Factors affecting the maternal-foetal relationship

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Background. Mother's attachment to her unborn child has a strong impact on a pregnant woman's attitude towards her health, postnatal attachment, and the child's physical and emotional growth. The purpose of our study was to identify the factors that impact the maternal-foetal relationship.

Materials and methods. The study was conducted at the Centre of Obstetrics and Gynaecology of the tertiary-level Vilnius University Hospital Santaros Klinikos in Vilnius, Lithuania. An original questionnaire of nine parts was developed that the questionnaire included information on demographical data, gynaecological and obstetrical history, a relationship assessment scale, the index of happiness, an antenatal depression risk questionnaire, and the Maternal-Antenatal Attachment Scale.

Results. The study included 388 pregnant women. It was found that the level of education, obstetrical issues during pregnancy, and the risk of postnatal depression negatively impacted the maternal-foetal relationship ($p < 0.05$). Mothers who were elder in family birth order, also those whose pregnancy was of a longer duration, who had a better-quality romantic relationship with partner, and whose socioeconomic fulfilment was higher were all found to have a better quality of maternal-foetal bonding ($p < 0.05$).

Conclusions. The early recognition of low attachment and right application of various means of psychologic intervention might improve the quality of pregnancy, maternity, and childhood.

Keywords: maternal-foetal relations, pregnancy, behaviour and behaviour mechanisms, family relations, parent-child relations

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INTRODUCTION

In one of his notable books, the famous American psychiatrist Daniel N. Stern stated that motherhood requires a mental change to acquire an ability of caring for an infant (1). The maternal deprivation theory founded by the psychoanalyst John Bowlby in 1969 suggested that bonding between mother and child starts to develop before birth (2). However, it was only in 1976 that Klaus and Kennell popularized the idea of the importance of the maternal-foetal relationship in their book *Maternal-Infant Bonding*, suggesting that parents should have an immediate relationship with their newborn in the postpartum period (3). These and other famous studies became a solid base for later researches into prenatal attachment. However, the process of the assessment of prenatal bonding was rather complicated until the development of Cranley's Maternal Foetal Attachment Scale (MFAS) and Condon's Maternal Antenatal Attachment Scale (MAAS) (4, 5). These and other questionnaires may potentially evaluate and help to understand the psychosomatic states in obstetrics and the process of becoming a mother. Mother's attachment to her unborn child has a strong impact not only on postnatal attachment, but also on a child's physical and emotional growth (6). It is evident that unclose prenatal relationship may have an impact on development of psychopathology during early childhood and adolescence (7). If identified early enough some of the issues of weak maternal-foetal relationship are avoidable (6). The purpose of our study was to find out if socioeconomic factors, gynaecologic and obstetrical history, the relationship with partner and the risk of development of postnatal depression have an impact on the maternal-foetal relationship.

MATERIALS AND METHODS

Participants
This study was conducted at the Centre of Obstetrics and Gynaecology of a tertiary-level hospital. Study inclusion criteria were pregnant women at any time during pregnancy that gave freely informed consent and agreed to fill an original printed-out questionnaire with no help from other family members. The data were collected from November 2017 to April 2018 from the respondents attending an antenatal class, women treated due to a high-risk pregnancy, and from women who were consulted antenatally at a perinatology centre.

This study excludes women who filled the questionnaires incorrectly or did not provide full information.

Ethics
The study was approved by the institutional Bioethics committee of Vilnius University Hospital Santaros Klinikos, Vilnius, Lithuania.

The questionnaire
The questionnaire in nine parts was developed. Three parts addressed the demographical data of the participants and their partners, including the level of education and questions regarding the early childhood environment and current relationships with the family. The level of education was measured by the highest achieved degree, from unfinished secondary education to acquired bachelor or higher degree. Other two parts included questions on gynaecologic history, previous pregnancies, and their outcomes. The sixth part of the questionnaire was a seven-item Relationship Assessment Scale (RAAS) developed by Hendrick et al. used to measure the quality of the romantic relationship (8). To identify the socioeconomic fulfilment, the Index of Happiness was used (9). The Antenatal Risk Questionnaire (ANRQ) was part of our questionnaire. This item was used as a screening test to identify women who might develop postnatal depression (10). The maternal-foetal bonding was assessed using Condon's Maternal Antenatal Attachment Scale (5), which contains questions about feelings, behaviours, and attitudes towards the foetus. This scale is distinctive from other questionnaires, which include questions on the state of pregnancy and the role of motherhood rather than attachment to the foetus (11). The other great strength of this questionnaire is that it is dividable into three categories – general attachment (GA), time spent in attachment (TA), and quality of attachment (QA).

