

Material

Pregnancy-related Comfort: A Survey on Pregnant Women during Their Second and Third Trimesters

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Abstract

This study investigated the comfort status of pregnant women to find out how perinatal professionals can ensure that women experience a comfortable pregnancy. We conducted a survey of pregnant women at two Japanese maternity hospitals using self-reported questionnaires using the prenatal comfort scale which measures the following factors: "realizing how to become a mother and developing attachment to the baby (Mother)," "interactions with fetal movement (Fetus)," "support from people around me (People)," "deepening relationship with husband as he approaches fatherhood (Husband)," and "changes in myself during pregnancy (Myself)." Each factor, was compared and scored from highest to lowest. A Mann-Whitney U test for variances of scores in each factor showed no association between these factors and pregnancy stages. However, there was a significant difference in variance between the primigravidae and multigravidas for four factors—Husband ($p=0.002$, 0.005), Fetus ($p=0.004$, 0.009), People ($p=0.01$, 0.043), and Myself ($p=0.003$, 0.009)—in pregnancy overall and the third trimester. In the second trimester, we found a difference between primigravidae and multigravidas only for the last factor, Myself ($p=0.045$). We recommend interventions that can promote pregnant women's understanding of their physical condition and the fetus' growth and development, and we suggest how perinatal professionals can initiate conversations with couples about life post-delivery.

1. Introduction

In 2019, there were 30.58 million women (44.4%) in Japan's labor force, which was a record number¹⁾. The labor force participation rate increased across all age groups, except for 20-24-year-olds, and the employment rate for married women was 56%¹⁾. Along with women's participation in working society and the diversification of their daily lives, Japan's total fertility rate has declined for five consecutive years to 1.34 in 2021. It is crucial for perinatal care professionals to ensure that women have satisfactory pregnancy and childbirth experiences.

Comfort is vital for a satisfactory pregnancy experience. Kinsyo conducted a concept analysis of comfort based on 57 previous studies published in both English and Japanese from 1978 to 2012²⁾. The analysis indicated that the attributes of comfort were "feeling relaxed," "feeling physically comfortable," "feeling

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calm," "feeling a connection," and "enjoying the experience," while its results were "recovering," "bursting with vitality," "becoming stronger," and "actively recuperating." Nakamura³⁾ suggested that comfort during the gestational period consists of nine factors, including "the joy of pregnancy itself"^{†1)} and "physical changes accompanying pregnancy."^{†1)} A study by Takeishi et al.⁴⁾, in which an objective scale was developed to evaluate comfort in pregnant women based on Nakamura³⁾, found that the perception of comfort changed according to the gestational stage.

Nakamura et al.⁵⁾ revealed that comfort during late pregnancy promoted maternal confidence and satisfaction in the early postpartum period. A comfortable pregnancy was also significant for the healthy development of the next generation. Owing to the recent increase in child abuse incidences in Japan⁶⁾, efforts to nurture parenting are necessary.

The purpose of this study was to examine the status of comfort for pregnant women in Japan and suggest how perinatal professionals can help them to achieve a comfortable pregnancy.

2. Methods

2.1 *Participants and procedures*

After receiving consent from the administrators of two maternity hospitals, anonymous self-reported questionnaires were distributed to expectant mothers from June to September 2013. They were given the questionnaires when they visited the hospitals for their maternity health checkups or treatments. The questionnaire was accompanied by a document that explained the research purpose, study methods, and ethical considerations. After anonymously completing the questionnaire, the participants returned it to the researchers by mail in a pre-addressed envelope. Consent to participate in the study was considered to have been obtained when the participant returned the questionnaire. Data were handled confidentially to protect the participants' privacy.

2.2 *Questionnaire*

The present study was part of a larger study and used anonymous self-administered questionnaires on pregnancy-related comforts and discomforts. The questionnaire covered the following domains: 1) participants' attributes and characteristics, 2) pregnancy-related comforts, 3) pregnancy-related discomforts, and 4) stress levels and their causes. In this study, we present the results regarding pregnancy-related comforts. Participants rated items in three domains on the Prenatal Comfort Scale (PCS). The PCS was developed by Takeishi et al.⁴⁾ and contains 35 items rated on a 6-point Likert scale ranging from 1 (have not experienced) to 6 (experienced often). The survey comprised eight items in the first factor: "deepening relationships with husband as he approaches fatherhood [Husband];" seven items in the second factor "interactions with fetal movement [Fetus];" eight items in the third factor "support from people around me [People];" seven items in the fourth factor "realizing how to become a mother and developing attachment to the baby [Mother];" and five items in the fifth factor "changes in myself during pregnancy [Myself]." The total scores ranged from 35-210, and a higher score indicated a higher comfort level.

