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ORIGINAL ARTICLE

Effects of a partnership support program for couples undergoing fertility treatment

Kyoko ASAZAWA

Department of Nursing, Tokyo Healthcare University, Tokyo, Japan

Abstract

Aim: The study's purpose was to examine the effects of providing a partnership support program. It was designed to improve Japanese couples' partnership, maintain quality of life, decrease psychological distress, and improve marital relationship satisfaction while they underwent infertility treatment that included the possibility of using assisted reproductive technology.

Methods: This quasi-experimental study with a two-group pretest–post-test design used purposive sampling and non-random assignment of 318 consenting Japanese patients from previous phases of assisted reproductive technology fertility treatment who were patients from a fertility clinic in Tokyo, Japan. The intervention group of 152 patients (76 couples) participated in the partnership support program. The comparison group of 166 patients (83 couples) received usual care. Recruitment was age matched. The program provided information and used a participatory–interactive approach to enhance understanding and cooperation in couples undergoing fertility treatment. The main outcome measures were: "partnership", FertiQoL, Quality Marriage Index, and "psychological distress".

Results: There were 311 participants (intervention group $n = 148$; comparison group, $n = 163$). The intervention group showed significant improvement in the couples' partnerships and a significant decrease in women's psychological distress using subgroup analysis.

Conclusion: The partnership support program provided effective improvement in partnership for the couples, and reduced psychological distress for the women; however, it had less impact for the men. The program was not effective in improving couples' overall quality of life (QOL); however, it was effective in improving the "mind–body" aspects of the QOL subscale.

Key words: infertility, partnership, program, psychological distress, quality of life.

INTRODUCTION

The number of patients undergoing assisted reproductive technology (ART) for infertility treatment has been growing steadily worldwide including Japan (Boivin, Bunting, Collins, & Nygren, 2007; Japan Society of Obstetrics & Gynecology, 2013). Treatments are complex and outcomes uncertain, both of which tend to increase patients' physical burden and psychological distress. Previous studies have found that infertile patients have numerous stresses and anxiety (Boivin & Schmidt, 2005), and their quality of life (QOL) is low (Drosdzol & Skrzypulec, 2009). In particular, some infertile patients, both men and women, encounter mood disorders, depression, anxiety disorder, and psychiatric disorders during assisted reproductive treatments (Volgsten, Skoog Svanberg, Ekselius, Lundkvist, & Sundström-Poromaa, 2008), and Nakayama, Koizumi, and Kamisawa (2005) reported that women experience a significant reduction in QOL during ART.

Correspondence: Kyoko Asazawa, Department of Nursing, Tokyo Healthcare University, 2-5-1 Higashigaoka, Meguro-ku, Tokyo 152-8558, Japan. Email: k-asazawa@thcu.ac.jp

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One factor compounding women's psychological distress was a deteriorated marital relationship (Berg & Wilson, 1991).

Approximately 20.0% of infertile Japanese women reported having trouble with their relationship with their husbands (Kitamura, 2001) and 23.3% infertile women had considered divorce (Shirai, 2004). Shirai (2007) reported that infertile women had trouble with the negative behavior of their husband toward treatment and felt that their husbands had an uncooperative attitude to treatment. This perceived lack of husbands' support has been related with the stress of women who are infertile (Matsubayashi *et al*., 2004). A decline in QOL and an increased level of stress in the men involved in infertility treatment has also been documented. (Fassino *et al*., 2002; Gomibuchi *et al*., 2002). A qualitative study involving interviews of men participating in infertility treatment revealed subjective differences compared with their wives about fertility treatment and having a child. The men felt burdened by cooperating with the treatment (Asazawa, 2012). The author noted that men's experience of infertility is less researched compared with women, although there are findings that suggest that the source of men's distress is different from women's, for example, men felt more distress if they were the cause of infertility (Fisher & Hammarberg, 2012). Therefore, improving the partnership for mutual understanding and cooperation of couples during infertility treatment is important in order to promote their well-being and to support their commitment to continuing treatments.

The author found that the effect of providing an information program for couples made a significant improvement in their marital relationship and the couple's communication. However, intervention studies of partnership support and relieving the effects of psychological distress have not been fully evaluated for couples undergoing infertility treatment (Schmidt, Tjornhoj-Thomsen, Boivin, & Nyboe, (2005). Several studies have documented the importance of social support on the well-being of women undergoing infertility treatment and the positive yet indirect effect it had on men (Martins, Peterson, Almeida & Costa, 2011; Yağmur & Oltuluoğlu, 2012). Social support is instrumental in mediating stress and facilitating resilience through psychobiological and psychosocial pathways (Ozbay, Johnson, Dimoulas, Morgan, Charney & Southwick, 2007).

Therefore, the underlying logic of this study is to address the reduction of psychological distress and improve QOL maintenance through the intentional promotion of the emotional component of social support (Ozbay, *et al*., 2007) expressed as partnership support. The theoretical base supporting the partnership support program is the partnership causal model (Asazawa & Mori, 2014) and Cohen's social support theory (2000). The authors defined "partnership" as sharing one's thoughts and feelings with one's partner and demonstrating empathy toward the partner's thoughts and feelings, particularly in the context of undergoing fertility treatment. The partnership causal model indicates that for a couple undergoing fertility treatments, a strong partnership maintains their QOL, and this can decrease the couple's distress.

