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PDF issue: 2025-12-05

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有本，梨花

(Degree)
博士（保健学）
(Date of Degree)
2022-03-25
(Date of Publication)
2023-03-01
(Resource Type)
doctoral thesis
(Report Number)
甲第8341号
(URL)
https://hdl.handle.net/20.500.14094/D1008341

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博 士 論 文

The influence of health care from health professionals on

maternal mental health

（医療者からのヘルスケアが母親のメンタルヘルスにあたえる影響）

令和 4 年 1 月 17 日

神戸大学大学院保健学研究科保健学専攻

Rika　Arimoto　（有本　梨花）

The Influence of Health Care from Health Professionals on Maternal Mental Health

Rika Arimoto[1*], Hiroya Matuo [2]

[1] Department of Public Health, Graduate School of Health Sciences, Kobe University, Kobe, 654-0142, Hyogo, Japan
[2] Department of Nursing, Osaka Shin-Ai College, Osaka, 538-0053, Japan
[*]Corresponding Author: rika.nashinohana@gmail.com

Abstract As maternal mental health is related to postpartum depression; it is essential to reduce anxiety in pregnant women. However, little information is available on the health care effect provided by health professionals on maternal mental health. This study aimed to investigate the health care provided by health professionals during check-ups and its influence on maternal mental health in Japan. This was a cross-sectional study. Participants were 105 first-time mothers with a gestational age of 20 to 27 weeks. Data on participants' demographics, healthcare services received, participants' understanding of health care were collected, and mental health was assessed using the Edinburgh Postnatal Depression Scale, State-Trait Anxiety Inventory-Form JYZ, and Prenatal Attachment Inventory. Results reveal that women who understood their physical condition and fetal conditions were less likely to experience state anxiety than those who did not ($p<.01$ and $p<.05$, respectively). An understanding of fetal condition and growth were also associated with a significantly increased fetal attachment ($p<.01$ and $p<.001$, respectively). The understanding of "better lifestyle" in the midwife-led care group was significantly higher than that in the group that did not receive midwife-led care ($p<.01$). Understanding health care might be necessary for promoting fetal attachment and reducing anxiety during pregnancy. Therefore, health professionals must sufficiently explain relevant conditions to pregnant women.

Keywords Anxiety during pregnancy, Antenatal/postpartum depression, Antenatal, Maternal health Care

1. Introduction

Infant and maternal mortality rates in Japan are the lowest in the world. In contrast, it has been reported that 9.8% of women experience postpartum depression [1], which contributes to increased prevalence of child abuse and suicide in mothers [2], and disorders in the formation of mother-infant attachment [3]. Furthermore, an antepartum depressive state could be related to a postpartum one [4, 5]. In Japan, the incidence rate of antenatal depression was 5.6% among women expecting their first baby [6]. Takeda reported that 63 pregnant and postpartum women in Tokyo died by suicide during the 10 years between 2005 and 2014, of whom, about half of women had mental health problems [2]. Therefore, women's mental health during pregnancy should be addressed for childbirth safety and reducing the prevalence of postpartum depression. Health professionals who care for pregnant women should pay significant attention to their mental health during pregnancy.

Pregnant women may have various anxieties because of the unexpected changes caused by pregnancy. Pregnant women have the most significant concerns about healthy diets, labor and delivery, and physical symptoms [7].

Maimburg reported that providing an environment where pregnant women can express their concerns might reduce their anxiety about health and increase their coping abilities [8]. In Japan, regular antenatal checkups are approximately 14 times during pregnancy. It is common to have a checkup every four week until around 23 weeks, every two weeks until around 35 weeks, and then every week until the due date. Most of the costs of antenatal checkups are subsidized by the local government. Pregnancy checkups may provide opportunities for women to consult with health professionals and discuss their concerns, such as their physical and mental condition, the condition of the fetus, the cost of pregnancy and childbirth, and life after childbirth. Healthcare provided by health professionals plays a crucial role in the management of maternal health. Adequate healthcare-related information from health professionals, such as midwives and obstetricians during pregnancy may provide a better understanding of the physical condition of pregnant women, thereby reducing anxiety and preventing the antepartum depressive state. However, thus far, there have been no

studies demonstrating whether health care provided by health professionals, and pregnant women`s understanding of the information provided by the health professionals, affect the mental state of pregnant women, in the context of Japan. Sufficient information from health professionals on health care during pregnancy may provide a better understanding of pregnant women's physical and mental health conditions, resulting in the reduction of anxiety and prevention of antepartum depression state.