2.3 *Data analysis*

Descriptive statistics were used to examine attributes of participants and the distribution of the scores for each item. A t-test was used to compare the mean gestational age between primigravidae and multigravidas. The Kolmogorov-Smirnov test was performed to confirm normality of the response distribution. Because none of the PCS items were normally distributed, a Mann-Whitney U test was used to investigate the relationship between the scores and parity (primigravida and multigravida) or gestational stage (second trimester and third trimester). The significance level was set at $p < 0.05$. We used SPSS version 23.0 for Windows for the statistical analysis. The results are presented as mean \pm standard deviation, percentage, or median, as appropriate.

2.4 Ethical considerations

This study was approved by the institutional ethics committee of Kawasaki University of Medical Welfare, Okayama, Japan (ref. no. 387). Permission to transcribe the PCS for the questionnaire was obtained in writing from the developers.

3. Results

3.1 Response status and characteristics of participants

We distributed 365 questionnaires and collected 174 (47.7% response rate). Of these, 142 were valid (38.9% valid response rate) and used in the final analysis.

Table 1 lists the participants' attributes and characteristics. The mean age of the respondents was 31.0 ± 5.0 years (range: 16-42), and it was 30.0 ± 5.0 years (range: 16-39) for the primigravidae and 31.6 ± 5.0 years (range: 18-42) for the multigravidas. Gestational age ranged from 22-40 weeks, with a mean gestational age of 32.5 ± 4.4 weeks. A total of 24 women (16.9%) were in the second trimester, 118 (83.1%) were in the third trimester, 55 (38.7%) were pregnant for the first time, and 87 (61.3%) were pregnant for at least the second time. The mean gestational age among the primigravidae was 32.8 ± 4.4 weeks (range: 22-39), and it was 32.3 ± 4.4 weeks (range: 22-40) among the multigravidas. No significant difference was found in the gestational age between the two. The average number of children ranged from zero to three, with a mean of 0.8 ± 0.8 . The mean number of family members was 3.2 ± 1.3 (range: 2-8).

3.2 Average PCS scores and comparison of scores

The mean scores of the PCS are shown in Table 2. The average score for all subjects and all gestational periods was 5 or higher for 14 items. The mean scores for each factor were as follows: 5.11 ± 0.72 for "realizing how to become a mother and developing attachment to the baby (Mother)," followed by 5.10 ± 0.66 for "interactions with fetal movement (Fetus)," 4.80 ± 0.76 for "support from people around me (People)," 4.76 ± 1.02 for "deepening relationship with husband as he approaches fatherhood (Husband)," and "changes in myself during pregnancy (Myself)" 3.50 ± 1.02 .

3.3 Relationship between the PCS scores and participant characteristics

The results of the Mann-Whitney U test for variances of scores in each factor showed no association between the factors and pregnancy stages. However, it showed a significant difference between the second trimester and third trimester for four items; "I am glad my husband takes care of me," "I am pleased that my husband shows interest in pregnancy, delivery, and child-rearing," "I am pleased that my husband is acting like a good father," and "I am glad I can do things that I could not do earlier in the pregnancy." ($p=0.018, 0.047, 0.033, 0.009$). Only the last of these items scored higher in the second trimester than in the third trimester (Table 3). There was a significant difference in the variance between primigravidae and multigravidas for four factors: factor 1 (Husband) ($p=0.002, 0.005$), 2 (Fetus) ($p=0.004, 0.009$), 3 (People) ($p=0.010, 0.043$), and 5 (Myself) ($p=0.003, 0.009$), for the second and third trimester. In the second trimester, we found a difference between primigravidae and multigravidas only for the fifth factor ($p=0.045$) (Table 4).

