

Original Article

The fertility quality of life (FertiQoL) questionnaire in Taiwanese infertile couples

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Abstract

Objective: To characterize the fertility quality of life (QoL) in Taiwanese infertile couples using an objective measurement tool—the FertiQoL questionnaire, and establish a reference level of QoL for clinical applications and future studies.

Materials and Methods: The FertiQoL tool, a self-report questionnaire, was distributed to seven infertility centers across Taiwan for infertile couples who were undergoing the treatment of *in vitro* fertilization. The online version of the FertiQoL questionnaire was issued on the website of Taiwan Society for Reproductive Medicine and was opened to the public.

Results: A total of 534 copies of eligible FertiQoL questionnaires were collected. The total scores for the Core FertiQoL and Treatment FertiQoL are 55.12 ± 13.72 and 56.40 ± 10.96 , respectively. Both the Core and Treatment FertiQoL were significantly higher in the males of infertile couples than the females (60.63 ± 14.07 vs. 54.39 ± 13.52 , $p = 0.001$, and 59.13 ± 12.44 vs. 56.03 ± 10.71 , $p = 0.035$, respectively). Significantly better QoL was found in infertile patients in the Southern Taiwan, with a Core FertiQoL of 58.21 ± 12.70 and a Treatment FertiQoL of 58.79 ± 10.15 .

Conclusion: The results of this study provide a baseline QoL in infertile couples in Taiwan, and could potentially be used as a guide for clinical counseling and future works.

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Keywords: FertiQoL; gender; infertility; quality of life; questionnaire

Introduction

Infertility has an estimated prevalence of 9% in general population, and around half of the infertile couples will seek for medical help [1]. According to prior psychosocial studies, it is known that both infertility and its treatment could lead to emotional and psychological stress [2–5], and thus threaten the quality of life (QoL) for infertile couples. However,

emotional distress has been taken as a factor contributing to infertility [6], and it is one of the reasons that make couples drop out from the treatment of infertility prematurely [7]. Owing to the intertwined relationship between infertility and QoL, integrating QoL assessment in clinical practice for fertility problems should become a standard of care for infertile couples.

In the past, various generic measurement tools were used for assessing QoL in infertile patients. Recently, a condition-specific QoL measurement tool, specifically designed for infertile couples, has been developed and used internationally—the Fertility Quality of Life (FertiQoL) questionnaire [8]. This tool has been demonstrated to have good

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psychometric properties, and its usefulness has been validated in a Dutch study comparing the FertiQoL tool with generic QoL measurement instruments [9].

To the best of our knowledge, there has been no published data regarding the general QoL in infertile couples in Taiwan. Our goal of this study is to understand the level of QoL in infertile couples in Taiwan, and serve as a reference for clinical QoL counseling and future studies.

Materials and methods

Project site and patient selection

A cross-sectional study design was implemented. The approval of Institutional Review Board of National Cheng Kung University Hospital was obtained at the beginning of this study. Two arms of data collection were administered simultaneously (Fig. 1). First, a total of 830 copies of written FertiQoL questionnaires were distributed to seven infertility centers in Taiwan. All of these seven fertility institutes were qualified by the Department of Health, Executive Yuan, R.O.C. (Taiwan). The FertiQoL questionnaires were introduced to infertile couples who were undergoing *in vitro* fertilization (IVF) treatment at each institute from June 2010 to August 2010. All participants who completed the survey entered this study voluntarily and anonymously. Secondly, an online surveillance was established as the other arm of our data sources. The FertiQoL questionnaire was transformed into a webpage and opened to the public through the website of Taiwan Society for Reproductive Medicine. Samples from the online FertiQoL were collected during the same period as the written FertiQoL questionnaires were collected.

