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Original Research Article

Psychometric properties of the Indonesian online version of fertility quality of life tool: a cross-sectional study

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ABSTRACT

Background: The clinical measurement of an infertile couple's quality of life (QoL) should be considered as a standard assessment of their pretreatment condition to aid in medical and psychological consultation. The study aimed to test the psychometric properties of the Indonesian online version of the fertility quality-of-life (FertiQoL) questionnaire.
Methods: This study applied cross-sectional methods among women/men over 18 years who have problems with infertility and have or have not undergone any medical treatment. PT. Integra Inovasi Indonesia helped develop the online FertiQoL questionnaire. This research applied R project version 3.6.3 to merge the data and conduct statistical analyses. Pearson correlation tests were used to ensure the validity. Cronbach's alpha coefficient test was also used to measure the instrument's quality and reliability.
Results: There were 214 participants enrolled from all over Indonesia. The total scores for core FertiQoL and treatment FertiQoL were 64.72±13.87 and 62.93±12.50, respectively. The total FertiQoL mean was 64.14±12.33. The reliability of the FertiQoL version of the Indonesian language was relatively high (Cronbach α was 0.92, and the value for each domain was >0.70 (0.76-0.94). The validity results of the FertiQoL questionnaire also showed that all question items were considered valid (r>0.1341).
Conclusions: The Indonesian version of FertiQoL is valid and reliable for assessment of the pre-treatment condition of infertile couples and the effects of treatment on QoL in infertile patients which can help in making more accurate diagnosis and providing diagnosis and treatment in infertility clinics.

Keywords: Fertility, Indonesia, Quality of life, Validity, Reliability

INTRODUCTION

Infertility is the absence of conception results after a year of sexual intercourse. Most normal and healthy young couples, approximately 85-90%, will become pregnant within one year of their marriage. Therefore, the high percentage of infertility (22.3%) experienced by some couples is a serious concern.[1]

The use of assisted reproduction technology (ART) is increasing throughout the world, especially in Indonesia, marked by an increase in the number of infertility clinics. However, the gap between the total prevalence of infertility and those seeking treatment is complex.

The issue of costs is a very significant barrier to accessing treatment, particularly the costs for the ART program.[2]

According to the Indonesian Health Profile in 2017, there were 37.3 million couples of childbearing age, with 8.3 million infertile couples (22.3%), and around 2.5 million (30%) infertile couples requiring in vitro fertilization (IVF) treatment.[3] From these figures, it is estimated that those who get access to IVF treatment are less than 1%. This is because infertility clinics are only available in big cities and the IVF treatments have high costs. This type of ART program is still considered a luxury health service and can only be accessed by the rich.

It was estimated that the primary infertility prevalence of Indonesian women (aged 15-49 years) was 10.2%, and the largest group are those aged 15-19 years. Infertility can be caused by early marriage when women are not ready to get married physically and mentally. This condition leads to women avoiding having a baby.[1] Depression is closely related to alternative stress, and anxiety. It affects the release of cortisol, and its symptoms can be noticed in about 37% of infertile women. Both depression and anxiety are commonly experienced by infertile women. This pattern often occurs in infertile couples and more in women with infertility than fertile women.[4]

Infertile women are typically less satisfied in life and considered weaker than working women who have children. In contrast, one research found there was neither anxiety nor depression among fertile women.[5] Dissatisfaction with becoming a mother can negatively affect the quality of life (QoL) of a couple and severely hamper the success of infertility treatment.[6]

Depression, avoidance, over active coping, and emotional expression give off the same consequences on the fertility of women. Depression is substantially correlated with anxiety, which is one of the manifestations of stress affecting the release of cortisol. The symptoms of depression are detected in approximately 37% of infertile women. These two emotions are consistently common in women. Moreover, there are more infertile women than fertile women.[7]

In the ART cycle, women showed lower quality of life than men. In addition, the number of failures in experiencing pregnancy through ART treatment affects women's quality of life more than men.[8,9] Prior to knowing the results of ART, women experiencing cognitive coping and relaxation in the IVF cycle first showed an improvement in their QoL, compared to those going through routine treatment.[10]

From a different standpoint, numerous women in ART programs report symptoms of depression before starting a cycle. This problem is likely to reflect a repetitive impact, from prior unsuccessful and less invasive forms of treatment. However, it may also indicate a previous history of mood or anxiety disorders apart from the infertility issues.[11]

The measuring tool used to observe the QoL for infertile people is FertiQoL. It has a reliable measurement on the effects of fertility problems and their treatment on patients' QoL.[12] This tool is recommended for measuring patient self-reported outcome in the QoL of infertile women.[7] The FertiQoL questionnaire is the most common tool to determine the QoL of people with infertility. It measures reliably the impacts of problems concerning fertility as well as their treatments involving a couple's QoL.[7,12]

This study aimed to test the psychometric properties of the Indonesian online version of the FertiQoL questionnaire.

METHODS

Design and data collection

As mentioned previously, the total score of FertiQoL is the average QoL for all core and care domains. The total FertiQoL score is the mean of QoL for all core and care domains. The optional modules of FertiQoL care are relevant for people undergoing fertility medical services, including medical consultations and interventions.

Project site and patient selection

Data collections were administered simultaneously (Figure 1).

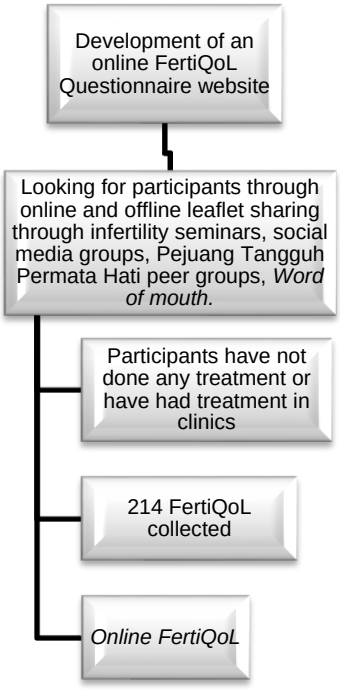

Figure 1: Study design.

