variable, i.e. the older the age and the level of education, the more the knowledge of blood pressure before pregnancy increases (since with 1 = I know).

Question 2. High or low blood pressure

In step wise multiple regression, age alone was responsible for 3.2% of the variation in high or low blood pressure (B=-0.013, p=0.002).

Thus, the independent variable has a negative correlation with the dependent variable, i.e. as the age increases the blood pressure before pregnancy increases (since 1 = increase in blood pressure).

Question 3. Knowledge of normal blood pressure levels during pregnancy

In the selected statistical analysis, only education was responsible for 4.7% of the variance in the dependent variable (B=-0.073, p<0.001).

Therefore, the independent variable has a negative correlation with the dependent variable, i.e. as the level of education increases the knowledge of normal blood pressure levels during pregnancy increases (since 1 = Yes).

Question 4. Knowledge of pressure measuring position in pregnant women

In the present statistical analysis, only age was responsible for 2.4% of the variance in the dependent variable (B=-0.012, p=0.007).

That is, the independent variable has a negative correlation with the dependent variable, which means that as age increases, so does the knowledge of the place of measurement of blood pressure in pregnant women (since 1 = Yes).

Question 5. Periodic pressure measurement during pregnancy

In step wise multiple regression, age alone was responsible for 15.5% of the variance in the dependent variable (B=-0.035, p<0.001).

So the independent variable has a negative correlation with the dependent variable, as the age increases the blood pressure in the home is controlled by the pregnant women (since 1 = Yes).

Question 6. Regular visit to a doctor

Only nationality was responsible for 28.0% of the variance in the dependent variable (B=0.053, p<0.001).

So, the independent variable has a positive correlation with the dependent variable, i.e. Greek women regularly visit the doctor during pregnancy (since 1 = Yes).

Question 7. Blood pressure measurement by a doctor

Warnings: No variables were entered into the equation.

None of the independent variables was statistically significant for the physician to measure blood pressure.

Question 8. Importance by the doctor in measuring blood pressure

Warnings: No variables were entered into the equation.

None of the independent variables predict statistically significant whether the doctor emphasizes in some specifics the importance of measuring blood pressure at different times and days.

Question 9. Increase in blood pressure with weight gain

The level of education, which was initially recorded, was responsible for 12.2% of the variance in the dependent variable (B=-0.106, p<0.001). Nationality was then added, and was associated with an additional 1.3% of variance (B=0.066, p=0.042).

Consequently, education has a negative correlation, while nationality has a positive correlation with the dependent variable, so the higher the education, the higher the blood pressure with body weight, while in Greek women the same happens (increase in blood pressure with weight gain) more from foreigners (since with 1 = Yes).

Question 10. Complications from high blood pressure during pregnancy

In the statistical analysis, the level of education was first recorded which is responsible for 12.2% of the variance in the dependent variable (B=-0.091, p<0.001). Nationality was then added, and is associated with an additional 7.7% of variance (B=0.145, p<0.001). Finally, a third predictor was added, that of age, which adds an additional 1.7% to the explanation of the dependent variable (B=-0.012, p=0.009).

Therefore, education and age have a negative correlation, while nationality has a positive correlation with the dependent variable. As education and age increase, so does the knowledge of the complications that an increase in blood pressure during pregnancy can create, while the same happens to Greek women (an increase in knowledge of the complications that an increase in blood pressure can create during pregnancy) more than foreigners (since with 1 = Yes).

Question 11. Apply a healthy diet to avoid gestational hypertension

The age initially recorded is responsible for 7.5% of the variance in the dependent variable (B=-0.018, p<0.001). The level of education was then added, and was related to an additional 2.5% of the variance (B=-0.056, p=0.004).

This indicates that both education and age are negatively correlated with the dependent variable. The higher the education and age, the more the application of a healthy diet by the pregnant woman increases in order to avoid hypertension of the pregnancy (since with 1 = Yes).

Question 12. Coffee consumption

With first entry the age which is responsible for 3.3% of the variance in the dependent variable (B=-0.016, p<0.001), while the number of children was added later, and was related to an additional 2.1% of the variance (B=0.115, p=0.010).

Therefore, age has a negative correlation with the dependent variable, while the number of children has a positive correlation. As age increases, so does the amount of coffee, while when pregnant women have a larger number of children, they drink less coffee (since with 1 = Yes).