Statistical analysis
The Pearson correlation coefficient was chosen to measure the correlation between variables and GA, TA, and QA. The confidence range was 95%. A correlation graph and the Chi-square test were used for some of the variables.

The statistical analysis was conducted using Excel 2016 (Microsoft, Redmon, WA), SPPS Statistics v.25.0 (SPSS Inc, Chicago, IL), and MedCalc v.18.2.1 (Mariakerke, Belgium). The p value of 0.05 was considered statistically significant.

RESULTS

The study included 388 pregnant women at any time of pregnancy. As seen in Table 1, the average age of the participants was 30.6 ± 3.9 years. The majority of women were nulliparous.

As can be seen in Table 2, the maternal age did not correlate with the MAAS score, $p > 0.05$. The Pearson correlation coefficient showed a weak downhill linear correlation between education and GA, TA, QA, $p < 0.05$. The correlation graph showed a positive linear relationship for participants with the education level from unfinished secondary to a university degree, though a negative linear relationship was seen for those with a university degree or higher, $p < 0.05$. A statistically significant difference was found between the mentioned groups. A university or higher degree showed a tendency to decrease general attachment and time spent in attachment more than the quality of attachment.

The time spent in attachment was higher for mothers who were elder in family birth order, $p < 0.05$.

The duration of pregnancy varied from 7 to 41 weeks with the average of 32.8 ± 5.04 weeks. The weak uphill linear correlation between duration of pregnancy and both general attachment and the quality of attachment was found, $p < 0.05$. However, a higher gestational age did not affect TA.

According to the collected data, pregnancy planning did not significantly impact GA, TA, and QA. The variables of obstetrical history such as the number of previous pregnancies and spontaneous abortions did not affect the maternal-foetal relationship, $p > 0.05$.

Table 1. Basic data on the participants

Age	30.6 ± 3.9 years (18–40 years)
Bachelor or higher degree	81%
Previous spontaneous abortions	14.5%
Nulliparous	76.3%
Planned pregnancy	93%
Gestational age	32.8 ± 5.04 weeks (7–41 weeks)

Table 2. Correlation between variables and the MAAS. r value – Pearson correlation coefficient

Variable	General attachment (GA)		Time spent in attachment (TA)		Quality of attachment (QA)	
	r value	p value	r value	p value	r value	p value
Age	−0.08	0.23	−0.12	0.06	−0.003	0.964
Education	−0.197	*0.003*	−0.197	*0.003*	−0.138	*0.04*
Mothers who were elder in the family birth order	0.108	0.11	0.148	*0.028*	0.029	0.668
Number of previous pregnancies	0.032	0.636	0.013	0.847	0.068	0.315
Previous spontaneous abortions	0.084	0.214	0.026	0.701	0.118	0.08
Planned pregnancy	−0.024	0.768	−0.05	0.46	−0.019	0.779
Gestational age	0.133	*0.048*	0.041	0.54	0.178	*0.008*
Obstetrical issues during pregnancy	0.01	0.11	0.167	*0.013*	0.019	0.77
RAAS	0.149	*0.03*	0.057	0.46	0.201	*0.002*
Index of happiness	0.165	*0.017*	0.106	0.13	0.173	*0.011*
ANRQ	−0.073	0.287	0.033	0.65	0.144	*0.032*

Obstetrical issues during pregnancy were divided into four levels: (1) no issues, (2) some problems, excluding hospitalizations, (3) some problems and one hospitalization, and (4) some problems and more than one hospitalization. Overall, obstetrical issues did not correlate with general attachment, $p > 0.05$. However, the weak uphill linear relationship between health problems during pregnancy and the time spent in attachment were found, $p < 0.05$.

The average score of RAAS was 25.7 ± 2 of 30. RAAS was compared to GA, TA, and QA. As shown in Table 2, the quality of the romantic relationship did affect the general maternal-foetal attachment and the quality of attachment, $p < 0.05$. The time spent in attachment was not affected by RAAS, $p > 0.05$.

The Index of Happiness affected the GA and QA ($p < 0.05$), but not the TA.

According to the questionnaire results, 28.9% of the participants were identified as having a great risk for the development of postnatal depression. Pearson correlation coefficient showed insignificant relationship for GA and TA. The score of ANRQ had a weak, thus, significant impact to quality of attachment, $p < 0.05$.