The FertiQoL tool

The FertiQoL tool is a self-report questionnaire. It is specifically designed for infertile patients to assess their QoL by experts from the European Society of Human Reproduction and

Embryology (ESHRE) and the American Society of Reproductive Medicine (ASRM). Two main modules compose the FertiQoL tool: The Core FertiQoL module and the optional Treatment module. There are 24 items in the Core FertiQoL module and 10 items in the Treatment FertiQoL module. The 24 items from the Core FertiQoL are categorized into four domains, including the emotional, cognitive and physical (marked as mind/body), relational, and social domains. The emotional domain evaluates the impact of infertility on emotions, such as sadness, resentment, or grief. The mind/body domain refers to the influence of infertility on physical health, cognition, and behavior. The relational domain and the social domain are used to quantify the impact of infertility on partnership and on social aspects (e.g., social inclusion, expectation, and support), respectively. The optional treatment module consists of two domains that are used to assess the environment and tolerability for the treatment for infertility. Items from these domains are presented in the questionnaire randomly and rated on a scale of 0 to 4. The subscale and total FertiQoL scores are computed and transformed to achieve a range of 0 to 100, where higher scores indicate better QoL. The FertiQoL tool has been translated into 20 different languages, including traditional Chinese, and is available on the FertiQoL website (<http://www.fertiqol.org/>). In our study, the traditional Chinese version of the FertiQoL questionnaire was used as the measurement instrument for QoL of Taiwanese infertile couples.

Data analysis

SPSS version 17.0 was used for data merging and statistical analysis. Two sample *t* test or one-way analysis of variance (ANOVA) test was used for testing differences between the groups. The alpha was set to be 0.05. A *p* value of ≤ 0.05 was considered as statistically significant. Cronbach α coefficients were computed to evaluate the reliability of the FertiQoL tool. Besides, items with poor correlations within subscales were removed to see if the internal consistency could be improved.

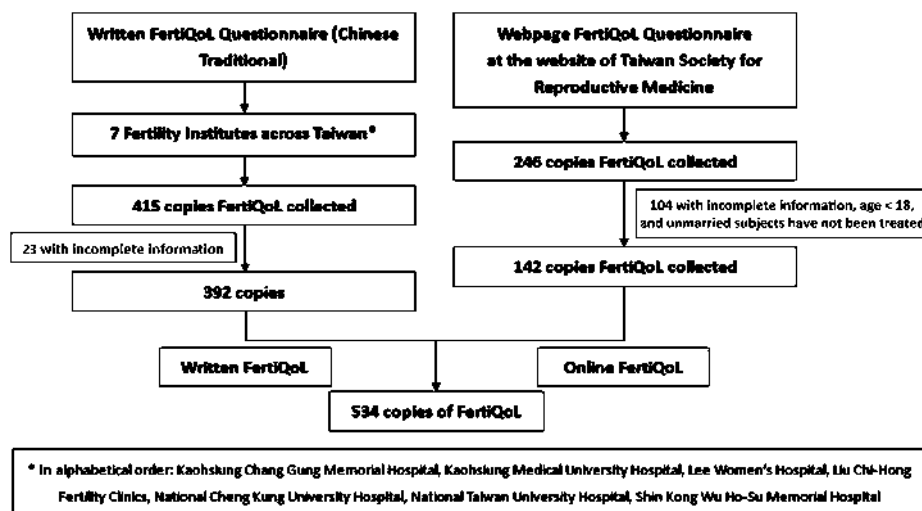


Fig. 1. Study design.

Results

Demographic information of the participants in this study, including age, age at marriage, age of spouse at marriage, gender, educational level, occupation, and area of living, is shown in Table 1. A total of 415 copies of the printed version of FertiQoL were collected. Twenty-three invalid questionnaires with incomplete information were excluded. Three hundred and ninety-two copies of valid questionnaires were kept entered into our database, labeled as the written FertiQoL. Two hundred and forty-six copies of online FertiQoL were collected at the end of the study period. After excluding 104 copies of online FertiQoL with incomplete information, age younger than 18, unmarried participants, or those who have not been treated before, a total of 142 copies were kept and entered in our database and marked as the online FertiQoL group (Fig. 1).