2. Materials and Methods

2.1 Aims of the Study

We conducted this study to clarify the care provided by health professionals and pregnant women's mental states and to explore whether the understanding of the information provided from the health professionals to pregnant women influenced their mental health.

2.2. Participants

One hundred and thirty pregnant women were recruited at 20 to 27 weeks of gestation in four facilities (one hospital, n = 77; one clinic, n = 45; two maternity homes, n = 15) in Hyogo, Japan, between December 2019 and October 2020. The inclusion criteria were first-time mothers and singleton pregnancies. Of these, 118 women responded (response rate of 90.8%). The participants were recruited while waiting for an antenatal check-up at the facility, and provided written informed consent by researcher. The researcher was introduced to the women who met the inclusion criteria by the medical staff. After excluding those who withdrew their consent (n = 3), questionnaires with insufficient data (n = 2), hospitalization during pregnancy (n = 4), and unsuitable gestational weeks (n = 4), data from 105 women were analyzed (one hospital, n = 59; one clinic, n = 37; two maternity homes, n = 9). Midwife-led care was provided in all facilities.

2.3. Questionnaire

This cross-sectional study used a questionnaire survey. The questionnaire consisted of items related to demographics, health care from health professionals during pregnancy, and understanding of health care.

Information collected on demographics included age, gestational weeks, economic status, medical complications, relationship with partner, mental health support, abnormalities during pregnancy, and type of pregnancy. Regarding health care from health professionals, we asked about the healthcare environment, such as interactions with health professionals, whether they received midwife-led care, when they first consulted a midwife, and the mean duration of counseling with a health professionals. The mean duration of counseling was recorded based on participants' self-report. Furthermore, we asked pregnant women if health professionals had briefed them on the following eight items and if they understood them. The eight items were: 1) physical condition, 2) changes in the body, 3) changes in mental health, 4) how to deal with minor troubles, 5) abnormalities that may occur during pregnancy and guidelines for hospital visits, 6) better lifestyle during pregnancy for normal birth, 7) current fetal condition, and 8) fetal growth. These items were rated on a 5-point Likert scale: 1 = "strongly agree," 2 = "agree," 3 = "neither," 4 = "disagree," and 5 = "strongly disagree." "Strongly agree" and "agree" were grouped as the "understanding group," whereas "neither," "disagree" and "strongly disagree" were grouped as the "not-understanding group."

Mental health was evaluated using the Edinburgh Postpartum Depression Scale (EPDS) [9], which was translated into Japanese by Okano et al [10], Prenatal Attachment Inventory (PAI) [11], which was translated into Japanese by Ohmura et al [12], and State-Trait Anxiety Inventory-Form JYZ (STAI-JYZ) , which was translated into Japanese by Hidano et al [13]. The EPDS is a 10-item self-report questionnaire asking respondents to consider depressive symptoms. The total score ranges from 0 to 30 points. In Japan, women are considered at a high risk of postpartum depression if they rate higher than 9 points. The PAI is a self-reported questionnaire composed of 21 items rated on a 4-point Likert scale. A high PAI score indicates mother's positive bonding with her baby. The total score ranges from 21 to 84 points. The STAI is a self-report psychological inventory based on a 4-point Likert scale and consists of 40 questions. Higher scores indicate higher anxiety levels. The STAI measures two types of anxiety, with 20 items assessing trait anxiety and 20 assessing state anxiety.

2.4. Ethics approval and informed consent

The study protocol was approved by the Ethics Committee of Kobe University Graduate School of Health Sciences (Approval number 871) and the Akashi Medical Center Ethics Committee (Approval number 2019-14). Written informed consent was obtained from all the participants.