The present author (Asazawa, 2014) developed a partnership support program for infertile patients undergoing ART treatment as a pilot study in preparation for this study. As a result of the pilot study, women's psychological distress was reduced after the program intervention. The process evaluation such as satisfaction and information acquisition for men and women confirmed the utility of program (Asazawa, 2014). Therefore, the present study established the comparison group and optimum sample size in order to clarify the effect of using a program developed for couples in the intervention group (Fig. 1).

The purpose of this study was to examine the effects of the partnership support program on infertile Japanese couples undergoing general fertility treatment and who were scheduled for the next course of ART treatment. The author predicted that the outcome of the partnership support program intervention would be the improvement of partnership, maintenance of QOL, reduction of distress, and the improvement of the marital relationship satisfaction.

METHODS

Design and study protocol

This was a quasi-experimental design using a convenience sample and a non-equivalent age-matched control group with non-random group assignment. In the author's pilot study QOL and age was correlated (Asazawa, 2014), therefore, the matching of ages in the intervention group and the control group was necessary.

The intervention group participated in a partnership support program aimed at the improvement of understanding and cooperation for couples during infertility treatment. The comparison group received care as usual without participating in the program.

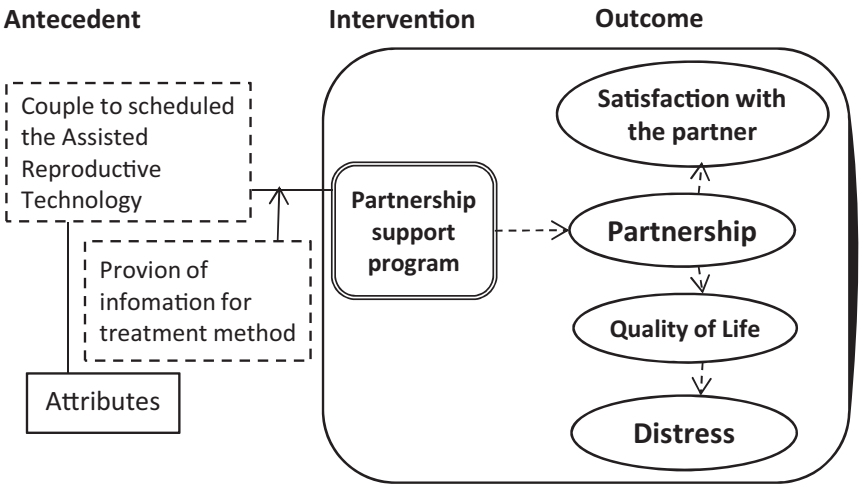

Figure 1 Conceptual framework of the study for the partnership support program.

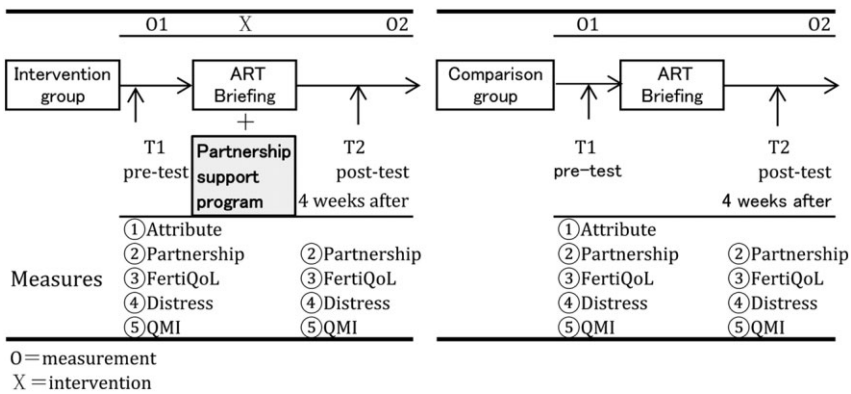

Figure 2 The study design for the effect of partnership support program. ART, assisted reproductive technology; QMI, Quality Marriage Index.

Figure 2 shows the protocol of this study. First, a baseline survey was administered to the intervention group. Next, the age-matched comparison group was assessed. Both groups were measured on each scale for the pretest, and the equivalence of the groups at baseline was confirmed. The post-test survey was conducted 4 weeks later for each group.

Intervention program

The programmatic goals were as follows: (i) the participants will understand the psychological conditions for men and women undergoing ART; (ii) the participants will understand specific cooperative behaviors while undergoing ART; and (iii) The participants will share their feelings and thoughts about treatment and the potential child. The direct intervention was 60 min (30 min didactic, 30 min experiential).

