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The level of stress in pregnant women hospitalized in the Department of Pathology of Pregnancy[1]

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Abstract: *Introduction and aims:* Pregnancy is a physiological state for a woman. However, if pathology develops, posing a risk to the health or life of the mother or child, the course of pregnancy is affected by both mental and biological stress. Stress experienced during pregnancy may irreversibly alter the cerebral structures in the foetus. Moreover, chronic stress is likely to cause miscarriage, preterm delivery, IUGR, or low birth weight in the newborn. The aim of this study was to analyse the correlation of the stress level in hospitalized pregnant women and sociodemographic factors. *Methods:* The study was carried out in a group of 140 pregnant women hospitalized in the Department of Pathology of Pregnancy, Independent State Clinical Hospital No.1 in Lublin, Poland. Inclusion criteria for the study were: age 18 or older, confirmed pregnancy, and hospitalization for more than two weeks in the Department of Pathology of Pregnancy. The participants were diagnostically surveyed with the Perceptible Stress Scale (PSS-10) and a questionnaire created for the study.
Results. Almost every second (n = 76; 54.3%) pregnant woman demonstrated low level of stress, 13.6% (n = 19) respondents showed a moderate level, and high level was found in 32.1% (n = 45) of the respondents. A statistically significant correlation was identified between the level of perceived stress and education (p = 0.031), as well as between stress and financial situation (p = 0.017). *Conclusions:* During hospitalization, nearly every third pregnant woman was affected by a high level of stress. The very fact that the health of the child and/or the mother may be at risk is already a source of stress for the woman. Statistically significant higher intensity of stress was found in mothers with professional education and average financial situation. Data from reports in the literature indicate that stress during pregnancy can also negatively affect the health of the psychophysical mother-child dyad. Further research in this area is needed, along with relevant steps measures to promote psychophysical comfort of hospitalized mothers.
Keywords: stress in pregnancy, sociodemographic factors, hospitalization

Introduction

Stress has always accompanied humans: it can have a positive, mobilizing effect (in which case it is called *eustress*) or a negative effect, destructive to the system (*distress*). According to Seyle's original theory of stress, it is defined as a reaction to a threat to stability (the homeostasis of the system); therefore, the period of pregnancy can be particularly prone to an increase in distress, i.e. negative acute or chronic stress reaction, or one superimposed on an already existing problem (Chudzik, Jarosz, Gołębiowska, Gołębiowska, 2017;

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Gajda, Biskupek-Wanot, 2020). It is a reaction to the demands placed on the system, as well as a process by which environmental factors threaten its stability – indeed, stress is defined as the body's response to the stimuli that upset its balance. A number of both biochemical and physiological changes occur as a result of stress (Gajda, Biskupek-Wanot, 2020; Kaczmarska, Curyło-Sikora, 2016). Incidental and periodic stress can affect the body's motivation to act effectively, while moderate stress can mobilize action but can also lead to negative effects (Kaczmarska, Curyło-Sikora, 2016; Sowa, Hess, 2015).

According to Social Readjustment Scale, the period of pregnancy is ranked as the 12th of up to 43 situations that cause the highest levels of stress for respondents (Szydełko, Szydełko, Piątek, Tuzim, Boguszewska-Czubara, 2016). Pregnancy is associated with both psychological and biological stress. The major role is played by hormones (adrenaline, cortisol), produced in the woman's body in a stressful situation, passing through the placenta to the foetus and causing it to experience emotions similar to those experienced by the mother (Brodowska, Bąk-Sosnowska, 2020; Makara-Studzińska, Zwierz, Madej, Wdowiak, 2015; Yildiz, Ayers, Phillips, 2017; Musiała, Hołyńska-Iwan, Olszewska-Słonina, 2018).

The positive effects of pregancy include the fulfilment of the dream of parenthood, the expectation of a happy childbirth, the fulfilment of personal needs related, among others, to the sense of security, recognition, respect, positive self-esteem, the meaning of life or, in a metaphorical sense, immortality (Brodowska, Bąk-Sosnowska, 2020; Wojaczek, 2012).