2.5. Statistical analysis

The association between health care and mental health was analyzed using the Student's t-test, chi-squared test, or Fisher's exact probability test. The data which were not normally distributed were analyzed using nonparametric statistics（Mann-Whitney U test）. Pearson correlation was used to evaluate the relationship between state and treat anxiety and PAI scores. Statistical significance was set at $p < 0.05$. The data were analyzed using SPSS version 25 for Windows.

3. Results

The characteristics of the participants are presented in Table 1. The mean gestational age was 24.6 ± 1.8 weeks. All women received mental support from their families. A total of 67 (63.8%) women had excellent partner relations. Further, 27 (25.7%) women had medical history, including asthma, diabetes, thyroid disease, myoma of the uterus, epilepsy, and heart disease. Eleven (10.9%) women had a history of mental issues.

Table 1. Characteristics of participants (n=105)

Age(years)	30.7±5.5(range19-45)	
Gestational age(weeks)	24.6±1.8(range20-27)	
Type of pregnancy		
Planed	69	(65.7%)
Unwanted	4	(3.8%)
Infertility	32	(30.5%)
Partner relationship		
Very good	67	(63.8%)
Good	37	(35.2%)
Neither	1	(1.0%)
Bad	0	(0.0%)
Very bad	0	(0.0%)
Economic status		
Rich	15	(13.3%)
Neither	82	(78.1%)
Poor	8	(7.7%)
Complications		
Yes	27	(25.7%)
No	78	(74.3%)
History of mental issues		
Yes	11	(10.6%)
No	93	(89.4%)
Abnormalities during pregnancy		
Yes	10	(9.6%)
No	94	(90.4%)
Baby anomaly		
Yes	2	(1.9%)
No	103	(98.1%)

The mean consultation time with a doctor and a midwife during check-ups was 7.3 ± 4.1 (range 2.0–20.0) minutes and 11.8 ± 67.4 (range 3.0–45.0) minutes, respectively. A total of 98 (94.2%) women had counseling sessions with midwives during check-ups. Of these, 27 (39.1%) women consulted with a midwife in the first trimester. The mean number of counseling sessions with a midwife was 1.91 ± 1.2 (range 0-5). Moreover, 43 (66.6%) women were provided with midwife-led care. The mean number of weeks for the first consultation with a midwife was 15.7 ± 4.1 (range 7–24) weeks.

Figure 1 presents the women's perceptions regarding the information provided by the health professionals. The participants answered with "strongly agree" and "agree" to the following items: "current physical condition," "changes in the body," "changes in mental health," "minor troubles," "abnormalities," "better lifestyle," "current fetal condition," and "fetal growth". More than 20% of the women did not receive sufficient information on "changes in the mental health," "abnormal pregnancy" and "Better lifestyle." Regarding the understanding of information from health professionals, the percentage of women who responded with "strongly agree" and "agree" were as follows: 83.8% in "current physical condition," 81.9% in "current fetal condition," and 77.1% in "minor troubles." Conversely, over 30% of the women answered that they did not understand "changes in the body," "changes in mental health," and "fetal growth" (Figure 2).

The mean scores for PAI were 66.1 ± 11.5 (range 31–84). Moreover, the mean scores for trait and state anxiety were 39.1 ± 9.1 (range 20-69) and 39.7 ± 8.6 (range 21–65), respectively. The percentage of women with an EPDS score of 9 or higher was 15.2%. There was a statistically significant association between EPDS and trait or state anxiety ($p < .001$ and $p < .001$, respectively).

However, no association was identified between EPDS and PAI. Additionally, the Pearson correlation analysis indicated a significant negative correlation between state or trait anxiety and PAI scores ($p = 0.009$, $r = -0.264$, and $p = 0.001$, $r = -0.327$, respectively).