Question 13. Smoker

The first entry in the analysis concerns the age which was responsible for 3.2% of the variance in the dependent variable (B=-0.025, p<0.001). The level of education was then added, and is related to an additional 2.7% of the variance (B=0.064, p=0.001). Finally, a third predictor was added, that of the number of children, which adds an

additional 2.1% to the explanation of the dependent variable (B=0.103, p=0.012).

Thus age has a negative correlation, while education and children have a positive correlation with the dependent variable. As age increases the percentage of smokers increases, while as the level of education increases and the number of children decreases the percentage of those who smoke (since with 1 = Yes).

Question 14. Smoking during pregnancy

Warnings: No variables were entered into the equation.

None of the independent variables statistically predicted pregnant women who smoked during pregnancy.

Question 15. Diabetes or gestational diabetes

Only age was responsible for 1.7% of the variance in the dependent variable (B=-0.005, p=0.026).

This means that the independent variable has a negative correlation with the dependent variable, i.e. as the age increases the more they had normal diabetes, while the younger pregnant women had gestational diabetes (since 1 = diabetes, 2 = gestational diabetes).

Question 16. Knowledge of preeclampsia - eclampsia

In this statistical analysis, the age responsible for 14.1% of the variance in the dependent variable was first recorded (B=-0.023, p<0.001).

The level of education was then added, and was related to an additional 5.3% of the variance (B=-0.074, p=0.001). Finally, a third predictor was added, that of nationality, which adds an additional 1.7% to the explanation of the dependent variable (B=0.085, p=0.014).

Therefore, age and level of education have a negative correlation, while nationality has a positive correlation with the dependent variable. As you get older and the level of education increases the knowledge of what preeclampsia is, while Greek women do not know as well as foreigners what preeclampsia is (since with 1 = Yes).

Question 17a. Does preeclampsia increase blood pressure?

Firstly, the level of education was recorded which was responsible for 11.9% of the variance in the dependent variable (B=-0.078, p<0.001). Age was then added, and was associated with an additional 4.5% of the variance (B=-0.017, p=0.001).

Finally, a third predictor added, that of nationality, which adds an additional 2.3% to the explanation of the dependent variable (B=0.102, p=0.004).

After that, age and level of education have a negative correlation, while nationality has a positive correlation with the dependent variable. As the age and the level of education increase, so does the knowledge of whether there is an increase in blood pressure in preeclampsia, while Greek women do not seem to know it as well in relation to foreigners (since with 1 = Yes).

Question 17b. Do preeclampsia cause swelling of the lower extremities?

Age was initially recorded, which was responsible for 10.5% of the variance in the dependent variable (B=-0.021, p<0.001). The level of education was then added, and was related to an additional 4.6% of the variance (B=-0.076, p=0.001).

So age and level of education have a negative correlation with the dependent variable. As the age and the level of education increase, so does the knowledge of whether the preeclampsia causes swelling of the lower extremities (since with 1 = Yes).

Question 17c. Does albuminuria occur during preeclampsia?

First and foremost was recorded the level of education for 8.7% of the variance in the dependent variable (B=-0.087, p<0.001).

This indicates that the level of education has a negative correlation with the dependent variable. As the level of education increases, so does the knowledge of whether albuminuria occurs in preeclampsia (since with 1 = Yes).

Question 18. Knowledge of albuminuria

In the step multiple regression, we first entered the level of training, which was responsible for 9.1% of the variance in the dependent variable (B=-0.070, p<0.001). Age was then added, and was associated with an additional 2.1% of the variance (B=-0.012, p=0.004).

So age and level of education have a negative correlation with the dependent variable. As the age and the level of education increase, so does the knowledge of what albuminuria is (since with 1 = Yes).

Table 1: Nationality.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Greek	242	76.1	81.5	81.5
	Albanian	47	14.8	15.8	97.3
	Romanian	1	0.3	0.3	97.6
	Georgian	1	0.3	0.3	98
	Portuguese	1	0.3	0.3	98.3
	Iraqi	2	0.6	0.7	99
	Bulgarian	2	0.6	0.7	99.7
	Ukrainian	1	0.3	0.3	100
	Total	297	93.4	100	
Missing	System	21	6.6		
Total		318	100		

Table 2: Education.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Primary school	6	1.9	2	2
	High school	20	6.3	6.7	8.7
	Elementary school	112	35.2	37.6	46.3
	Vocational training institute	39	12.3	13.1	59.4
	College	44	13.8	14.8	74.2
	University	64	20.1	21.5	95.6
	MSc/PhD	11	3.5	3.7	99.3
	Uneducated	2	0.6	0.7	100
	Total	298	93.7	100	
Missing	System	20	6.3		
Total		318	100		