The overall FertiQoL total and subscale scores are shown in Table 2. An average Core FertiQoL and Treatment FertiQoL were of 55.12 ± 13.72 and 56.40 ± 10.96 , respectively. Cronbach α coefficients of the FertiQoL subscales are also presented in Table 2. Low Cronbach α coefficients were found in the relational, social, and treatment environment domains. Deleting one item (Q13: “Do you feel uncomfortable attending social situations like holidays and celebrations because of your fertility problems?”) from the social subscale

Table 2
FertiQoL scores.

| | Mean | SD | Cronbach α |
|--------------------|--------------|--------------|-------------------|
| Emotional | 54.81 | 19.40 | 0.816 |
| Mind/body | 51.58 | 24.29 | 0.910 |
| Relational | 54.80 | 11.10 | 0.205 |
| Social | 59.32 | 11.05 | –0.076 |
| Environment | 54.63 | 9.19 | 0.148 |
| Burden | 59.04 | 18.99 | 0.721 |
| Core FertiQoL | 55.12 | 13.72 | 0.827 |
| Treatment FertiQoL | 56.40 | 10.96 | 0.620 |

would yield a Cronbach α of 0.54, which improved the reliability within this subscale dramatically. Additionally, deleting one item (T5: “Do you feel the fertility staff understand what you are going through?”) from the treatment environment subscale changed the Cronbach α from 0.148 to 0.522. Deleting the item Q11 (“Are you and your partner affectionate with each other even though you have fertility problems?”) from the relational subscale also seemed to improve the scale’s validity (Cronbach α of 0.328). Moreover, deleting Q13 increased the Cronbach α of the Core FertiQoL from 0.827 to 0.865. Removing T5 from the Treatment FertiQoL subscale would also change the Cronbach α coefficient from 0.620 to 0.712. Similar results of the Cronbach α were found in the written FertiQoL group only (Supplement Table 1).

We investigated the FertiQoL scores of the samples from the two different data sources (Table 3). The FertiQoL scores were statistically significantly higher in the written FertiQoL group than in the online FertiQoL group in all domains ($p < 0.05$). The total Core FertiQoL and the Treatment FertiQoL of the written FertiQoL group were 58.06 ± 12.15 and 58.33 ± 10.09 , respectively. The scores of these two subscales are both statistically significantly higher than the ones in the online FertiQoL group, which were 47.01 ± 14.57 in the Core FertiQoL and 51.06 ± 11.52 in the Treatment FertiQoL.

We also evaluated the FertiQoL results on different genders (Table 4). Men showed a statistically significantly higher FertiQoL scores in emotional and mind/body aspects in the Core FertiQoL subscale (63.82 ± 20.48 vs. 53.60 ± 18.95 in the emotional domain, and 64.55 ± 22.57 vs. 49.84 ± 24.01 in the mind/body domain), and a marginally significantly higher

Table 1
Characteristics of participants.