4. Discussion

4.1 Characteristics of the participants

The participants' mean age was 31.0 ± 5.0 years (16-42 years). According to the Demographic Statistics 2019⁷, the 30-34 age group had the highest total fertility rate, which was like our results. The range of the gestational period was 22-40 weeks, with 24 women in the second trimester and 118 women (over 80%) in the third trimester. Our study included first- to fourth-time expectant mothers with various occupations. Family structure included both nuclear and extended families. We believe that the inclusion of a diverse group of pregnant women reduces, to some extent, the limitation of generalizability in this cross-sectional survey conducted at only two institutions.

Table 1 Attributes and characteristics of the participants

		(<i>n</i> =142)	
Attributes and characteristics	<i>n</i>	%	
Age (years)	31.0 ± 5.0 (mean ± SD) (range: 16-42)		
16-19	2	1.4	
20-29	54	38.0	
30-39	82	57.7	
40-42	4	2.8	
Parity			
Primigravida	55	38.7	
Age (years)	30.0 ± 5.0 (mean ± SD) (range: 16-39)		
Multigravida	87	61.3	
Age (years)	31.6 ± 5.0 (mean ± SD) (range: 18-42)		
Gestational age (weeks)	32.5 ± 4.4 (mean ± SD) (range: 22-40)		
2nd trimester	24	16.9	
3rd trimester	118	83.1	
Primigravida	32.8 ± 4.4 (mean ± SD) (range: 22-39)		
Multigravida	32.3 ± 4.4 (mean ± SD) (range: 22-40)		
Number of family members in the same household	3.2 ± 1.3 (mean ± SD) (range: 2-8)		
2	49	34.5	
3	54	38	
4	18	12.7	
5	13	9.2	
6	3	2.1	
7	4	2.8	
8	1	0.7	
Number of children	0.8 ± 0.8 (mean ± SD) (range: 0-3)		
0	55	38.7	
1	67	47.2	
2	14	9.9	
3	6	4.2	
Occupation			
Housewife	86	59.4	
Clerical	18	12.7	
Sales, customer service	5	3.5	
Professional work other than healthcare professionals or teachers	11	7.7	
Healthcare professionals	15	10.6	
Teachers	2	1.4	
Unskilled work	2	1.4	
Self-employed	3	2.1	
Technical work	2	1.4	
Other	3	2.1	

n: numbers, SD: Standard Deviation

Table 2 Average PCS scores

(n=142)