In contrast, it has been found that traumatic or chronic stress experienced by a pregnant woman alters the child's nervous system by inhibiting neurogenesis, which leads to neuronal atrophy, reduced number of neurons, lessened communicative efficiency between them, and decreased neuroplasticity. There is also an increased risk of the child developing an autism spectrum disorder, Down's syndrome, a mental deficiency and various somatic illnesses (Brodowska and Bąk-Sosnowska, 2020). The consequences of permanent stress also include miscarriages, premature births, low birth weight, IUGR, and cardiovascular or neurological changes in the foetus (Andhavarapu, Orwa, Temmerman, Musana, 2021; Huras, Radoń-Pokracka, 2016; Jośko-Ochojska, 2016; Musiała, Hołyńska-Iwan, Olszewska-Słonina, 2018; Szydełko, Szydełko, Piątek, Tuzim, Boguszewska-Czubara, 2016). Furthermore, in a study by Zietlow, Nonnenmacher, Reck, Ditzen, Müller (2019), emotional stress during pregnancy was shown to be associated with infant stress reactivity, which in turn affects mother-child interactions up to preschool age.

In addition, the pathological course of pregnancy and the need for hospitalization increase the level of negative emotions in pregnant women (Lewicka, Wójcik, Sulima, Makara-Studzińska, 2015; Tałaj, Fischer, Kupcewicz, 2012). Hospitalization in a pathology of pregnancy unit disrupts the satisfaction of women's psychosocial needs. A pregnant woman may begin to identify herself as a sick person, which increases stress and fear for the course of the pregnancy. Patients feel lonely during their stay in a hospital, while at the same time they hold themselves responsible for complications that pose a risk to the health and life of the child (Dembińska, Wichary, 2016; Tałaj, Fischer, Kupcewicz, 2012).

1. Own research

1.1. Aim of the study

The aim of this study was to analyse the correlation of the stress level in hospitalized pregnant women and sociodemographic factors.

1.2. Methods

The study was conducted in a group of 140 pregnant women hospitalized in the Department of Pathology of Pregnancy of the Independent Public Clinical Hospital No. 1 in Lublin, Poland, between November 2019 and February 2020. The inclusion criteria for the study were: age 18 years or older, confirmed pregnancy, and hospitalization for more than two weeks in the Department of Pathology of Pregnancy. Patients were informed of the purpose of the study and their consent was obtained. The study was carried out with the aid of a diagnostic survey method

with the Perceived Stress Scale PSS-10 and a survey questionnaire created specifically for this project. The self-administered questionnaire consisted of 39 closed questions. Questions 1-18 concerned previous pregnancies and the course of the current pregnancy. Questions 19-33 referred to the conditions in the Department of Pathology of Pregnancy. The last six questions were related to sociodemographic data of the pregnant women surveyed. The Perceived Stress Scale (PSS-10), proposed by S. Cohen, T. Kamarcki and R. Mermelstein, and adapted for the Polish context by Juczyński Oglińska-Bulik (2012), is used to test adults, both healthy and with various conditions. It is used as a method for self-assessment, but also as a form of interview. It contains ten questions evaluated subjectively by the respondent. The questions concern affective, emotional reactions to personal problems and events, behaviours and ways of managing them. The PSS-10 scale is used to measure the intensity of stress related to the respondent's life situation over the past month. The higher the total score, the higher the intensity of perceived stress (Juczyński, Ogińska-Bulik, 2012).

The present research was conducted following approval of its design by the Council of the Faculty of Health Sciences of the Medical University of Lublin and in accordance with the assumptions of the Declaration of Helsinki. The data collected were statistically processed using the statistical package SPSS21 Academic License and R3.61. First, the number and percentage of specific responses to each question were reported. The relationship between variables was checked using the Kruskal-Wallis H test. The results of the analysis obtained were assumed to be statistically significant at a significance level of $p<0.05$.

2. Research results

The age of the pregnant women participating in the study ranged from 20 to 44 years (M = 31.76 years; SD = 5.28 years). The largest group (45%) were women aged between 29 and 35 years. An overwhelming proportion of the patients surveyed (88.6%) declared that they were married or in a relationship. As far as the level of education is concerned, the majority of the patients (64.3%) had a higher education degree. Exactly half of the women indicated that their finacial situation was very good, slightly fewer (45%) described it as good, while 5% as average. Detailed socio-demographic breakdown of the study group is presented in Table 1.

The majority of the women (82.9%) were in week 28-40 of pregnancy (the third trimester), 10% were in the second trimester (14-27 hbd), while 7.1% were under week 13 of pregnancy. 37.4% of the respondents were primiparous, slightly fewer (33.8%) were pregnant for the second time, while 28.8% were pregnant for the third and subsequent time. Pregnancy planning was declared by 68.8% of the women surveyed. Detailed obstetric data are given in Table 2.

The results of the analysis regarding the overall level of perceived stress in the women surveyed are presented in Figure 1.

More than half (54.3%) of the women experienced a low level of stress, one third (32.1%) experienced a high level, while in 13.6% the level of vperceived stress was moderate. The mean value of stress level of the women surveyed was 15.06 on the PSS-10 scale.