Table 2 presents the relationship between the healthcare environment and care provided by health professionals. The rates of understanding of "better lifestyle" in the midwife-led care group were significantly higher than that in the group that did not receive midwife care. However, the rate of understanding of "abnormalities" in the midwife-led care group was significantly lower than that in the group that did not receive the midwife care. There was no significant difference in the gestational weeks of first counseling with midwives between the "understanding" groups and "not-understanding" groups in all items. However, there was a significant difference in the degree of conversation on the "current fetal condition" with a midwife between the "understanding" and "not-understanding" groups. Conversely, there was a significant difference in conversation degrees on "better lifestyle" with a doctor between the "understanding" group and the "not-understanding" group.

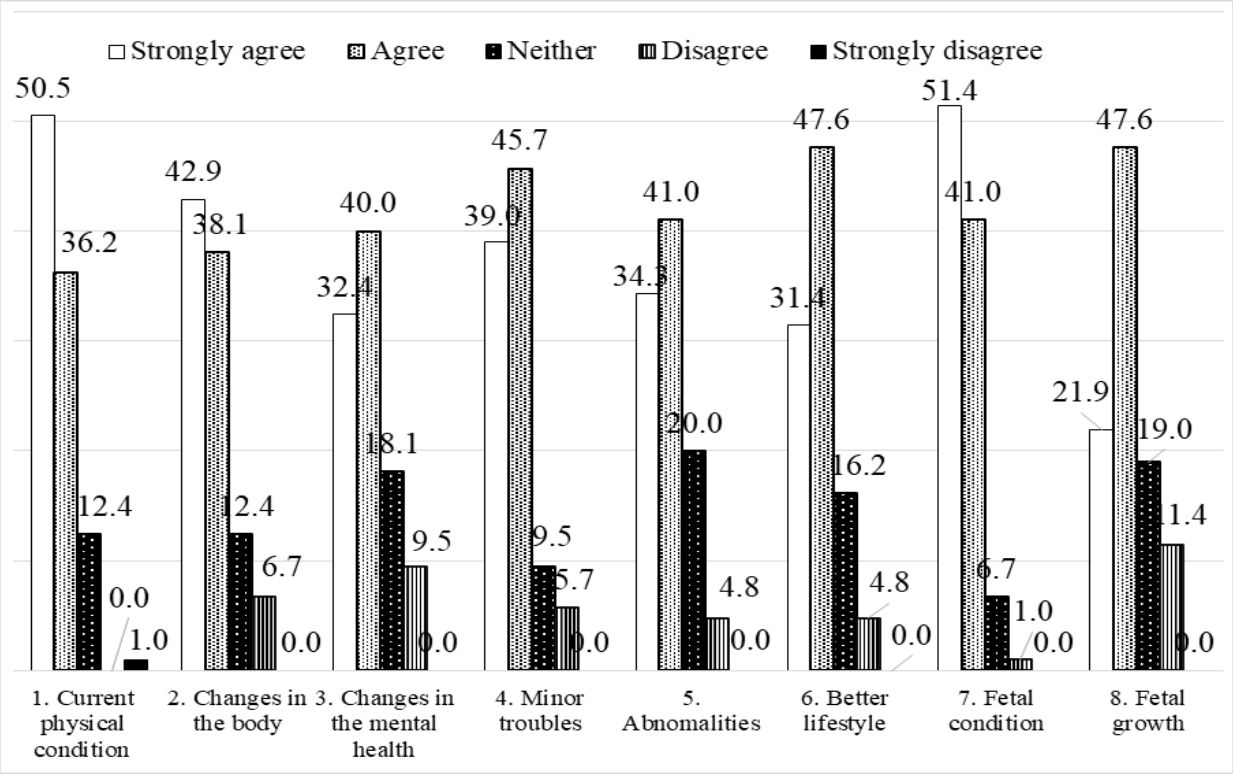

Figure 1. Women's perceptions of information from health professionals

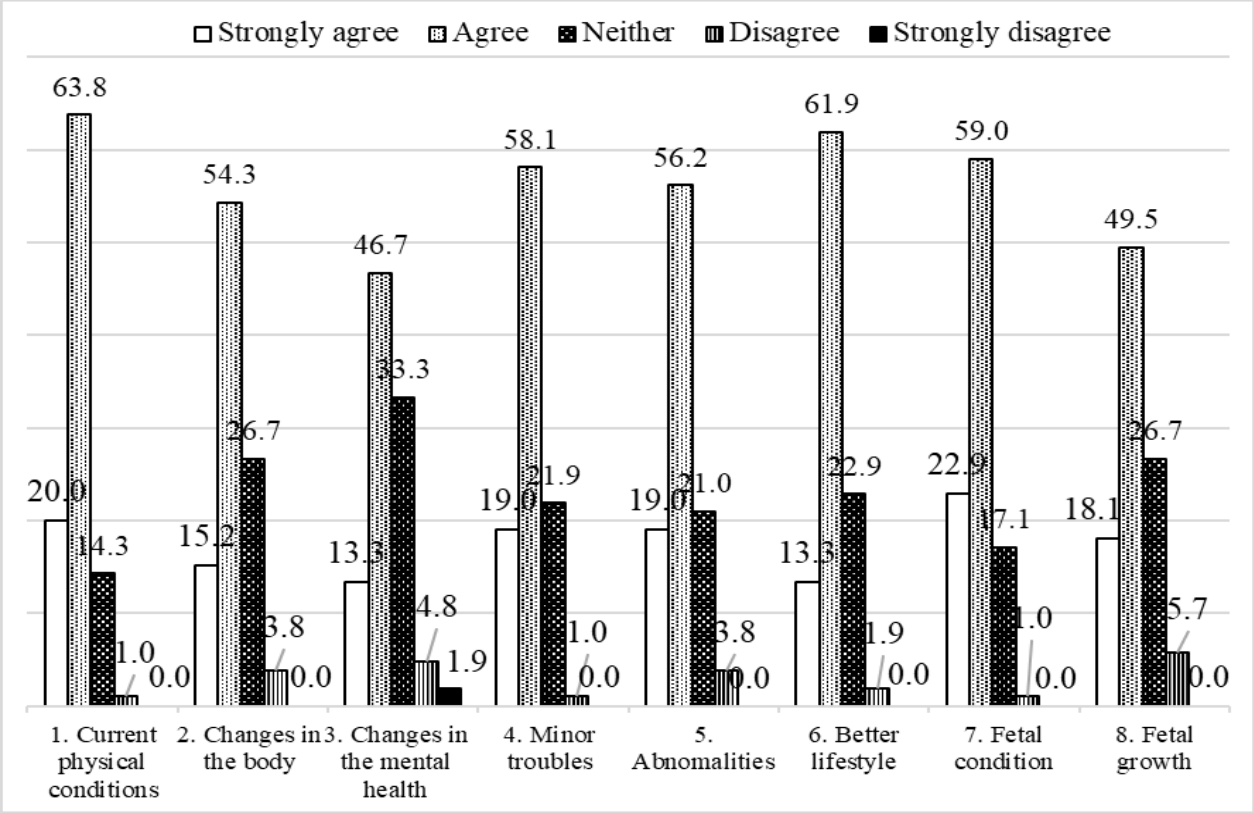

Figure 2. Pregnant women's understanding of maternal physical condition and fetal condition

A comparison of the understanding of health care by health professionals and maternal mental health is presented in Table 3. There were significant differences in the PAI scores between the "understanding" and "not-understanding" groups in "changes in the mental health," "better lifestyle," "fetal condition," and "fetal growth." In the STAI, scores of five out of eight items in the state anxiety inventory scores differed between the "understanding" and "not-understanding" groups: "current physical condition" ($p < 0.01$); "changes in the body" ($p < 0.05$); "abnormalities during pregnancy" ($p < 0.05$); "better lifestyle" ($p < 0.05$); and "fetal condition" ($p < 0.05$). There were significant differences in the trait anxiety inventory scores between the "understanding" and "not-understanding" groups in "current physical condition," "changes in the body," "changes in the mental health," "abnormalities during pregnancy," and "better lifestyle." However, there was no significant difference in EPDS scores between the two groups.