	Total			Primigravidae			Multigravidas		
	Mean ± SD (n=142)	2nd trimester Mean ± SD (n=24)	3rd trimester Mean ± SD (n=118)	Total Mean ± SD (n=55)	2nd trimester Mean ± SD (n=8)	3rd trimester Mean ± SD (n=47)	Total Mean ± SD (n=87)	2nd trimester Mean ± SD (n=16)	3rd trimester Mean ± SD (n=71)
PCS total	4.73±0.62	4.71±0.60	4.71±0.60	4.96±0.55	4.96±0.83	4.96±0.50	4.58±0.61	4.58±0.42	4.58±0.65
Factor 1: "Deepening relationship with husband as he approaches fatherhood (Husband)"	4.76±1.02	4.53±0.83	4.81±1.05	5.11±0.75	4.69±1.02	5.18±0.69	4.54±1.10	4.45±0.74	4.56±1.17
1. I am glad my husband takes care of me.	4.54±1.21	4.08±1.10	4.64±1.21	4.93±0.92	4.50±1.20	5.00±0.86	4.30±1.30	3.88±1.03	4.39±1.35
2. My husband is dependable because he is likely to help with housework and child-rearing.	4.45±1.26	4.38±0.97	4.47±1.31	4.62±1.11	4.13±0.84	4.70±1.14	4.34±1.34	4.50±1.03	4.31±1.40
3. I am pleased that my husband shows an interest in pregnancy, delivery, and child-rearing.	4.70±1.15	4.42±0.88	4.75±1.19	5.04±0.88	4.63±1.06	5.11±0.84	4.48±1.25	4.31±0.79	4.52±1.33
4. It makes me smile when my husband talks to or touches my belly.	4.73±1.58	4.54±1.47	4.77±1.60	5.53±0.86	5.50±0.76	5.53±0.88	4.23±1.72	4.06±1.53	4.27±1.76
5. I am pleased that my husband is acting like a good father.	4.52±1.41	4.17±1.05	4.59±1.46	4.71±1.26	4.00±1.20	4.83±1.24	4.40±1.49	4.25±1.00	4.44±1.58
6. I am glad my husband is delighted about my pregnancy and our baby.	5.15±1.14	5.04±1.08	5.18±1.16	5.44±0.92	5.00±1.51	5.51±0.78	4.98±1.24	5.06±0.85	4.96±1.31
7. I am happy that my husband loves my baby.	5.28±1.06	5.13±1.15	5.31±1.04	5.40±0.96	5.00±1.60	5.47±0.80	5.21±1.12	5.19±0.91	5.21±1.17
8. I am glad my husband loves me as a woman.	4.70±1.25	4.50±1.29	4.74±1.25	5.22±1.07	4.75±1.67	5.30±0.93	4.37±1.26	4.38±1.09	4.37±1.30
Factor 2: "Interactions with fetal movement (Fetus)"	5.10±0.66	5.06±0.73	5.11±0.64	5.30±0.59	5.20±0.94	5.31±0.52	4.98±0.67	4.99±0.63	4.98±0.68
9. I feel happy when the fetal movement becomes more dynamic.	5.37±0.85	5.63±0.65	5.32±0.88	5.62±0.59	5.88±0.35	5.57±0.62	5.22±0.95	5.50±0.73	5.15±0.98
10. I feel joy when the people around me can also feel the fetal movement when touching my belly.	4.89±1.22	4.71±1.33	4.93±1.20	5.22±1.05	4.50±1.86	5.34±0.82	4.69±1.28	4.81±1.05	4.66±1.33
11. I am happy to share with my husband my joy at feeling the fetus move in my belly.	4.68±1.39	4.38±1.41	4.74±1.39	5.27±1.08	4.88±1.89	5.34±0.89	4.30±1.44	4.13±1.09	4.34±1.51
12. I know my baby is fine and feels at ease because it is moving.	5.66±0.58	5.71±0.55	5.65±0.59	5.71±0.53	5.75±0.46	5.70±0.55	5.63±0.61	5.69±0.60	5.62±0.62
13. I enjoy feeling how my baby responds when my belly is being touched or talked to.	4.96±1.03	5.00±1.02	4.96±1.03	4.98±1.03	5.00±0.93	4.98±1.05	4.95±1.03	5.00±1.10	4.94±1.03
14. I feel happy when I realize "only I can feel this fetal movement."	4.83±1.24	5.04±0.91	4.79±1.30	4.78±1.20	5.13±0.84	4.72±1.25	4.86±1.28	5.00±0.97	4.83±1.34
15. I feel relieved when the ultrasound shows my baby moving.	5.33±1.00	4.96±1.40	5.41±0.89	5.49±0.92	5.25±1.76	5.53±0.72	5.23±1.04	4.81±1.22	5.32±0.98
Factor 3: "Support from people around me (People)"	4.80±0.76	4.73±0.80	4.81±0.76	5.00±0.70	5.11±0.78	4.98±0.69	4.67±0.78	4.55±0.76	4.70±0.79
16. I am glad that the people around me take care of me.	5.00±1.00	4.79±1.06	5.04±0.98	5.25±0.80	5.38±0.92	5.23±0.79	4.84±1.08	4.50±1.03	4.92±1.08