DISCUSSION

Psychologists and psychoanalysts have taken interest in the maternal-foetal relationship (MFA) since 1960s. Facilitated assessment of the factors impacting MFA resulted from scales for calculating the score of MFA. However, researchers tried many different ways to obtain more information about the development of the early relationship. The authors tried to find different factors affecting MFA of all pregnant women and of specific groups of mothers. The information collected in the studies revealed possible factors which may impact the feeling towards the foetus. Some of the earliest studies by Reading et al. focused on the impact of the gestational age on MFA. Scientists have found that MFA increases along with the gestational age, which suggests that the feeling of foetal movements helps to develop bonding between mother and foetus (12). In our study, we found that the gestational age had a weak impact on both general attachment and the quality of attachment, $p < 0.05$.

Subsequently, researchers attempted to link some demographical factors to MFA, but Cannella et al. concluded that this linkage was unsuccessful (13). In the meta-analysis by Yarcheski et al., maternal age was examined in 28 studies and it was considered as having a weak impact on MFA (14). Thus, Camarneiro et al. observed 407 pregnant women and concluded that maternal age does not impact maternal-foetal bonding (15). However, the studies into other demographical factors not only disproved their importance to MFA but many scientists also theorized that education might impact the maternal-foetal bonding. Muller et al. suggested that intensity of MFA decreased in women with more years of education (16). Camarneiro et al. found similar results (15).

Maternal age had no impact on MFA. We found that the level of education negatively impacted MFA and the intensity of attachment suddenly dropped for women with a bachelor or higher university degree. Further analysis should be performed in order to determine the factors that specifically affect women with higher education.

Mother's relationship to the family that she grew up in and its connection with MFA is widely discussed in psychological and medical researches on MFA. However, no information has been found on the mother's place in family birth order and its impact on MFA. We found a significant result that the mothers who were elder in the family birth order tended to spend more time in attachment, $p < 0.05$.

Further, gynaecological and obstetrical history is one of the mostly studied regarding MFA. In most studies, multiparous women have been found having weaker MFA than nulliparous (4, 17). Planning of pregnancy is considered consistently related to maternal-foetal bonding (18). Hassan et al. found that women who planned pregnancy had an overall stronger maternal-foetal attachment level compared with unplanned pregnancies (19). Tsartsara et al. studied the impact of miscarriage on women's feelings of prenatal maternal-foetal attachment during a subsequent pregnancy and found that the history of a spontaneous abortion may not have a long-lasting effect on MFA (20). However, high-risk pregnancies might theoretically have an impact on MFA but the results of different studies are contradictory. In 1987, Kemp and Page compared MFA in

normal and high-risk pregnancies and found no significant differences between the groups (21). On the other hand, Pisoni et al. found that maternal antenatal attachment is significantly lower in a high-risk pregnancy than in a physiologic pregnancy (22). We found that parity, planned pregnancy, and previous spontaneous abortions did not affect maternal-foetal attachment, $p > 0.05$. A high-risk pregnancy does not affect general attachment but mothers tend to spent more time in attachment, $p < 0.05$.

Many studies suggest that a close relationship with the partner has a positive impact on maternal-foetal bonding. In 1993, Wayland and Tale examined associations between maternal-foetal attachment and pregnant adolescents' relationships with baby's father and found that MFA significantly correlated with a close relationship with the partner (23). Siddiqui et al. found that the assessment of the attitude toward pregnancy indicated that the relationships of expectant mothers with their partners had an important impact on establishing prenatal attachment. Mothers that experienced a positive relationship with their partner expressed stronger attachment to their unborn child (24). In our study, we measured relationship with partner using the RAAS. Since we were not able to find any information about the use of this scale to compare the relationship with the partner and the foetus, our results were similar to those of other studies. A close relationship with the partner significantly improved general attachment and the quality of attachment, $p < 0.05$. However, the time spent in attachment was not affected by the RAAS.

In our study, we asked the participants to answer questions on socioeconomic fulfilment, while many other studies used income to measure socioeconomic wellbeing (14). We presumed that the size of income sufficiently reflects the maternal attitude towards her economic status. However, as in the studies measuring income, we found a weak yet significant positive correlation between the socioeconomic status, general attachment, and the quality of attachment, $p < 0.05$.