The pedagogical approach and components of the program were based on research about care for infertility patients (Akizuki, 2009; Asazawa, 2012; Domar, Clapp, Slawsby, Kessel, & Orav, 2000; Schmidt *et al*., 2005) and empowerment theory (Anme, 2004). The program components provided: (i) information about women's and men's psychological state during each stage of ART treatment; (ii) specific information for cooperation during ART treatment; and (iii) mechanisms to promote the couple's communication.

The program consisted of lectures and experiences such as exercises, discussion, use of slides, booklet, digital versatile disc (DVD), and practice sheets. Convenience sampling provided 10 Master's prepared midwives and certified fertility nursing experts who provided face validity for the content and educational materials, and three certified fertility nursing experts and fertility specialists who contributed to the supervision of the program, and examined the consistency of the intervention purpose and content alignment. The author provided various formats of the information for the lectures. To reinforce the content, participants

Table 1 Partnership support program

	Contents	Time
	<Lecture>	(min)
1	Preparing for ART	5
2	Sex differences and stress in ART	5
3	Feelings of men and women in ART	5
4	Cooperation of the couple in the treatment stage	5
5	Cooperation and information after pregnancy test	5
6	DVD: Art of communication for couples	5
	<Participatory-experiential approach>	
7	Exercise and discussion	30
	Confirmation for feeling and thinking	
	Participants' exchange of opinions	
Total time		60

received a copy of the material in DVD format and in a booklet format: "Guide book for enhancement of partnership in couples". The author explained the program content as shown in Table 1 along with the intended use and responses to participants' questions, which could be answered at any time throughout the program. In the participatory exercises, participants first described their feelings and thoughts about children and their treatment using the author's created communication sheet; next, couples discussed and exchanged thoughts and feeling. The participants used the communication sheet as a basis for their discussion. It contained the confirmation of the partners' agreement or non-agreement about their feelings and thoughts about each other. Participants exchanged views during the program about agreement or non-agreement of the discussion results. During the program, the author took an active role by directly intervening at the introduction of the discussion and the presentation of the communication sheet to prompt a continuation of the discussion at home during the following 4 weeks.

Participants and setting

Potential participants were couples undergoing fertility treatment visits at a Japanese fertility clinic. The inclusion criteria were: (i) undergoing infertility treatment with a plan to include ART; (ii) participating in a briefing session of ART; (iii) participating as a couple in a partnership support program; (iv) fluent in Japanese; and (v) the primary physician granted permission for the couple to participate in the study. The exclusion criteria were: (i) patients with sexual dysfunction or severe psychiatric disorders; and (ii) having previous experience of ART.

The approximate number of participants necessary for an adequate effect size was derived from the estimation method developed by Cohen (1992). The pilot study's FertiQoL scale mean values before (57.9) and after (62.8) the intervention, were used to calculate for effect size yielding of $\gamma = 0.541$ (Asazawa, 2014). Based on the author's pilot study, a dropout rate of 30.6% was anticipated. Using $\gamma = 0.54$ to determine the effect size, it was indicated that 55 participants were necessary for each group. Therefore, an estimated 308 participants (154 for each group) must be enrolled to achieve the desired 80% power with an alpha level of 0.05.

Procedures

The nurse manager of the clinic cooperating with the study assisted the author in recruiting participants using convenience sampling from April to September 2013. After the couples were registered to attend the ART briefing, the nurse manager and the author confirmed that they met the inclusion criteria. The nurse manager then introduced the author to the couples. The couples were informed verbally and in writing about the study's purpose as well as about confidentiality, anonymity, and safety of personal data. If the couple agreed to participate in the study, the author obtained their written consent. The author provided an explanation of their right to withdraw from the study without penalty, and provided the couples with a withdrawal from the study form. The participants were also informed that they had the option to mail the withdrawal form if necessary.

The data collection period was from April to November 2013. During the first 4 months, data were collected from the intervention group. During the next 3 months (after the intervention program was completed), the data were collected from the comparison group. The author was responsible for conducting the program. Therefore, homogeneity of the program content over time was assured and verified using a fidelity evaluation developed by Yasuda (2011) and implemented by three Master's prepared midwives trained to use the evaluation method.

Ethical considerations

This study was conducted after obtaining approval from the Ethics Committee for Epidemiological Studies at St Luke's College of Nursing, Tokyo, Japan (approval no. 12–078) dated 19 March 2013. Following the Declaration of Helsinki, a written explanation was provided to the participants regarding the study objectives, methods,

protection of anonymity, and voluntary basis of participation. It also explained that the collected data would be used only for this study. The author obtained signed informed consent from each participant.

Outcome measures

Partnership scale

The Japanese Infertility Partnership Scale (IPS) was used to evaluate the partnership of infertile couples. This scale was developed by Asazawa (2013) and consists of three factors: (i) "emotional support"; (ii) "understanding the burden"; and (iii) "cooperation with treatment". The scale has 18 Likert items with response categories ranging from 5 ("strongly agree") to 1 ("strongly disagree"). Higher scores of understanding, cooperation, and empathy for fertility treatment indicate a more positive perception of the partnership. An acceptable reliability of the IPS was confirmed, (Cronbach's alpha coefficient, 0.71–0.90). The concurrent validity of the IPS (also referred to as "partnership") was established by finding acceptable correlations with the QOL subscales.