| | Written FertiQoL (N = 392) | | Online FertiQoL (N = 142) | |
|---------------------------|-------------------------------|-------------------|------------------------------|-------------------|
| | Number (n) | Percentage (%) | Number (n) | Percentage (%) |
| Age (y) | | | | |
| ≤ 30 | 53 | 13.50 | 19 | 13.40 |
| 31 to 40 | 290 | 74.0 | 111 | 78.20 |
| ≥ 41 | 49 | 12.50 | 12 | 8.5 |
| Mean ± SD | 35.25 ± 4.523 | | 36.64 ± 4.235 | |
| Age at marriage (y) | | | | |
| ≤ 30 | 248 | 63.30 | 90 | 63.40 |
| 31 to 40 | 136 | 34.70 | 52 | 36.60 |
| ≥ 41 | 8 | 2.0 | 0 | 0.00 |
| Mean ± SD | 29.78 ± 4.267 | | 29.69 ± 3.460 | |
| Age of spouse at marriage | | | | |
| ≤ 30 | 179 | 45.70 | 59 | 41.50 |
| 31 to 40 | 194 | 49.50 | 81 | 57.0 |
| ≥ 41 | 19 | 4.80 | 2 | 1.40 |
| Mean ± SD | 31.76 ± 4.856 | | 31.59 ± 3.702 | |
| Gender | | | | |
| Male | 50 | 12.80 | 13 | 9.20 |
| Female | 342 | 87.20 | 129 | 90.80 |
| Educational level | | | | |
| High school or less | 71 | 18.10 | 18 | 12.70 |
| Bachelor | 230 | 58.70 | 101 | 71.10 |
| Master or above | 91 | 23.2 | 23 | 16.20 |
| Area of living | | | | |
| Northern | 158 | 40.3 | 75 | 52.80 |
| Middle | 70 | 17.90 | 38 | 26.80 |
| Southern | 162 | 41.3 | 26 | 18.30 |
| East and Outer islands | 2 | 0.50 | 3 | 2.10 |

Table 3
FertiQoL results by sources of data.

| | Written FertiQoL (N = 392) (Mean ± SD) | Online FertiQoL (N = 142) (Mean ± SD) | p^a |
|--------------------|--|---|----------|
| Emotional | 59.10 ± 17.13 | 42.96 ± 20.40 | <0.001** |
| Mind/body | 56.34 ± 22.59 | 38.44 ± 24.06 | <0.001** |
| Relational | 55.90 ± 10.61 | 51.76 ± 11.87 | <0.001** |
| Social | 60.93 ± 9.73 | 54.87 ± 13.12 | <0.001** |
| Environment | 56.23 ± 8.45 | 50.23 ± 9.73 | <0.001** |
| Burden | 61.48 ± 17.69 | 52.29 ± 20.82 | <0.001** |
| Core FertiQoL | 58.06 ± 12.15 | 47.01 ± 14.57 | <0.001** |
| Treatment FertiQoL | 58.33 ± 10.09 | 51.06 ± 11.52 | <0.001** |

* $p < 0.05$.

** $p < 0.001$.

^a Two sample t test.

Table 4
FertiQoL results by gender.

| | Male (N = 63) (Mean ± SD) | Female (N = 471) (Mean ± SD) | <i>p</i> ^a |
|--------------------|------------------------------|---------------------------------|-----------------------|
| Emotional | 63.82 ± 20.48 | 53.60 ± 18.95 | <0.001** |
| Mind/Body | 64.55 ± 22.57 | 49.84 ± 24.01 | <0.001** |
| Relational | 54.76 ± 12.06 | 54.80 ± 10.98 | 0.978 |
| Social | 59.39 ± 10.34 | 59.31 ± 11.15 | 0.954 |
| Environment | 57.28 ± 11.02 | 54.28 ± 8.87 | 0.042* |
| Burden | 61.90 ± 19.14 | 58.65 ± 18.96 | 0.202 |
| Core FertiQoL | 60.63 ± 14.07 | 54.39 ± 13.52 | 0.001* |
| Treatment FertiQoL | 59.13 ± 12.44 | 56.03 ± 10.71 | 0.035* |

**p* < 0.05.

***p* < 0.001.

^a Two sample *t* test.

score in the treatment environment FertiQoL score. The score was not different statistically on the rest of the three domains. The mean score of the Core FertiQoL in males of infertile couples was significantly higher than the score in females (60.63 ± 14.07 vs. 54.39 ± 13.52, *p* < 0.001). Again, only a marginally higher score was noted in the Treatment FertiQoL subscale in men.