The relationship between the level of perceived stress and material situation is shown in Table 3. The statistical analysis showed that the mean value of the stress level in the women whose financial situation was very good was 13.06, i.e. statistically significantly lower ($p = 0.017$) than in the women whose situation was assessed as good (17.21) or average (16.29). The questionnaire-based part of our study showed that the financial situation conditioned the level of stress in the hospitalized pregnant women surveyed, which was higher in the women in good and average situation than in the women in a very good financial situation.

Table 4 shows the relationship between the level of perceived stress and the education of the pregnant women studied. The study showed that the mean stress value in pregnant women with vocational education was 19.4, which was significantly higher ($p = 0.031$) than in those with secondary education (16.03) or higher education (13.97). Our question-

Table 1. Socio-demographic data relating to the respondents

Socio-demographic data	Total	
	n	%
Age		
Below 29 years	41	29
29-35 years	63	45
Above 35 years	36	26
Place of residence		
Countryside	50	36
City	90	64
Marital status		
Single	16	11.4
Married/in a relationship	124	88.6
Level of education		
Secondary	29	20.7
Vociational	21	15
Higher	90	64.3

Table 2. Obstetric situation of the women surveyed

Obstetric situation	Total	
	n	%
Week of pregnancy		
1-13	10	7.1
14-27	14	10.0
28-40	116	82.9
Number of pregnancies		
1st	52	37.4
2nd	48	33.8
3rd and subsequent	40	28.8
Pregnancy planning (concerns current pregnancy)		
Planned	96	68.8
Unplanned	44	31.2

naire showed that the level of education conditioned the stress level of the women studied, which was highest in patients with vocational education.

The relationship between the stress level of the pregnant women and age is presented in Table 5. The study showed that the mean value of stress in women over 35 years of age was 15.25, which was

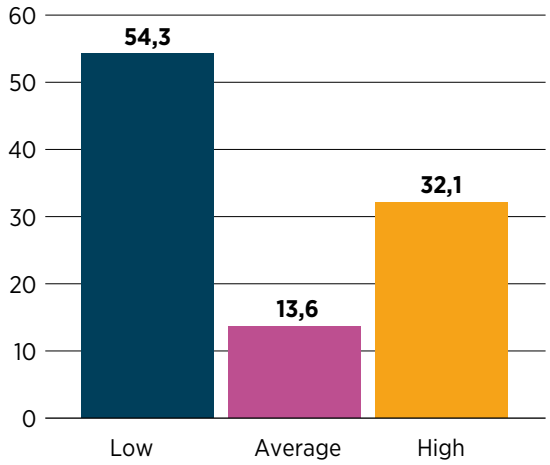

Figure 1. Level of perceived stress.

Table 3. Financial situation of the hospitalized pregnant women and the stress level

Financial situation	M	SD
Very good	13.06	8.35
Good	17.21	8.48
Average	16.29	9.27

Statistical analysis: p = 0.017

M – mean; SD – standard deviation

Table 4. The level of education and the level of stress in the women surveyed

Education	M	SD
Secondary	16.03	9.27
Higher	13.97	8.20
Vocational	19.40	9.03

Statistical analysis: p = 0.031

M – mean; SD – standard deviation

Table 5. The relationship between the age of the pregnant women surveyed and the level of perceived stress

Age	M	SD
Below 28 years	14.73	8.61
29-35 years	15.17	8.00
Above 35 years	15.25	9.82

Statistical analysis: p = 0.563

M – mean; SD – standard deviation

Table 6. The relationship between the place of residence of the women surveyed and their level of stress

Place of residence	M	SD
Countryside	14.86	8.64
City	14.90	8.29

Statistical analysis: p = 0.740

M – mean; SD – standard deviation

Table 7. The relationship between the women's marital status and their level of stress

Marital status	M	SD
Single	13.64	9.02
In a relationship	15.06	8.36

Statistical analysis: p = 0.745

M – mean; SD – standard deviation

higher than in those between 29 and 35 years of age (15.17), or in those under 28 years of age (14.73). In the questionnaire-based part of our study, no significant correlation was found between the level of perceived stress and age (p>0.05).

Table 6 shows the relationship between place of residence and stress levels of the hospitalized pregnant women. The statistical analysis showed that the mean value of the stress level in the women who lived in the countryside was 14.86, which was slightly lower than that of those who lived in the city (14.90). Thus, there was no significant relationship between the place of residence and the level of perceived stress (p>0.05). The questionnaire that we used showed that the place of residence did not condition the level of stress in hospitalized pregnant women.