17. I feel blessed with the people around me.	5.15±0.89	4.92±1.10	5.19±0.84	5.33±0.82	5.38±0.92	5.32±0.81	5.03±0.92	4.69±1.14	5.11±0.85
18. I am glad to have had more conversations with my family since this pregnancy.	4.64±1.09	4.38±1.06	4.69±1.09	5.05±0.95	5.00±1.07	5.06±0.94	4.38±1.09	4.06±0.93	4.45±1.12
19. I am pleased that the people around me are interested in the baby in my belly.	5.02±0.97	4.79±1.14	5.07±0.93	5.29±0.79	5.38±0.92	5.28±0.77	4.85±1.04	4.50±1.16	4.93±1.00
20. Medical checkups, obtaining information from people around me, fetal movement, and other factors help to ease my anxiety surrounding my pregnancy.	4.68±1.05	4.71±0.96	4.68±1.07	4.76±1.05	4.75±0.71	4.77±1.11	4.63±1.05	4.69±1.08	4.62±1.05
21. I am glad to share my unique experiences and thoughts about pregnant women.	4.99±0.95	5.21±0.78	4.95±0.98	4.96±0.98	5.25±0.89	4.91±1.00	5.01±0.93	5.19±0.75	4.97±0.97
22. I am glad to be able to imagine pregnancy, delivery, and child-rearing thanks to friends, magazines, and others.	4.58±0.97	4.54±0.88	4.59±0.99	4.80±0.87	5.00±0.93	4.77±0.87	4.45±1.00	4.31±0.79	4.48±1.05
23. I feel encouraged and think, "They are soul mates!" when I see or talk with other pregnant women.	4.33±1.25	4.54±0.93	4.29±1.31	4.56±1.10	4.75±1.04	4.53±1.12	4.18±1.33	4.44±0.89	4.13±1.40
Factor 4: "Realizing how to become a mother and developing attachment to the baby (Mother)"	5.11±0.72	5.19±0.85	5.09±0.70	5.23±0.76	5.38±1.12	5.20±0.69	5.04±0.69	5.10±0.70	5.02±0.69
24. I have fun picturing my baby in my head.	5.23±0.96	5.17±0.96	5.24±0.96	5.40±0.87	5.50±0.93	5.38±0.87	5.11±0.99	5.00±0.97	5.14±1.00
25. I have fun imagining my new family life.	5.08±0.97	5.13±1.04	5.07±0.96	5.18±1.04	5.38±1.19	5.15±1.02	5.01±0.92	5.00±0.97	5.01±0.92
26. I have fun imagining my baby growing in my belly.	5.13±0.91	5.13±0.99	5.14±0.90	5.29±0.85	5.38±1.19	5.28±0.80	5.03±0.93	5.00±0.89	5.04±0.95
27. I am pleased that I was able to get pregnant.	5.63±0.68	5.67±0.92	5.62±0.63	5.69±0.74	5.50±1.41	5.72±0.58	5.59±0.64	5.75±0.58	5.55±0.65
28. I am pleased that I feel like my baby and I connect with each other.	5.19±0.90	5.17±1.09	5.19±0.86	5.33±0.94	5.25±1.39	5.34±0.87	5.10±0.86	5.13±0.96	5.10±0.85
29. I am looking forward to my delivery.	4.39±1.26	4.75±1.33	4.32±1.23	4.55±1.36	5.25±1.49	4.43±1.32	4.30±1.18	4.50±1.21	4.25±1.18
30. I feel relieved knowing my baby is in my belly when I have ultrasounds, experience morning sickness, etc.	5.13±0.97	5.33±0.96	5.08±0.97	5.15±1.06	5.38±1.19	5.11±1.05	5.11±0.91	5.31±0.87	5.07±0.92
Factor 5: "Changes in myself during pregnancy (Myself)"	3.50±1.02	3.77±1.02	3.44±1.02	3.82±0.97	4.28±1.32	3.74±0.90	3.29±1.00	3.52±0.76	3.24±1.06
31. I am happy because I feel as if time is passing slowly.	3.68±1.44	3.88±1.36	3.64±1.45	4.13±1.42	4.13±1.64	4.13±1.39	3.39±1.38	3.75±1.24	3.31±1.41
32. I feel joy when my feelings change.	3.53±1.39	3.63±1.28	3.58±0.97	3.98±1.31	4.13±1.56	3.96±1.29	3.24±1.36	3.38±1.09	3.21±1.42
33. I am glad I can do things that I could not do earlier in the pregnancy.	3.04±1.31	3.58±0.97	2.92±1.35	3.09±1.34	4.25±0.71	2.89±1.32	3.00±1.30	3.25±0.93	2.94±1.37
34. I enjoy seeing my life (environment, behavior, etc) change due to pregnancy.	3.29±1.18	3.54±1.14	3.24±1.19	3.62±1.13	4.00±1.60	3.55±1.04	3.08±1.17	3.31±0.79	3.03±1.24
35. I am pleased at how my body changes during pregnancy (belly and breasts are bigger).	3.96±1.34	4.25±1.39	3.90±1.33	4.27±1.27	4.88±1.46	4.17±1.22	3.76±1.36	3.94±1.29	3.72±1.38