4. Discussion

This is the first study to demonstrate that pregnant women's understanding of health care provided by health professionals may be related to their maternal mental health. Also, the knowledge of the physical and fetal conditions during pregnancy promotes fetal attachment. Furthermore, the degree of conversation with health professionals may play an important role in augmenting pregnant women's understanding of healthcare.

According to the findings, women who understood their "physical condition", "current changes in the body and mental health during pregnancy", and "fetal condition" experienced significantly lower anxiety than women who did not have a good understanding of the same. Also, women who understood "better lifestyle," "current fetal condition," and "fetal growth" had significantly higher attachment to their babies than women who did not understand. Furthermore, women who understood "current physical condition," "better lifestyle," and "fetal condition" spent more time talking with the health professionals than those who did not.

First of all, regarding the understanding of healthcare provided by health professionals to pregnant women. Fava and Grandi [14] reported that pregnant women have substantially higher levels of hypochondriacal beliefs and disease phobias than women who are not pregnant. Anxiety during pregnancy may be associated with an increased likelihood of postpartum depression [15, 16] and child behavioral problems after childbirth [17]. Reducing anxiety during pregnancy is important for the health of the mother and child after birth. Pregnant women may experience anxiety due to the physiological changes associated with pregnancy. Therefore, health professionals need to inform pregnant women about the changes in their body due to pregnancy, which should alleviate fear during pregnancy. Pregnant women seek reassurance on their baby's and their own health through check-ups, access to midwives for questions, prenatal tests,

and parental education classes [18]. Health professionals should educate women about their baby's condition and their physical conditions during pregnancy checkups to reduce their anxiety. Furthermore, understanding the changes in mental health during pregnancy is also important for maternal mental health. According to previous studies, the prevalence of women with probable anxiety and depression during pregnancy was 14.2%–17.9% and 10.0%–14.0%, respectively [4, 19]. In this study, approximately 30% of the women felt that they did not receive enough information from their health professionals concerning the "changes in the mental health." Moreover, 40.0% of women could not understand the "changes in the mental health." Levels of anxiety in pregnant women could be related to depressive symptomatology [20]. Therefore, health professionals should inform pregnant women about the changes in their physical and mental health to promote their understanding of the health care provided.

Table 2. The relationship between the environments of health care and understanding of health care provided by health professionals

		Midwife Led-care [a]			First counseling [b]			Amount of conversation with a doctor [c]			Amount of conversation with a midwife [d]		
		n=96			n=73			n=105			n=99		
Understanding of health care		Yes n (%)	No n (%)	p Value	< 11 weeks	≧ 12 weeks	p Value	n	Mean ± SD	p Value	n	Mean ± SD	p Value
1. Current physical condition	Understanding	36 (83.7)	45 (86.5)	0.700	12 (100.0)	50 (83.3)	0.196	88	7.4 ± 4.3	0.486	83	12.4 ± 7.8	0.013
	Not understanding	7 (16.3)	7 (13.5)		0 (0.0)	10 (16.7)		16	6.7 ± 3.0		16	9.0 ± 3.9	
2. Changes in the body	Understanding	31 (72.1)	34 (64.2)	0.408	9 (69.2)	39 (65.0)	1.000	73	7.7 ± 4.4	0.087	68	11.5 ± 6.9	0.451
	Not understanding	12 (27.9)	19 (35.8)		4 (30.8)	21 (35.0)		32	6.4 ± 3.2		31	12.7 ± 8.4	
3. Changes in the mental health	Understanding	28 (65.1)	29 (54.7)	0.302	9 (69.2)	32 (53.3)	0.365	63	7.6 ± 4.5	0.380	58	11.0 ± 6.1	0.172
	Not understanding	15 (34.9)	24 (45.3)		4 (30.8)	28 (46.7)		42	6.8 ± 3.6		41	13.0 ± 8.8	
4. Minor troubles	Understanding	32 (74.4)	44 (83.0)	0.302	12 (92.3)	47 (78.3)	0.440	81	7.4 ± 4.3	0.459	76	12.3 ± 8.0	0.141
	Not understanding	11 (25.6)	9 (17.0)		1 (7.7)	13 (21.7)		24	6.7 ± 3.5		23	10.3 ± 4.5	
5. Abnormalities	Understanding	26 (60.5)	46 (86.8)	0.003	11 (84.6)	45 (75.0)	0.719	79	7.2 ± 4.2	0.778	73	12.0 ± 7.8	0.711
	Not understanding	17 (39.5)	7 (13.2)		2 (15.4)	15 (25.0)		26	7. 5± 3.8		26	11.4 ± 6.0	
6. Better lifestyle	Understanding	39 (90.7)	33 (62.3)	0.002	12 (92.3)	46 (76.7)	0.279	79	7.8 ± 4.3	0.029	74	12.6 ± 8.0	0.056
	Not understanding	4 (9.3)	20 (37.7)		1 (7.7)	14 (23.3)		26	5.8 ± 3.1		25	9.4 ± 4.5	
7. Fetal condition	Understanding	35 (81.4)	44 (83.0)	0.836	13 (100.0)	49 (81.7)	0.195	86	7.5 ± 4.3	0.349	80	12.4 ± 7.8	0.024
	Not understanding	8 (18.6)	9 (17.0)		0 (0.0)	11 (18.3)		19	6. 5± 3.0		19	9.3 ± 4.4	
8. Fetal growth	Understanding	32 (74.4)	33 (62.3)	0.205	9 (69.2)	45 (75.0)	0.731	71	7.5 ± 4.5	0.340	66	12.2 ± 8.5	0.343
	Not understanding	11 (25.6)	20 (37.7)		4 (30.8)	15 (25.0)		34	6.8 ± 3.3		33	11.0 ± 4.5	