QOL scale

The QOL scale was used as the basis for the FertiQoL tool developed by Boivin, Takefman, and Braverman (2011) to evaluate men and women's QOL related to their personal experiences of fertility problems. The FertiQoL consists of 34 items with five response categories ranging from 0 ("lower QOL") to 4 ("higher QOL"). It includes six factors: (i) "emotional"; (ii) "mind/body"; (iii) "relational"; (iv) "social"; (v) "environment"; and (vi) tolerability. The FertiQoL assesses the influences of fertility problems in diverse life areas, namely, on self-esteem, emotions, general health, partnership, family and social relationships, work life and future life plans; the optional FertiQoL Treatment factor assesses the burden/tolerability of fertility treatment. Higher scores indicate a higher QOL. The reliability of the FertiQoL was established based on its Cronbach's alpha coefficient range of 0.72–0.90 (Boivin *et al.*, 2011). The FertiQoL was then translated into 31 languages. The reliability of the FertiQoL in the Japanese version was established and yielded a Cronbach's alpha coefficient range of 0.66–0.88 (Asazawa & Mori, 2014).

Distress scale

The distress of infertile couples was evaluated using the distress scale developed by the author (Asazawa & Mori, 2014). The distress scale is a three item inventory: (i) "Do you feel stressed by the treatment?"; (ii) "Do you feel depressed because of the treatment?"; and (iii) "Do you feel anxiety from the treatment?". The response categories ranged from 1 ("strongly disagree") to 5 ("strongly agree"). Higher scores indicate the presence of higher distress. The instrument had acceptable reliability (Cronbach's alpha coefficient, 0.89), establishing its internal consistency, and expert midwives established face validity and content validity.

Quality Marriage Index

Marital quality was assessed using the Quality Marriage Index (QMI) (Norton, 1983). The QMI is a six item inventory that uses broadly worded, global items such as "We have a good marriage" and "My relationship with my partner is very stable" (Norton, 1983). In this version, participants provided their degree of agreement with each of the six items on a 4 point scale, ranging from 1 ("strong disagreement") to 4 ("strong agreement"). A high QMI score reflects a good evaluation of the marital relationship. A Cronbach's alpha coefficient of 0.95 was obtained in the present study.

Statistical analysis

The software programs SPSS version 19.0 (SPSS, Tokyo, Japan) was used for the data analyses, with the significance level set at 5%. Unpaired Student's *t*-test and χ^2-test were used to compare the basic characteristics: each scale score of the participants and each variable before the program between the groups. The statistical analysis methods of an intention-to-treat analysis, two way factorial ANOVA, and simple main effect test were used to analyze and test the differences between the intervention group and control group in order to verify the program's effectiveness. If there were significant differences found from the two way factorial ANOVA, a simple main effect test was used in the next stage.

RESULTS

Recruitment and baseline comparison between two groups

As shown in Figure 3 depicting the flow of participants through the study, meeting the inclusion criteria were 226 patients in the intervention group and 190 patients in the comparison group. Agreeing to participate were 152 patients from the intervention group and 166 patients from the comparison group. Completing the study were 108 patients (71.1%) from the intervention