Table 3: Profession.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Graphic designer	3	0.9	1	1
	Teacher	24	7.5	8.1	9.1
	Hairdresser	2	0.6	0.7	9.8
	Beekeeper	1	0.3	0.3	10.1
	Taxi driver	1	0.3	0.3	10.5
	Midwife	4	1.3	1.4	11.8
	Nurse	9	2.8	3	14.9
	Educator	2	0.6	0.7	15.5
	Health visitor	1	0,3	0.3	15.9
	Doctor	2	0.6	0.7	16.6
	Saleswoman	5	1.6	1.7	18.2
	Housewife	57	17.9	19.3	37.5
	Gymnast	1	0.3	0.3	37.8
	Florist	2	0.6	0.7	38.5
	Private Employee	132	41.5	44.6	83.1
	Unemployed	39	12.3	13.2	96.3
	Hotel employee	5	1.6	1.7	98
	Developer	1	0.3	0.3	98.3
	Assistant accountant	2	0.6	0.7	99
	Actress	2	0.6	0.7	99.7
	25	1	0.3	0.3	100
	Total	296	93.1	100	
Missing	System	22	6.9		
Total		318	100		

Table 4: Children.

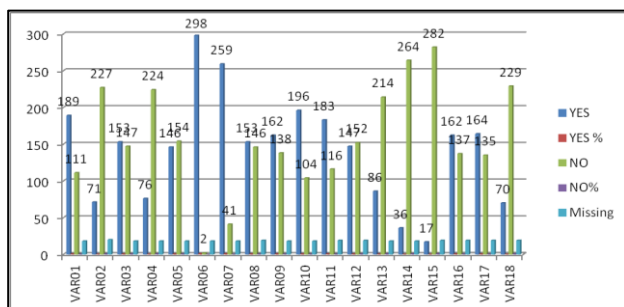|		n	%	Valid %	Cumulative %
Valid	1	193	60.7	64.3	64.3
	2	81	25.5	27	91.3
	3	22	6.9	7.3	98.7
	4	4	1.3	1.3	100
	Total	300	94.3	100	
Missing	system	18	5.7		
Total		318	100		

Figure 1: Frequencies.

Descriptive statistics

The problem of the process was learned by 318 people, duration M=31.37 years, SD=5.72 years, with a value range of 29 years (minimum=17 - maximum=46 years). Exhaustion, the vast majority of original creations (N=242 people). Typically, available colour demographics of different leaf numbers and graphs.

Descriptive statistics

The following figure list the descriptive statistics (frequencies) of the 18 questions of the questionnaire.

At questions 12 (amount of coffee you drink), 13 (years you smoked) and 14 (how much you smoked during pregnancy), the descriptive statistics are listed in the following Table 5. Of the women in the study, 146 drank from 0 to 5 coffees a day (M=1.16 coffee, SD=0.56), 78 were chronic smokers consuming 4 to 18 cigarettes a day (M=11.51 cigarettes, SD=4.46), while, finally, 36 of them smoked during pregnancy from 1 to 39 cigarettes per day (M=4.69 cigarettes, SD=6.99).

Table 5: Descriptive statistics.

	N	Range	Min.	Max.	Mean	SD
VAR12	146	5	0	5	1,16	0,561
VAR13	78	18	4	22	11,51	4,463
VAR14	36	39	1	40	4,69	6,989
Valid N (listwise)	29					

DISCUSSION

The results of the research were discouraging since the majority of pregnant women were unaware that it concerns the complications of pregnancy that they might need to know from the moment the pregnancy was diagnosed. This shows that they did not spend a bit of their time reading or searching the internet for information about this new situation they are in and which is considered to be the best period of their lives.

More detailed and always according to the data it was found that 63% of pregnant women knew the blood pressure they had before pregnancy and which was in normal levels, however 49% did not know the acceptable normal levels of blood pressure fluctuations during pregnancy as well as 75% of its measuring position. The periodic measurement of blood pressure at home during pregnancy was applied by only 49% of pregnant women while 99% of them kept to the visit to the scheduled appointments with their doctor.

In 89% of pregnant women, blood pressure was measured by the doctor at each visit, while when asked if the doctor suggested measuring blood pressure at different times and days at home, the positive answer corresponds to 51%.

54% of the sample knew that the increase in blood pressure was related to body weight as well as 65% stated that they were aware of the complications caused by the increase in blood pressure although 61% applied measures (healthy diet, salt restriction, etc.) to prevent the development of hypertension.