Lastly, we stratified the FertiQoL scores according to different geographic areas in Taiwan. The scores and the results of the ANOVA *F* tests are listed in Table 5. Statistically significant higher scores of both the emotional and mind/body domain were found in infertile couples living in the Southern Taiwan. In the Treatment FertiQoL subscale, both the environment and tolerability domains showed higher scores from couples living in Southern Taiwan, as compared to those who live in other areas of Taiwan.

Discussion

According to a recent report published by Aarts et al, FertiQoL is a useful tool for evaluating the QoL in infertile couples [9]. FertiQoL provides a precise and disease-specific measurement for the impact of infertility in QoL. Although it was the first study using FertiQoL as the primary tool measuring QoL, it showed a high reliability in the Dutch population and provided a trustworthy external validation of the FertiQoL tool. Surprisingly, in our study, poor internal consistency was found

in the social and treatment environment domains. Better reliability in these two domains was found after removing Q13 from Core FertiQoL and T5 from Treatment FertiQoL, respectively. These findings indicated that modification for questions Q13 and T5 may be needed in the traditional Chinese version of the FertiQoL questionnaire to yield better reliability. A cultural difference may contribute to these results. Question 13 asks if one would feel uncomfortable owing to infertility problems while attending social situations such as holidays and celebrations. We suppose that because couples in Taiwan do not frequently bring their family, especially children, to attend social events, the impact of seeing others having their own children is not as significant as in the western society. Owing to the lack of internal consistency in these three subscales, the power of the FertiQoL tool in attributing poor QoL to specific domains in Taiwanese infertile couples may be decreased. Nevertheless, since all items in the FertiQoL were designed for infertility and the overall reliability for the Core FertiQoL and Treatment FertiQoL in our study remained high, the FertiQoL scores could still reflect the interaction between infertility and quality of life in our patient population.

In Table 2 of our study, the absolute scores in all four domains of the Core FertiQoL subscales are lower as compared to the scores in the Dutch study, but are similar to the mean scores presented in the developmental study of FertiQoL [8]. Since the FertiQoL tool is not designed for identifying psychopathology, there were no definite cut-off scores available to identify those who need extra attention on counseling. Further studies comparing the FertiQoL tool with other psychometric tools will be needed to set such cut-off values for potential clinical applications.

In Table 3 of our study, significant differences were demonstrated in the scores of all domains and subscales between the written and online FertiQoL groups. This finding was also found in the study for the developmental stage of the FertiQoL questionnaire. Boivin et al attributed the differences to either different sets of norms in different populations or the duplicated samples in the online FertiQoL group, i.e., one person did more than once of the questionnaire [8]. In our case, both of these two conditions are plausible. Since our FertiQoL online survey was opened to the public, people who were willing to respond to the survey voluntarily might have a

Table 5
FertiQoL results by geographic regions.

| | Northern (N = 233) (Mean ± SD) | Central (N = 108) (Mean ± SD) | Southern (N = 188) (Mean ± SD) | Eastern & outlying islands (N = 5) (Mean ± SD) | <i>p</i> ^a |
|--------------------|-----------------------------------|----------------------------------|-----------------------------------|---|-----------------------|
| Emotional | 52.77 ± 20.29 | 52.20 ± 19.06 | 58.91 ± 17.92 | 51.67 ± 16.82 | 0.004* |
| Mind/body | 47.68 ± 24.47 | 50.15 ± 24.53 | 57.45 ± 23.01 | 43.33 ± 20.11 | <0.001** |
| Relational | 53.83 ± 11.34 | 54.51 ± 10.51 | 56.18 ± 11.07 | 54.17 ± 10.62 | 0.187 |
| Social | 58.69 ± 11.19 | 59.07 ± 11.82 | 60.31 ± 10.37 | 56.67 ± 12.71 | 0.459 |
| Environment | 54.95 ± 8.65 | 52.16 ± 9.91 | 55.72 ± 9.17 | 52.50 ± 11.26 | 0.011* |
| Burden | 57.22 ± 19.94 | 55.61 ± 19.43 | 63.40 ± 16.78 | 53.75 ± 18.01 | 0.001* |
| Core FertiQoL | 53.24 ± 14.10 | 53.98 ± 13.92 | 58.21 ± 12.70 | 51.46 ± 11.80 | 0.002* |
| Treatment FertiQoL | 55.86 ± 10.77 | 53.54 ± 11.91 | 58.79 ± 10.15 | 53.00 ± 12.67 | 0.001* |