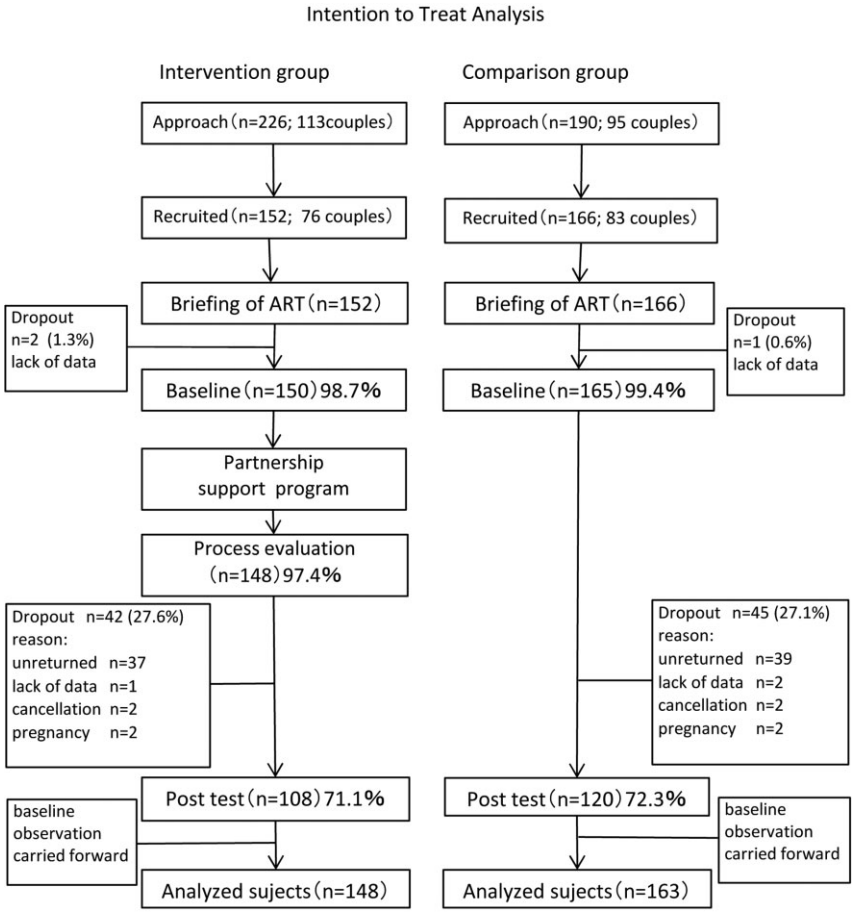

Figure 3 Flowchart of study participants: Effects of Partnership Support Program for Couples Undergoing Fertility Treatment. ART, assisted reproductive technology.

group and 120 patients (72.3%) from the comparison group. Missing data and participant dropout were managed using "baseline observation carried forward analysis" for intention-to-treat analysis. The final analysis included 148 participants for the intervention group and 163 participants for the comparison group and excluded those who canceled. The program was repeated nine times to accommodate all the patients. The average number of participants per session was 17. There was a significant between-group difference of underlying disease at baseline. There were no significant differences between the intervention and control group regarding their characteristics or their pretest scale and subscale scores other than underlying disease (see Table 2).

The average scores of each scale for all participants (male/female) were as follows: partnership, 68.0/70.2; FertiQoL, 67.6/58.6 ($t = 6.57$, $P = 0.000$); distress, 9.0/11.7 ($t = 7.88$, $P = 0.000$); and QMI, 20.3/19.9.

Verification of hypotheses

Verification of interaction effect in program and time, using two way factorial ANOVA

It was anticipated that there would be an interaction effect with program and time and a difference in the pattern of changes between the two groups. First, to examine the two factor interaction, a two way factorial ANOVA was conducted for each scale and subscale. ANOVA was established. The dependent variable was each scale score, between-subjects factor was the presence or absence of program, and within-subjects factor was time. There were significant interaction effects between program and time in the two scales, partnership ($P = 0.008$) and FertiQoL ($P = 0.047$). In addition, there were significant interaction effects in two partnership subscales, emotional support ($P = 0.006$) and understanding the burden ($P = 0.011$), and one FertiQoL subscale mind/body ($P = 0.003$) (see Table 3).

Table 2 Baseline comparison between the two groups ($n = 311$)

	Intervention group ($n = 148$)		Comparison group ($n = 163$)				
Demographic variables	M	SD	M	SD	*t*	d.f.	*P*
Age (years)	37.1	5.21	37.7	5.29	–0.939	309	0.349
Duration of marriage (months)	53.9	38.72	56.8	39.93	–0.637	309	0.525
Duration of infertility (months)	39.5	31.18	42.0	37.04	–0.642	309	0.521
Duration of infertility treatment (months)	14.6	18.83	15.3	13.40	–0.383	309	0.702
Attribute	N	%	N	%	Total	χ^2	*P*
Sex							
Male	74	50.0	81	49.7	155	0.003	0.957
Female	74	50.0	82	50.3	156		
Underlying disease							
Yes	23	15.5	13	8.5	36	4.337	0.037*
No	125	84.5	150	92.0	275		
Marital status							
First marriage	135	91.2	140	85.9	275	5.616	0.060
Remarried	11	7.4	23	14.1	34		
Not married	2	1.4	0	0.0	2		
Having a child							
Yes	2	1.4	6	3.7	8	1.680	0.287
No	146	98.6	157	96.3	303		
Causes of infertility							
Unexplained	41	27.7	57	35.0	98	3.742	0.442
Male factor	27	18.2	22	13.5	49		
Female factor	43	29.1	38	23.3	81		
Male and female factors	17	11.5	21	12.3	37		
Unknown	20	13.5	26	16.0	46		
Type of treatment							
Under exam or undecided	25	16.9	22	13.5	47	1.370	0.849
Timing therapy	19	12.8	22	13.5	41		
Ovulation-inducing drugs	11	7.4	16	9.8	27		
Artificial insemination	92	62.2	101	62.0	193		
Unknown	1	0.7	2	1.2	3		
Changed hospitals/clinics							
Yes	65	43.9	84	51.5	149	1.802	0.179
No	83	56.1	79	48.5	162		
Annual payable medical cost							
<¥200 000	1	0.7	8	4.9	9	6.913	0.227
¥200 000–500 000	28	18.9	39	23.9	67		
¥500 001–1 000 000	50	33.8	49	30.1	99		
¥1 000 001–2 000 000	34	23.0	32	19.6	66		
>¥2 000 000	8	5.4	10	6.1	18		
Unknown	27	18.2	25	15.3	52		
Scales and subscales	M	SD	M	SD	*t*	d.f.	*P*
Partnership	68.3	10.5	69.9	11.4	–1.282	309	0.201
Emotional support	34.4	6.4	35.4	7.0	–1.213	309	0.226
Understanding the burden	15.5	3.2	16.0	3.1	–1.634	309	0.103
Cooperation with treatment	18.4	3.7	18.4	3.8	–0.194	309	0.846