a: Chi-square test (The association between MW led-care and Better lifestyle was analyzed using the Fisher's exact probability test)
b: Fisher's exact probability test c: Mann-Whitney U test d: Student t-test

Second, regarding the attachment toward the baby, healthy behavior during pregnancy is known to be associated with fetal attachment [21–23]. Kelly reported that higher levels of maternal-fetal attachment are associated with better health practices, such as sufficient sleep and smoking habits [23]. If pregnant women are interested in the fetus, they may want to know about better lifestyle habits, contributing to a high level of maternal-fetal attachment. Additionally, Ross [22] reported that women bonded more with the fetus by reassuring fetal well-being and were less anxious about strictly adhering to healthy diets or abstaining from alcohol. Pregnant women's health can be promoted by emphasizing fetal attachment. According to a previous study, behaviors reinforced by maternal-fetal attachment, such as touching the

baby, counting fetal movement, picturing fetal appearance, mothers talking to the fetus, training parents about fetal characteristics, focusing on attachment role, and coping with pregnancy, could attract relatively more maternal attention to the fetus [24]. Health professionals, especially midwives, should inform pregnant women about fetal position, growth, and health when they conduct the physical examination through midwife-led care, which results in the promotion of maternal-fetal attachment.

Table 3. The relationship between understanding of health care and maternal mental health