n: numbers, SD: Standard Deviation

Mean score for each factor is the score per item.

The factors and items were translated from Japanese into English by the author of this article.

Table 3 Items that showed significant differences by pregnancy stage (n=142)

Item	2nd trimester (n=55) median	3rd trimester (n=87) median	P-value
· I am glad my husband takes care of me.	4.0	5.0	0.018
· I am pleased that my husband shows interest in pregnancy, delivery, and child-rearing.	4.0	5.0	0.047
· I am pleased that my husband is acting like a good father.	4.0	5.0	0.033
· I am happy to be able to do things I could not do in the early pregnancy.	4.0	3.0	0.009

A Mann-Whitney U test was performed.

Table 4 Relationship between subscale score and parity

	Total (n=142)				2nd trimester (n=24)			3rd trimester (n=118)		
	Total	Primigravidae (n=55) median	Multigravidas (n=87) median	P-value	Primigravidae (n=8) median	Multigravidas (n=16) median	P-value	Primigravidae (n=47) median	Multigravidas (n=71) median	P-value
Total	4.7	5.0	4.6	0.000	5.1	4.6	0.027	5.0	4.6	0.003
Factor 1 (Husband)	5	5.3	4.8	0.002	4.8	4.4	n.s	5.4	4.9	0.005
Factor 2 (Fetus)	5.3	5.4	5.1	0.004	5.6	5.1	n.s	5.4	5.1	0.009
Factor 3 (People)	4.9	5.1	4.8	0.010	5.3	4.6	n.s	5.0	4.8	0.043
Factor 4 (Mother)	5.2	5.4	5.1	n.s	5.8	5.2	n.s	5.4	5.1	n.s
Factor 5 (Myself)	3.6	3.8	3.4	0.003	4.4	3.7	0.045	3.8	3.2	0.009

The median of the scale or each subscale score per item is indicated.

A Mann-Whitney U test was performed.

n.s: not significant

4.2 PCS scores

There were many mean scores above 5 for the entire PCS scale and subscales, other than factor 5 (Myself). Studies by Takeishi et al.⁴⁾ and Nakamura et al.⁵⁾ did not show the mean scores obtained. The relatively small number of participants (142) may have also had an effect. In Misato et al.⁸⁾, only the total score for each factor was presented, not for each item by parity; that study compared the comfort level of 87 third trimester primigravidae and multigravidas using the PCS scale, and mean scores above 5 points were found for factors 1, 2, 3, and 4 for the primigravidae. One implication of using these items of the scale in the clinical setting is that pregnant women who responded negatively could be targeted for intensive care.

Misato et al.⁸⁾ found that the primigravidae scored significantly higher than multigravidas on the first factor "Husband" in the third trimester of pregnancy. In our study, the primigravidae scored significantly higher than the multigravidas on factors 1 (Husband), 2 (Fetus), 3 (People), and 5 (Myself) for the entire pregnancy period and the third trimester. This probably reflects the fact that, while multigravidas had already witnessed the growth of their husbands as fathers, experienced excitement from fetal movement, received support from their relationships with others, and encountered life changes from their earlier pregnancies, the primigravidae were experiencing these things for the first time, especially in the third trimester.

Conversely, only factor 4 (Mother) had no association with parity. Factor 4 (Mother) consisted of enjoying imagining the condition of the fetus and life after birth and realizing the presence of the fetus inside the body through ultrasonography. The comfort levels of the primigravidae and multigravidas were similar for this factor; therefore, we can say that both groups experienced comfort by visualizing the face and expression of their baby. In Japan, many maternity facilities perform an ultrasound examination at every antenatal checkup. Nakatani et al.⁹ reported that pregnant women prefer to have a midwife over a doctor perform the ultrasound examination. They were less interested in learning about fetal abnormalities and amniotic fluid volume—the original purpose of an ultrasound examination. Experiencing the development of their fetus is usually considered an enjoyable opportunity for pregnant women. Thus, in Japan, ultrasonography is not merely recognized as a test, but also as a service provided by perinatal care professionals for pregnant women and their families to visualize the fetus. We believe that having various expectations and picturing what the fetus looks like may lead to feelings of comfort.

The mean score per item for "Mother" was the highest, followed by "Fetus," "People," "Husband," and then "Myself." Arimoto and Shimada¹⁰ reported that women who "fully understood their physical and mental condition through explanations from medical personnel" during pregnancy had a stronger attachment to their fetus. It is considered that pregnant women gain a sense of becoming a mother, promote attachment formation, and increase comfort by understanding their own physical condition and feeling fetal movements. Additionally, Ohmura and Mitsuoka¹¹ revealed that mothers' attachments to their fetuses were significantly related to their attachments to their infants at three months and one year. Therefore, it is essential to explain the appearance and condition of the fetus in a way that pregnant women can understand during the ultrasound examination at each prenatal checkup.