Table 2 *Continued*

Scales and subscales	M	SD	M	SD	*t*	d.f.	*P*
FertiQoL	62.4	13.1	63.7	12.8	–0.900	309	0.369
Emotional	14.0	4.9	14.2	4.8	–0.358	309	0.721
Mind/body	16.0	4.7	15.8	5.2	0.281	309	0.779
Relational	17.0	3.8	17.5	3.5	–1.107	309	0.269
Social	15.4	4.3	16.0	4.2	–1.197	309	0.232
Environment	12.2	3.5	12.8	3.6	–1.428	309	0.154
Tolerability	10.1	3.4	10.3	3.5	–0.373	309	0.709
Distress	10.5	3.2	10.3	3.4	0.560	309	0.576
QMI	19.8	3.5	20.3	3.6	–1.406	309	0.161

*$P < 0.05$. d.f., degrees of freedom; M, mean; SD, standard deviation; QMI, Quality Marriage Index.

Because there was no significant interaction effect between QMI and distress, a two way ANOVA was conducted with men and women as subgroups. As a result, in women, a significant interaction effect between program and time was observed for distress ($F = 6.93$, $P = 0.009$).

Verification of differences between groups, using simple main effect test

Next, in order to verify the differences between groups, a simple main effect test for each scale having a significant interaction effect was analyzed. There was a significant difference between the groups in the simple main effect test of partnership ($F = 11.28$, $P = 0.001$) (Fig. 4). There was no significant difference between the groups in the simple main effect test of FertiQoL. However, there was a significant difference between the groups of the mind/body subscale ($F = 5.98$, $P = 0.015$) (Fig. 5). In the subgroup analysis by sex, there was a significant difference between the groups for the distress scale in women ($F = 12.22$, $P = 0.001$) (Fig. 6).

Because there was a significant between-group difference of underlying disease at baseline, the three factor interaction of program, sex, and underlying disease were examined using a three way ANOVA. The dependent variable was the score difference of the distress scale of before and after the intervention. There were significant interaction effects between program, sex, and underlying disease on the score difference of the distress scale ($F = 6.01$, $P = 0.015$). In order to verify the differences between groups, a simple main effect test on the score difference of the distress scale using significant interaction effect was analyzed. There was a significant difference between the groups of the distress score difference without underlying disease and women ($F = 8.82$, $P = 0.003$). Therefore, there was no impact on the score due to the presence or absence of underlying disease.

Fidelity evaluation

Fidelity evaluation was conducted to assess the uniformity of interventional content, procedures, and progress on times. Trained research assistants conducted the fidelity evaluation and monitored the nine interventions occurring over time. After the implementation of the program, they evaluated it using a five item questionnaire with a five level response with 5 points as a perfect score. The evaluation contents were: "performance of intervention content", "compliance with time and amount of intervention", "compliance with the initial plan", "uniformly implemented for participants" and without obstructive factors'. The three items that received a response of 5 points each time, meaning they were able to consistently comply, were "performance of intervention content", "compliance with the initial plan", and "uniformly implemented for participants". The two items, "compliance with time and amount of intervention" and "no interferences", scored an average of 4.3 points. The reasons for non-compliance were as follows: "interruptions due to caring for poor physical condition of participant", "delay of program start time", and "trouble with personal computer connection". Therefore, in general, the program was delivered in a highly consistent manner over time.

DISCUSSION

This was a quasi-experimental study in which data were collected from the two groups at different times. Therefore, in order to examine the effect of the partnership support program, the homogeneity of

Table 3 Two way factorial ANOVA by time and programs in each scale ($n = 311$)