		PAI[a]	p Value	STAI-S[a]	p Value	STAI-T[a]	p Value	EPDS[b]		p Value
		n=105		n=99		n=99		n=102		
Understanding of health care		Mean ± SD		Mean ± SD		Mean ± SD		< 9 n (%)	≧ 9 n (%)	
1. Current physical condition	Understanding	66.7± 11.1	0.149	37.8 ± 8.5	0.002	38.7± 8.1	0.006	74 (86.0)	12 (14.0)	0.693
	Not understanding	62.2± 13.4		45.7±10.1		45.2± 9.6		12 (80.0)	3 (20.0)	
2. Changes in the body	Understanding	67.5± 10.7	0.060	37.5 ± 9.2	0.011	38.1± 8.9	0.002	60 (69.0)	11 (73.3)	1.000
	Not understanding	62.9 ±12.9		42.4 ± 8.1		43.2± 7.0		27 (31.0)	4 (26.7)	
3. Changes in the mental health	Understanding	68.3 ±10.8	0.019	38.0 ± 8.9	0.165	38.1± 8.6	0.025	55 (63.2)	7 (46.7)	0.225[c]
	Not understanding	62.9 ±11.9		40.6 ± 9.2		42.0± 8.2		32 (36.8)	8 (53.3)	
4. Minor troubles	Understanding	66.9 ±11.4	0.184	38.6 ± 9.1	0.359	40.0± 8.8	0.622	66 (75.9)	14 (93.3)	0.181
	Not understanding	63.4 ±11.6		40.6 ± 9.2		39.0± 8.0		21 (24.1)	1 (6.7)	
5. Abnormalities	Understanding	67.3 ±11.9	0.064	38.0 ± 9.1	0.024	38.8± 9.0	0.028	64 (73.6)	13 (86.7)	0.348
	Not understanding	62.5 ± 9.5		42.6 ± 8.4		42. ± 6.7		23 (26.4)	2 (13.3)	
6. Better lifestyle	Understanding	67.8 ±11.1	0.008	38.0 ± 9.0	0.018	38.4± 8.3	0.009	66 (75.9)	11 (73.3)	1.000
	Not understanding	61.0 ±11.5		42.8 ± 8.5		43.6± 8.6		21 (24.1)	4 (26.7)	
7. Fetal condition	Understanding	67.7 ±10.6	0.003	38.2 ± 8.8	0.049	39.2± 8.3	0.172	71 (81.6)	13 (86.7)	1.000
	Not understanding	59.2 ±13.3		42.8 ± 9.9		42.2± 9.8		16 (18.4)	2 (13.3)	
8. Fetal growth	Understanding	69.3 ± 9.9	0.000	38.0 ± 9.3	0.058	38.7± 8.4	0.079	57 (65.5)	12 (80.0)	0.375
	Not understanding	59.4 ±12.0		41.6 ± 8.2		41.9± 8.8		30 (34.5)	3 (20.0)	

a: Student t-test b: Fishers exact probability test c: Chi-square test
Abbreviations: PAI, Prenatal Attachment Inventory; STAI-S, State-Trait Anxiety Inventory-Form JYZ- state anxiety; STAI-T, State-Trait Anxiety Inventory-Form JYZ-trait anxiety; EPDS, Edinburgh Postpartum Depression Scale.

Finally, it is important for women to receive midwifery-led care in order to understand "better lifestyle". The amount of conversation with health care providers is also an important perspective in understanding “physical condition”, “better lifestyle”, and “fetal condition”. Ida [25] reported that women who received midwife-led care spent more time on antenatal care than those who received obstetrician-led care. Midwives-led care enables women to express their concerns and fears through “effective interaction” with the caregiver. Consulting with the midwife may be an essential aspect in providing prenatal care. This is because women wanted to consult about what is “normal” during pregnancy, physical and mental changes that occur, possible complications to expect, and their fears [18]. Health professionals should adequately converse with pregnant women to promote the understanding of the provided health care.

This Study has some limitations. It was conducted in one community, which limits its generalizability. High-risk pregnant women who require hospitalization during pregnancy, and suffer from mental illness, and congenital anomalies were excluded from this study. Since this study was conducted on low-risk women, the results are not appropriate for high-risk pregnant women. Another limitation is that we were not able to conduct a valid analysis using regression coefficients due to a sample size. Therefore, we were not able to adequately examine the confounding factors

that affect mental health during pregnancy. Therefore, interpretation of study results should consider these limitations.

5. Conclusions

In conclusion, the understanding of health care provided by health professionals in pregnant women was not associated with EPDS, but associated with PAI and STAI. The understanding of “physical condition,” “better lifestyle during pregnancy” and “fetal condition” promotes maternal-fetal attachment, and the degree of conversation between pregnant women and health professionals could be related to understanding the provided health care. Health professionals should adequately promote the understanding of maternal and fetal conditions in pregnant women.

Funding

This study did not receive any funding.

Competing interests

The author reports no conflicts of interest in this work.

Acknowledgements

We are deeply grateful to all participants and medical staff who cooperated in this study.

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