**p* < 0.05.

***p* < 0.001.

^a ANOVA *F*-test.

different level of QoL from those who were not and thus led to the nonresponse bias. In addition, since couples in the online FertiQoL group were not limited to those who were receiving IVF treatment and counseling as in the written FertiQoL group, some of them might have completed their treatments for infertility and had unsatisfactory results.

In our analysis of Table 4, males and females of the infertile couples show statistically significant differences in both the Core and the Treatment FertiQoL scores. In Core FertiQoL, the difference mainly came from two aspects, which are the emotional and mind/body domains. The male spouses were shown to have a higher score in these two domains than female in infertility couples, indicating that infertile women in Taiwan may experience greater emotional stress and have a poorer physical health status. This finding is compatible with a prior study conducted in Iran, in which a higher depression rate was found in women suffering from infertility than infertile men [10]. It has been reported in Japan that infertile women with increased depression and anxiety may result from lacking of support from their spouses and feelings of stress [11]. In our reports, the scores in the social and relational domains were not different statistically among infertile men and women, suggesting that poorer family support might not be the main reason for lower emotional and mind/body score in Taiwanese infertile women. Further studies are needed to determine the reasons of the QoL differences by gender.

In our study, geographic factor was shown to be correlated with infertile couples' QoL. This result may be due to different settings of infertility centers and social expectations in different areas of Taiwan. An upward trend in the scores of the emotional and mind/body domains was observed across the geographic areas from the northern to the southern parts of Taiwan. Owing to the urban–rural difference which was generally acknowledged in Taiwan, i.e., the northern the city and the more metropolitan it is, the social expectation about the importance of childbearing tends to be higher in the north, which in turn may result in a low QoL. This hypothesis should be verified in future studies with adequately designed questionnaires. An interesting finding was that infertile couples in the Eastern part of Taiwan and outlying islands had the lowest emotional and mind/body scores. Since only five persons from these areas were included in our study, the result may be unrepresentative and inadequate to be generalized to the true population in these two areas. Nevertheless, the association between the geographic factor and QoL suggested that in addition to the general counseling for infertility, more attention on the psychological aspects should be considered for infertile patients from specific areas.

Our findings in this study could be served as references for tackling the psychological or physical impacts came along with infertility, and also as references for monitoring the change in QoL along the treatment courses of infertility. It is known that counseling intervention may lead to improved pregnancy rates in infertile women [12,13]. With the integration of the FertiQoL tool into the treatment of infertility, the counseling could be more focused and efficient, therefore ensuring the success of treatment.

Some limitations in our study should be mentioned while interpreting our study results. First, we used the Internet as a data collection platform to facilitate the understanding of QoL in infertile Taiwanese couples. However, the data sources may be unreliable since it was difficult to ensure that people who filled the FertiQoL survey online did have infertility problems. In contrast to online FertiQoL, the source population of the written FertiQoL was more controlled. Second, the treatment modalities for infertility were not specified in couples from the online FertiQoL. Since it is thought that the infertility treatment itself is stressful [14,15], different treatment modalities may result in different treatment tolerabilities. Lastly, a cross-sectional study design limited our ability to make causal inferences between infertility and QoL.

In conclusion, our study offers a general idea of the QoL in infertile couples in Taiwan using an infertility-specific QoL assessment tool—FertiQoL. The FertiQoL is an objective measurement of not only the overall QoL, but also various domains in QoL, which could provide important detailed information for treatment intervention. Individualized counseling methods could therefore be applied to tailor the treatment for infertility. Future studies focusing on determining various factors associated with the QoL in infertility with the similar approach in this study will help to develop a thorough approach for clinical practice.