Scales and subscales		SS	d.f.	MS	*F*	*P*
Partnership	Time	221.15	1	221.15	4.91	0.027*
	Program	4.43	1	4.43	0.02	0.886
	Time × program	316.22	1	316.22	7.02	0.008**
Emotional support	Time	21.81	1	21.81	1.52	0.218
	Program	1.03	1	1.03	0.01	0.908
	Time × program	109.79	1	109.79	7.66	0.006**
Understanding the burden	Time	2.67	1	2.67	0.72	0.396
	Program	5.91	1	5.91	0.35	0.554
	Time × program	24.29	1	24.29	6.55	0.011*
Cooperation with treatment	Time	73.36	1	73.36	16.45	0.000***
	Program	1.80	1	1.80	0.07	0.785
	Time × program	5.64	1	5.64	1.27	0.262
FertiQoL	Time	24.13	1	24.13	0.63	0.427
	Program	16.67	1	16.67	0.05	0.819
	Time × program	152.43	1	152.43	3.99	0.047*
Emotional	Time	0.31	1	0.31	0.07	0.796
	Program	1.17	1	1.17	0.03	0.870
	Time × program	1.88	1	1.88	0.41	0.523
Mind/body	Time	1.46	1	1.46	0.28	0.597
	Program	77.90	1	77.90	1.72	0.190
	Time × program	47.10	1	47.10	9.06	0.003**
Relational	Time	0.32	1	0.32	0.09	0.762
	Program	32.09	1	32.09	1.28	0.258
	Time × program	0.00	1	0.00	0.00	0.988
Social	Time	0.27	1	0.27	0.07	0.795
	Program	14.54	1	14.54	0.43	0.512
	Time × program	11.30	1	11.30	2.84	0.093
Environment	Time	13.11	1	13.11	3.50	0.062
	Program	15.31	1	15.31	0.72	0.395
	Time × program	10.49	1	10.49	2.80	0.095
Tolerability	Time	0.05	1	0.05	0.01	0.903
	Program	0.01	1	0.01	0.00	0.984
	Time × program	3.72	1	3.72	1.17	0.280
Distress	Time	19.35	1	19.35	5.80	0.017*
	Program	0.29	1	0.29	0.01	0.904
	Time × program	10.09	1	10.09	3.02	0.083
QMI	Time	13.08	1	13.08	4.41	0.037*
	Program	46.58	1	46.58	1.96	0.163
	Time × program	0.06	1	0.06	0.02	0.883

*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$. d.f., degrees of freedom; MS, mean square; QMI, Quality Marriage Index; SS, sum of squares.

conditions was carefully examined. There were no significant differences in the characteristics of the participants other than their underlying disease. It was verified that the presence or absence of underlying disease had no effect on the intervention effect. Therefore, the two groups were regarded as homogenous in this discussion of the results.

Effectiveness of partnership support program

The comparison of the effects of the IPS on the post-test of the program indicated significant improvement in the intervention group compared with the control group, supporting the hypothesis of this study. The most likely reason for this was reflected in the

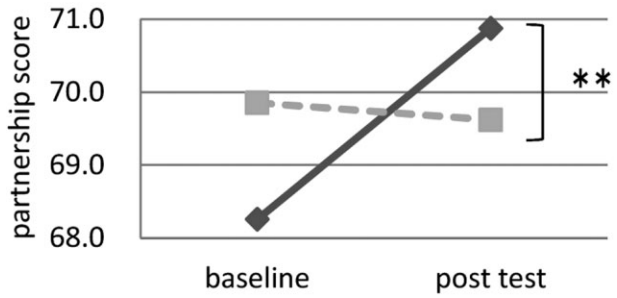

Figure 4 Effects of the partnership scale score average ($n = 311$). —●—, intervention group; - -■- -, comparison group. $^{**}P < 0.01$.

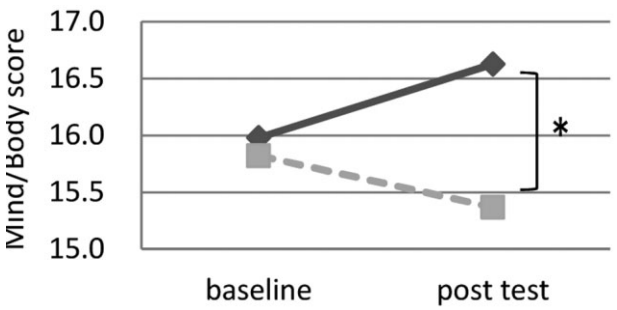

Figure 5 Effects of the mind/body subscale score average ($n = 311$). —●—, intervention group; - -■- -, comparison group. $^{*}P < 0.05$.

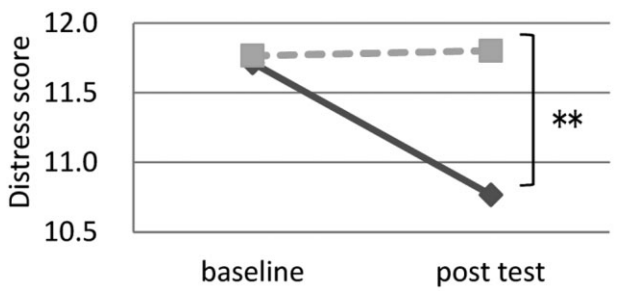

Figure 6 Effects of the distress scale score average in women ($n = 156$). —●—, intervention group women; - -■- -, comparison group women. $^{**}P < 0.01$.

significant increases shown in the IPS such as: "talking with partner", "understanding partner's burden", and "giving advice to each other". A previous study also identified the need of infertile Japanese women for empathic support from their partners (Akizuki, 2009). There is a possibility that more empathic communication was promoted by the participatory exercises and provision of information. A previous, longitudinal, multicenter study found that an educational program for couples undergoing infertility treatment where they participated six times in one course facilitated communication between men and women, and increased women's marital benefit (Schmidt *et al*., 2005). By comparison, in the partnership support program, increased partnership was confirmed by participation in one course that was "configured knowledge" and "methods to support partner". It required 60 min of participation time at the venue and the application of information continued, supported by couples' discussions in their homes. Therefore, this partnership support program required less time and a fewer number of visits while still providing a positive outcome so was considered more efficient. In the partnership support program, the provision of information was necessary for patients who had no knowledge or experience with the system and were scheduled for complex ART treatment, and for couples who were confused about the understanding and cooperation necessary for the treatment. Read *et al*. (2013) reported that couples undergoing infertility treatment had a need for support for their marital relationship problems. Therefore, nurses need to learn how to be involved with patients to enhance the couples' partnership during treatment.