Some studies concentrate on the association between the maternal-foetal relationship and the risk of postnatal depression. It is evident that depression during pregnancy has a negative impact on maternal-foetal relationship. Gobel et al. found that antenatal maternal-foetal bonding was not affected by postnatal depression, although the quality of perceived emotional proximity to the child was in overall negative and of a low to moderate level (25). Goecke et al. suggested that closer prenatal attachment of a mother to her unborn child protects her from postnatal depression (26). Honjo et al. did not find any correlation between antenatal depression and maternal-foetal attachment (27). In our study, we used ANRQ to measure the risk of the onset of postnatal depression. This questionnaire is a psychosocial assessment tool that aids in the prediction of women who go on to develop postnatal depression (11). We found that the risk for developing postnatal depression was 29%. The score of ANRQ did not affect the general attachment. However, the higher the risk, the weaker the quality of attachment was observed, $p < 0.05$. This result might be due to possible pre-clinical symptoms of depression during pregnancy and specific parts of this questionnaire, which include questions of both physical and emotional violence during lifetime and pregnancy. Some studies suggest that women with depression might avoid attachment to their foetus (28). Further investigations might help to understand the nature of our results.

Overall, it is important to foresee the possible factors which negatively impact the maternal-foetal relationship. Many specialists assume that emotional problems during pregnancy are triggered by the new state of being a mother and ignore the mother's negativity towards her foetus. Meanwhile, a pregnant woman does not want to admit her negative emotions towards the foetus (6). It is therefore essential to evaluate the maternal-foetal relationship for all pregnant women. It is evident that such psychological interventions as pregnancy-adaptation training might improve the mother-foetus relationship before delivery (29). Understanding the importance of maternal-foetal bonding and its role for further development of both the child and postnatal relationships with the mother might help to avoid negative outcomes.

The limitation of our study was that many respondents might have been considered as having a positive attitude towards their pregnancy because they were attending antenatal classes.

CONCLUSIONS

It is important to identify the factors affecting the maternal-foetal relationship in a negative way because many of these factors are preventable if recognized at the right time. Early recognition of low attachment and correct application of various means of psychological intervention might improve the quality of pregnancy, maternity, and childhood.

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VEIKSNIAI, DARANTYS ĮTAKĄ MOTINOS IR VAISIAUS RYŠIUI

Santrauka

Įvadas. Motinos ir dar negimusio vaiko ryšys yra svarbus veiksnys, lemiantis nėščiosios rūpinimąsi savo sveikata, mamos ir vaiko santykius po gimimo, vaiko emocinę ir fizinę brandą. Tyrimo tikslas buvo nustatyti, kas lemia motinos ir vaisiaus emocinio ryšio stiprumą.

Metodai. Tyrimas atliktas Vilniaus universiteto Santaros klinikų Akušerijos ir ginekologijos centre. Buvo sukurtas originalus klausimynas, sudarytas iš devynių dalių, į jį įtraukta informacija apie socialinius veiksnius, ginekologinę ir akušerinę anamnezę, santykių su partneriu įvertinimo skalė (Relationship Assesment Scale), Laimės indekso klausimynas ir klausimynas, nustatantis depresijos po gimdymo riziką (The Antenatal Risk Questionnaire). Motinos ir vaisiaus ryšio stiprumui nustatyti buvo pasirinkta motinos antenatalinio prisirišimo nustatymo skalė (Maternal-Antenatal Attachment Scale).

Rezultatai. Tyrime dalyvavo 388 nėščios moterys. Nustatyta, kad aukštesnis išsilavinimas, nėštumo komplikacijos ir rizika susirgti depresija po gimdymo silpnina motinos ir vaisiaus ryšį ($p < 0,05$). Tiriamųjų, kurios turėjo vyresnių brolių ir seserų ir buvo jauniausios šeimoje, ryšys su vaisiumi buvo geresnis ($p < 0,05$). Geresni tiriamosios ir jos partnerio santykiai ir didesnis pasitenkinimas socioekonomine padėtimi teigiamai veikė motinos ir vaisiaus ryšį ($p < 0,05$).

Išvados. Svarbu anksti atpažinti veiksnius, kurie neigiamai veikia motinos ir vaisiaus ryšį, nes ankstyvas tinkamų psichologinių intervencijų taikymas gali pagerinti nėštumo kokybę, motinos ir vaiko santykį.

Raktažodžiai: motinos ir vaisiaus ryšys, nėštumas, elgesys ir elgesio mechanizmai, šeimos santykiai, tėvų ir vaikų santykiai