The relationship between the women's marital status and their level of stress is shown in Table 7. On the basis of statistical analysis, the mean stress value in single women was 13.64, that is, those patients felt stress less frequently (p = 0.745) than respondents in a relationships (15.06). In the data we obtained from the questionnaire, there was no statistical significance between the level of perceived stress and marital status.

3. Discussion

Pregnancy is a period of emotional change that arises from psychological, social, and biological factors. The emotional state of the pregnant woman develops along with the development of the pregnancy. In the first trimester, there is acceptance of the new life, the woman's feelings are mixed from joy to anxiety concerning health and safety. In the second trimester of pregnancy, the woman is usually in a better mental and physical condition: she can feel positive emotions associated with the presence of the baby, can recognize his or her first movements, and makes contact with the baby. The third trimester, on the other hand, is a time of preparation for childbirth, when anxiety and uncertainty concerning the delivery can occur. The woman prepares both herself and her immediate environment for the presence of the child, a process known as „nesting" (Battulga, Benjamin, Chen, Bat-Enkh, 2021; Bjelica, Cetkovic, Trninic-Pjevic, Mladenovic-Segedi, 2018; Dragomir, Popescu, Jurca, Laza, Ivan Florian, Dragomir, Negrea, Craina, Dehelean, 2022; Semeia, Bauer, Sippel, Hartkopf, Schaal, Preissl, 2023; Wojaczek, 2012). Stressors that occur during physiological pregnancy are associated with changes in the woman's external appearance, but also with many other factors. Mikolajkow and Malyszczak (2022) report that there is a significant relationship between anxiety in pregnancy and hormonal changes in the pregnant woman. These changes include not only the regulation of the Hypothalamic-Pituitary-Adrenal (HPA) axis (responsible for stress responses) or thyroid functionality, but also, for example, oxytocin, prolactin and progesterone levels.

Another factor that increases the patient's stress level is the need for hospitalization due to the occurrence of irregularities in the course of pregnancy or other complications that pose risk to the health or life of the mother or child, including hypertension, gestational diabetes, premature outflow of amniotic fluid, or irregularities in cardiotocographic records or ultrasound examinations. It is particularly important for pregnant patients during hospitalization to receive support from relatives, but especially from medical staff (midwives and doctors). The psychological support received often improves well-being, leading

to reduced risk of stress (Alves, Cecatti, Souza, 2021; Koss, Rudnik, Bidzan, 2014; Lewicka et al., 2015; Musiała et al., 2018; Tałaj et al., 2012).

This study was conducted after considering a number of determinants of stress experienced by pregnant women, as well as its consequences for maternal and child health: its aim was to analyze stress levels in hospitalized pregnant women in relation to sociodemographic factors. More than half (54.3%) of the pregnant women experienced low levels of stress, 13.6% experienced moderate levels, while as many as 32.1% experienced high levels of stress. In a study conducted in Spain by Awad-Sirhan, Simo-Teufel, Molina-Munoz, Cajiao-Nieto, and Izquierdo-Puchol (2022), the mean stress level of pregnant women was calculated at 16.98. In that study, 67.3% of the respondents had low stress levels, while the remainder (32.6%) had high stress levels. A significantly higher mean level of stress (25.6) was is reported by Garcia-Silva et al. (2021) in a study conducted during the COVID-19 pandemic, which was likely a significant factor. In Lewicka et al. (2015), the mean level of stress in hospitalized pregnant women was shown to be 12.5±8.15. The study reported that just over 6% of the women surveyed had severe and very severe stress symptoms. Mild and moderate symptoms were found in 15.74% and 13.44% patients respectively. In contrast, up to 63.93% of women were found to have no stress symptoms. However, in a study conducted by Alves et al. (2021) in a group of 1,500 pregnant women, high levels of stress were found in 6% of the subjects, 78% experienced low or moderate stress, while a stress-free pregnancy occurred in only 16%.

There are many reports in the current literature on the influence of sociodemographic factors on the occurrence of stress in pregnant women (Alves et al. 2021; Babu, Murthy, Singh, Nath, Rathnaiah, Saldanha, Deppa, Kinra, 2018; Chanduszko-Salska, Kossakowska, 2018; Effati-Daryani, Somayeh, Mohammadi, Hemati, Yngyknd, Mirghafourvand, 2020; Ghaffar, Iqbal, Khalid, Saleem, Hassali, Baloch, Ahmad, Bashir, Haider, Bashaar, 2017; Kanadys, Tyrańska, Lewicka, Sulima, Bucholc, Wiktor, 2018; Kicia, Skurzak, Korżyńska-Piętas, Palus, Iwanowicz-Palus, 2021; McLeod, Ebeling, Baatz, Shary, Mulligan, Wagner, 2021; Morylowska-Topolska, Makara-Studzińska, Kotarski, 2014). Most reports from research conducted both in Poland and other countries indicate higher levels of stress in pregnant women with lower material status. This corresponds with the results of the present study. In the discussion that follows, the issue of the influence of sociodemographic factors on stress levels is highlighted in more detail.