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References

- [1] Boivin J, Bunting L, Collins JA, Nygren KG. International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. *Hum Reprod* 2007;22:1506–12.
- [2] Greil AL. Infertility and psychological distress: a critical review of the literature. *Soc Sci Med* 1997;45:1679–704.
- [3] Fekkes M, Buitendijk SE, Verrips GH, Braat DD, Brewaeys AM, Dolfin JG, et al. Health-related quality of life in relation to gender and age in couples planning IVF treatment. *Hum Reprod* 2003;18:1536–43.

- [4] Schmidt L. Psychosocial burden of infertility and assisted reproduction. *Lancet* 2006;367:379–80.
- [5] Verhaak CM, Smeenk JM, Evers AW, Kremer JA, Kraaijaat FW, Braat DD. Women's emotional adjustment to IVF: a systematic review of 25 years of research. *Hum Reprod Update* 2007;13:27–36.
- [6] Campagne DM. Should fertilization treatment start with reducing stress? *Hum Reprod* 2006;21:1651–8.
- [7] Smeenk JM, Verhaak CM, Stolwijk AM, Kremer JA, Braat DD. Reasons for dropout in an in vitro fertilization/intracytoplasmic sperm injection program. *Fertil Steril* 2004;81:262–8.
- [8] Boivin J, Takefman J, Braverman A. The Fertility Quality of Life (FertiQoL) tool: development and general psychometric properties. *Fertil Steril* 2011;96:409–15.
- [9] Aarts JW, van Empel IW, Boivin J, Nelen WL, Kremer JA, Verhaak CM. Relationship between quality of life and distress in infertility: a validation study of the Dutch FertiQoL. *Hum Reprod* 2011;26:1112–8.
- [10] Ashkani H, Akbari A, Heydari ST. Epidemiology of depression among infertile and fertile couples in Shiraz, southern Iran. *Indian J Med Sci* 2006;60:399–406.
- [11] Matsubayashi H, Hosaka T, Izumi S, Suzuki T, Kondo A, Makino T. Increased depression and anxiety in infertile Japanese women resulting from lack of husband's support and feelings of stress. *Gen Hosp Psychiatry* 2004;26:398–404.
- [12] Domar AD, Clapp D, Slawsby EA, Dusek J, Kessel B, Freizinger M. Impact of group psychological interventions on pregnancy rates in infertile women. *Fertil Steril* 2000;73:805–11.
- [13] Terzioğlu F. Investigation into effectiveness of counseling on assisted reproductive techniques in Turkey. *J Psychosom Obstet Gynaecol* 2001;22:133–41.
- [14] Boivin J, Takefman JE. Stress level across stages of in vitro fertilization in subsequently pregnant and nonpregnant women. *Fertil Steril* 1995;64:802–10.
- [15] Eimers JM, Omtzigt AM, Vogelzang ET, van Ommen R, Habbema JD, te Velde ER. Physical complaints and emotional stress related to routine diagnostic procedures of the fertility investigation. *J Psychosom Obstet Gynaecol* 1997;18:31–5.

Appendix 1.

Supplement Table 1

Cronbach α from the written FertiQoL group.

| | Original | After the item is deleted | Deleted item |
|--------------------|----------|---------------------------|--------------|
| Emotional | 0.784 | 0.868 | Q4R |
| Mind/Body | 0.901 | 0.905 | Q12 |
| Relational | 0.208 | 0.329 | Q11R |
| Social | −0.159 | 0.442 | Q13 |
| Environment | 0.133 | 0.470 | T5R |
| Burden | 0.704 | — | — |
| Core FertiQoL | 0.807 | 0.844 | Q13 |
| Treatment FertiQoL | 0.604 | 0.685 | T2R |