49% of them consumed a small amount of coffee (1 cup) on a daily basis, 29% were chronic smokers, although during pregnancy only a percentage of 12% smoked 1-5 cigarettes a day and 2 cases were recorded where they smoked 20 and 40 cigarettes a day respectively.

Diabetes was found to have 6% of the sample and of this 2% corresponded to gestational diabetes.

In the last 3 questions (with sub-questions) of the questionnaire which were more specialized, 54% stated that they knew what preeclampsia-eclampsia was, 55% that it was characterized by an increase in blood pressure, 44% that there was also swelling of the lower extremities while only 26% knew that albuminuria also occurs. Especially in the last question that was asked to be given a short definition of albuminuria, only 23% answered positively and correctly.

Comparing a similar study with life style changes most of the women (83%) that planned their pregnancy reported life style change in preparation for pregnancy.[42]

A second study found that the mean caffeine intake among the pregnant women was 68±51 mg/day. A vast majority of the women (79%) consumed <100 mg of caffeine, while the remaining 19% and 2% of the respondents consumed 100-200 mg and >200 mg/day, respectively and none of the subjects exceeded the dose of 300 mg of caffeine/day.[43]

A systematic review that included studies showed that before and during pregnancy a majority pregnant women reported healthier diet and decrease in coffee consumption.[44]

Common features of the women participating in all these studies suggest that age, education, and pregnancy intention are associated with healthier dietary changes and life style.

The main limitation of the study is that there was no randomization of the sample as the control group was from a specific hospital in contrast to the sample number which was sufficient. This study has taken place at the "Elena Venizelou" Hospital for first time.

CONCLUSION

The issue of awareness of blood pressure and its normal levels before and during pregnancy is particularly important for the recognition of its pathological growth which will endanger the life of the pregnant woman and the pregnant fetus.

This study concludes that a large percentage of the sample ignores the complications of pregnancy and their risk factors. However, a majority of pregnant women reported a healthier diet during pregnancy and life style.

In the future, it is proposed to conduct a randomized sample survey in various hospitals in the country for a more comprehensive and effective approach to the forthcoming issue and to take a comparative study

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ANNEXURE 1

Research work questionnaire

Investigation of awareness of blood pressure levels before and during pregnancy

General elements

Age ……………………………………………………………….

Citizenship ....

Education ……………………………………………………….

Profession ……………………………………………………

Number of births ……………………………………………

1. Do you know the blood pressure you had before pregnancy?

YES …………………...NO………………………….

2. Have you had high or low blood pressure in the past (underline if yes)

YES…………………….NO………………………

3. Do you know the normal levels of blood pressure during pregnancy (if yes you mention)

YES… ………………...NO ……………………….

4. Do you know the position of measuring blood pressure in pregnant women? (if yes describe briefly)

YES…………………….NO………………………

5. Do you periodically measure your blood pressure at home during your pregnancy?
YES…………………….NO……………………...

6. Do you visit your doctor regularly? (scheduled appointments)

YES……………………..NO……………………..

7. Does your doctor measure your blood pressure at each visit?

YES…………………….NO……………………….

8. Does your doctor draw attention to the importance of measuring blood pressure at different days and times?

YES…………………….NO………………………..

9. Is the increase in blood pressure related to your body weight?

YES…………………….NO…………………………..

10. Are you aware of the complications that high blood pressure can cause during pregnancy?

YES…………………….NO………………………….

11. Do you follow a healthy diet and measures to prevent gestational hypertension? (if yes short report)

YES……………………NO……………………………….……………………………………………………………

12. Do you drink coffee? (if yes indicate the quantity)

YES… ………………...NO …...QUANTITY………

13. Are you a smoker (if yes indicate years and number of cigarettes daily)

YES…………………….NO……………………………………………………………………………

14. Do you smoke during pregnancy? (if yes report daily number of cigarettes)

YES…………………....NO …………………………... NUMBER OF CIGARETTS DAILY ……………….

15. Do you have diabetes or gestational diabetes? (if yes report accordingly)

YES…………………….NO………………………..

16. Do you know what preeclampsia-eclampsia is? (If you yes short report)

YES…………………….NO…………………………

17. Do you know if preeclampsia causes:

a. Increase in blood pressure

YES…………………….NO………………………….

b. Swelling of the lower extremities

YES…………………….NO………………………….

c. Albumuria

YES…………………….NO………………………….

18. Do you know what albuminuria is? YES………………….NO………………………….