On the basis of our study, we found that the determinants of high stress levels of hospitalized pregnant women were education and financial situation. Respondents with vocational education and those in an average or good financial situation exhibited significantly higher levels of stress. On the other hand, place of residence, marital status, and age did not condition the level of stress in the pregnant women surveyed.

A study by Kanadys et al. (2018), an analysis of stress levels in pregnant women with a risk of preterm birth, showed that education significantly correlated with experiencing negative emotions, while age, financial situation, or occupational status did not determine stress levels. Similarly, Sulima et al. (2014) showed that in women with a risk of preterm birth, education significantly correlated with both positive and negative emotions, while positive emotions also increased, to a statistically significant degree, with age. In those studies, no correlation was found between the marital status of the women and the positive or negative emotions they experienced. In contrast, Ghaffar et al. (2017), in a study involving 750 pregnant women, found a significant correlation between age and anxiety or depression, which were more common in women aged 36-41 years. In contrast, a study by Kicia et al. (2021) also showed correlation between age and elevated stress levels in women after miscarriage: higher levels of stress were found in patients up to 25 and 30-35 years of age, compared to women between 26 and 30 years of age. Furthermore, Bhat, Hassan, Shafiq, Sheikh (2015) found that anxiety was higher in pregnant women under 30 years of age, compared to those above 30 years of age. Also, the level of income had an impact on the occurrence of anxiety in the participants of the study: the lower the income, the higher

the level of anxiety. Similar findings were obtained by Andhavarapu et al. (2021), who report that only the financial situation, but not age, marital status or the level of education, had an impact on perceived stress in pregnant women. The results obtained by Dembinska and Wichara (2016) even indicate that the anxiety experienced by pregnant women was not dependent on their age, education, place of residence, or financial security. However, in a study conducted in Iran with the aid of DASS-21, Effati-Daryani et al. (2020) showed that the occurrence of elevated stress levels in pregnant women was influenced by the partner's education, work, income, level of support and satisfaction with marital life. In contrast, a patient's age or education, or the age of her partner, had no significant effect on the levels of perceived stress, anxiety, or depression.

In conclusion, sociodemographic variables such as age, education, place of residence, marital status and financial situation are important factors shaping the level of perceived stress in pregnant women. Our own research showed that the factors determining the level of stress were education and financial situation of the pregnant women surveyed. In contrast, no significant correlation was observed between stress and their age, place of residence, or marital status. Therefore, special psychoprophylactic care should be offered to pregnant women with vocational education and average financial situation.

The level of stress in hospitalized pregnant women may be influenced by many variables, such as a difficult obstetric history (problems with conception, the trimester of pregnancy, the number and course of pregnancies and deliveries, previous complications), general health status including psychiatric disorders, the fact of hospitalization and the conditions in hospital (multi-bed rooms, medical examinations and procedures), support from the medical staff, the relationship with the father of the child, or anxiety about the health of the child. However, these issues will be investigated in future research.

The results obtained here indicate a need for further research on stress levels in pregnant women, as well as strategies for coping with stress during the perinatal period. Greater awareness of the medical staff concerning the determinants of stress and the methods of coping with stress by pregnant, parturient, or postpartum women can have a positive impact on the quality of perinatal care.

4. Limitations of the study

Firstly, limitations of this research may arise from the fact that the study group included pregnant women hospitalized in one hospital in the Lubelskie Voivodeship, and therefore may not be representative of the entire population of hospitalized pregnant women. The second limitation may result from the lack of analysis of hospital records (the patients' medical history), so that the picture of the health situation of the respondents may be incomplete, which may influence the results obtained.

Conclusions

1. Nearly one in three pregnant women experienced high levels of stress during hospitalization.
2. The very fact that the health of the child and/or her own health is jeopardized is already a source of stress for the woman.
3. Higher levels of stress were statistically significant for mothers with vocational education and average financial situation.
4. Data from literature reports indicate that stress during pregnancy can negatively affect the health of the psychophysical mother-child dyad.
5. Further research in this area is needed, together with possible measures to promote psychophysical well-being of hospitalized pregnant women.

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