In the subgroup analysis by sex with the distress scale as the dependent variable, only the women showed a significant positive effect from the intervention. Thus, there was no effect on the reduction of psychological distress for men in this program, but it was effective in reducing psychological distress for women. Previous research revealed that distress scores while undergoing infertility treatment were higher in women than men (Wichman, Ehlers, Wichman, Weaver, & Coddington, 2011; Wischmann, Stammer, Scherg, Gerhard, & Verres, 2001). Similar to the results of Wichman *et al*. (2011), in this study, there was a sex difference in the distress scores before the intervention, with men expressing significantly less depression, anxiety, and stress than women. One reason for this could be that the source of women's stress was often the lack of partner support where as the source of stress for men lay elsewhere. Previous studies of stress in infertile women were significantly associated with lack of support of partners (Martins, Peterson, Almeida, & Costa, 2011; Matsubayashi *et al*., 2004). If the men were inherently less distressed from the fertility treatment, that could be an important factor. Even though there are fewer studies

about men's emotional experiences, researchers have found that the stage of infertility treatment and being the infertile spouse affected men's fertility-specific anxiety and lasting sadness but men's level of distress was considered within the normal range (Fisher & Hammarberg, 2012). Given the lack of research about men's distress, it is also possible that the distress measurement failed to capture that aspect of men's emotional reaction.

While this program did not improve the overall QOL of the participants, there was a significant positive effect found on the mind/body subscale of the FertiQoL for the intervention group by using the simple main effect test and two way factorial ANOVA. The FertiQoL mind/body subscale assessed to what extent the subjects experiences negative physical symptoms (e.g. fatigue, pain) and cognitive or behavioral disruptions (e.g. poor concentration, disrupted daily activities, delayed life plans) as a result of their infertility (Boivin *et al*., 2011). In other words, there was a significant improvement for participants in "attention and concentration impaired", "pain or fatigue", and "cannot move ahead with other life goals and plans". This result would be considered to be very beneficial for the patients to continue treatment for infertility.

In addition, this program did not improve the participants' marital quality. The reason gathered from the participants was that couples agreeing to participate in the study already had a very good relationship, therefore, it is reasonable to assume that couples with low marital satisfaction tended to not agree to participate at the time of recruitment. Thus, further program changes would not impact the intervention group, because the marital relationship was good to some extent in both groups. In the program by Schmidt *et al*. (2005), the intervention produced no stress reduction, but there was a significantly increased marital benefit for the women in the intervention group. Therefore, it may be necessary to consider improvements in the timing and content of this program.

Limitations and future challenges

Because this study was not a randomized controlled trial (RCT) and the location of data collection was only a single clinic, there is limited generalizability and potential bias. The research design for the present study was a non-equivalent control group design instead of an RCT, therefore, the internal validity for the intervention effect was weaker. While the response rate for the intervention group and comparison group was acceptable, the dropout rate was high (28%). The detailed reasons for unanswered questions were not known. Also, the author implemented the program so author bias might have influenced the results of this study. Participants and their partners were inherently presumed to have been cooperative for treatment as they participated in the study as a couple. Future challenges are to create a method for training nurses in the partnership support program to implement the program in other infertility clinics. A detailed investigation is required to discover why men did not respond to the intervention and report reduced psychological stress.

CONCLUSIONS

The effectiveness of the partnership support program for couples undergoing fertility treatment was examined, and the following results were obtained:

1 The intervention group's IPS scores after the intervention were significantly higher than the comparison group, indicating a stronger partnership.
2 The intervention group's FertiQoL scale scores at post-intervention were not significantly higher than the comparison group. However, the intervention group's mind/body subscale score was significantly higher than the comparison group, indicating higher concentration and focus, less pain and fatigue, and a greater ability to move ahead with life.
3 The intervention group's distress scale scores at post-intervention were not significantly lower than the comparison group. However, the distress scale scores for the women in the intervention group were significantly lower than the women's scores in the comparison group, meaning the women in the intervention group had less distress.
4 The intervention group's QMI scale scores after the intervention were higher than the comparison group, suggesting that the intervention group had a more positive feeling about their marriage after the intervention.

The partnership support program was effective in improving the couples' partnership while undergoing infertility treatment, and that in turn was effective in reducing psychological distress among the participating women; however, it had less impact for the men. It is possible that there was less distress for men than women undergoing treatment and, therefore, the men did not require support from their partners. The program was not effective in improving QOL as a whole for the couples; however, it was effective in improving the QOL subscale "mind/body" for the intervention group.

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CONFLICT OF INTEREST

No conflict of interest has been declared by the author.

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