The next highest mean score was for factor 3, "People," followed by factor 1, "Husband." In Japan, the number of nuclear family households is increasing¹², while communication within neighborhood communities, especially in urban areas, is decreasing. Our survey was conducted in 2013. Since then, the current COVID-19 pandemic has limited face-to-face interactions even more. Interactions have moved online as people refrain from going out, especially pregnant women. The impact of the new coronavirus pandemic on pregnant women and fetuses has not yet been adequately reported^{13,14}, and careful measures are required. Alan et al.¹⁵ reported that due to the COVID-19 pandemic, pregnant women's social support levels, sleep quality, and stress levels were affected. They experienced more anxiety and sought security through social isolation. In August 2021, a pregnant woman in Japan who had not been vaccinated against coronavirus was infected. She gave birth prematurely while undergoing medical treatment at home, which resulted in the death of her eight-month gestational age newborn baby. In response, the Japanese government prioritized vaccinating pregnant women and their families¹⁶. However, fear of infection is increasing among pregnant women, and they continue to refrain from going out. From this perspective, the score for factor 1 (Husband) may be higher now that some pregnant women no longer interact with people outside their home.

In a study by Ogawa et al.¹⁷ that compared the comfort level of working and non-working pregnant women, a significant increase was only observed in the "deepening of the relationship with the husband as he grows into a father" (Husband) in working pregnant women who were toward the end of their pregnancies. In the last trimester, expectant mothers take maternity leave and spend more time at home to prepare for childbirth with their husbands. We believe that this improves the comfort levels of pregnant women. Thus, the husband's involvement during pregnancy may have a significant impact on the comfort level of pregnant women. Given that pregnant women are now restricted from interacting with other people, interventions to promote relationships with husbands should also be considered. Since husbands cannot feel fetal movement in the same way that their wives do, their expectation of postpartum life during pregnancy tends to be very different compared to their wives. Support during pregnancy is significant for the development of attachment to the fetus and the self-image of fatherhood¹⁸. Therefore, when husbands accompany their wives to antenatal checkups, they should be encouraged to imagine fetal growth and

postpartum life as well as to discuss their roles in child-rearing with their wives. This participation promotes husbands' acquisition of the fatherhood role and reduces stress after childbirth, factors which are thought to promote the comfort of pregnant women.

4.3 Association between the PCS scores and gestational age

While there was no significant difference in the variances of scores for each factor between the second and third trimesters, the scores for "I am glad I can do things that I could not do earlier in the pregnancy." was significantly higher in the second trimester than in the third. Additionally, the scores for "I am glad my husband takes care of me," "I am pleased that my husband shows interest in pregnancy, delivery, and child-rearing," and "I am pleased that my husband is acting like a good father" were significantly higher in the third trimester compared to the second. This may be because many pregnancy-related discomforts in the early part of a pregnancy disappear or decrease in the second trimester. Kato et al.¹⁹⁾ reported that "It is troublesome to do anything" was significantly more common in early term pregnancy than in mid- and late-term pregnancy. In the third trimester, husbands recognized the necessity of cooperation in housework and childcare to ease their wives' burdens, and "a cooperative relationship between the family before and after childbirth" was formed.²⁰⁾ It can be said that in the third trimester, husbands become more active in housework and childcare in anticipation of childbirth, and wives become more aware of this. It is essential that perinatal healthcare professionals provide information on the fetus and pregnancy, childbirth, and childcare as a starting point for conversations between couples during antenatal checkups and childbirth preparation classes. This may help couples spend the remainder of the pregnancy from the second trimester with a better idea of what cooperation between the husband and wife looks like in childbirth and postpartum life.

Due to the small number of participants recruited through convenience sampling, generalization of our results should be made with caution.

5. Conclusion

The comfort of pregnant women was investigated using the PCS. The results suggest the importance of interventions that promote the understanding of pregnant women's physical condition and the growth and development of the fetus through visualization using ultrasound during antenatal checkups. Interventions for couples that can encourage them to anticipate the arrival of the child and talk about life after delivery are also recommended.

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Conflicts of interest

None to declare.

Notes

† 1) In Japanese, translated by the author of this article.

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