In the initial stage, each question and answer item choice was assessed before the online trial. It was because the Likert scale used in the international FertiQoL questionnaire in Indonesia was complicated and respondents were unfamiliar with the choices. To make it

easier for participants to understand the questions and answer choices, some changes were made. In the second stage, the IT and Software Team PT. Integra Inovasi Indonesia developed an online FertiQoL questionnaire. In the next stage, each aspect of the scoring formula was determined based on scoring guidelines and locking questions. The fourth stage was to compare the accuracy between the online scoring and the manual scoring system. This trial and error stage was executed several times. Finally, a poster was distributed to the in-vitro fertilization (IVF) peer support group, IVF clubs, clinics that serve pregnancy programs, other groups through social media to select the participants.

This cross-sectional study was conducted on two hundred and fourteen (n=214) participants who filled out the FertiQoL questionnaires online from August 2019 to May 2020 and had underwent examination and treatment in fifteen infertility clinics and health facilities owned by government and private or are people with infertility who are in the general public in all Indonesia districts. All participants who voluntarily and anonymously completed the survey were enrolled in this study.

The inclusion criteria for this study were as follows: (a) participants completing the FertiQoL consisted of infertile women and men over 18 years of age; (b) diagnosed with infertility; (c) infertility duration of more than one year; and (d) ability to read and write in Indonesian. Additionally, participants who did not have a partner at the time of the study were not required to answer questions about marriages or partnerships marked with an asterisk. The FertiQoL optional care module is intended for people who have utilized fertility medical services (which include medical consultations or interventions). All participants lived in Indonesia and have access to the Internet. The exclusion criteria were women and men below 18 years of age; and duration of infertility below one year. The questionnaire from FertiQoL has been transferred into a website and is open to the public via the https://integra.web.id/fertiqol-int/ website.

Participants were selected through convenient sampling from infertile women and men with infertility who have undergone examination and treatments at infertility clinics and health facilities in Indonesia or who have not undergone examination and treatment. The sample size was calculated as 214 participants, considering that 5 participants were necessary for each item (subject-to-item ratio: 5:1).

As a rule of thumb, a minimum sample size of 100 can have 98% power, and the vast majority of p values will be smaller than 0.001 which is enough for psychometric study.[13]

The FertiQoL tool

The FertiQoL tool is a self-reporting questionnaire. It is constructed exclusively by the experts of European Society for Human Reproduction and Embryology (ESHRE) to evaluate the QoL of infertile patients. The FertiQoL tool consisted of two main modules: the Core Module for FertiQoL and ten Items for FertiQoL Treatment. The 24 Core FertiQoL items are divided into four fields: the emotional and cognitive, the physical (mind/body), the relational, and the social subscales. The dynamic environment assesses the effect on emotions, e.g. resentment, sadness, or infertility grievance. The physical or mind/body part refers to the effect of infertility on physical health, cognition, and behavior. In terms of relational and social domains, the impact of infertility on partnerships and social aspects, such as social inclusion, expectations, and support, are quantified respectively. The optional module is comprised of two parts used for environmental assessment and tolerance for the treatment of infertility.

Elements of these domains are presented and rated randomly on a scale of 0 to 4. The FertiQoL subscale and total values are calculated and then converted to 100. Higher scores suggest better QoL. FertiQoL is available in 46 different languages, including Indonesian, on its website https://www.fertiqol.org/.

Reliability

The reliability level was empirically indicated by a number recognized as the reliability coefficient value. Cronbach's alpha is a statistical measurement commonly cited by authors to validate that the created or adapted scales and tests in certain research project are fit for its purpose. Guidance is offered to authors who will act as reporters and readers acting as evaluators. Studies presented the results of Cronbach's alpha coefficient as the evidence of instrument quality, indicating that alpha has an acceptable, sufficient, or satisfactory level threshold or cut-off, typically perceived as ≥ 0.70 or >0.70.[14]

Ethical considerations

This research was a cross-sectional study. Prior to its implementation, study approval was obtained from the Medical and Health Research Ethics Committee of the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada (Ref No: KE/FK/0476/EC/2019).

Statistical analysis

R project version 3.6.3 was applied for data merging and statistical analysis. The alpha was set to 0.05. A p value of 0.05 was regarded as statistically significant. The Cronbach α-coefficient was calculated to evaluate the reliability of the FertiQoL instrument. Before conducting the comparison test, the distribution of the data was first checked. The validity test of the Pearson product-moment correlation applies the principle of making correlation or connection between each item score or question and the total score attained from the questionnaire.

RESULTS

Study sample

A total of 214 people with infertility contributed to this study for 9 months with mean age 33.05±6.66 years. The demographic characteristics of the participants can be seen in Table 1. As shown in Table 2 below, the participants rated their health conditions from normal to very bad. Those who felt very bad were 97.2%, while only 2.8% answered that they were in good health. This illustrates that the burden of infertility directly affects their physical health conditions or vice versa. Participants feel tired, and unhealthy with the burden of infertility they experience. In the answers to questions about satisfaction with their QoL, 92.1% answered mediocre to very dissatisfied, and those who expressed very little satisfaction was 7.9%. These percentages reflect that the problem of infertility is very influential on satisfaction with the QoL.

Table 1. Demographic characteristics of FertiQoL online samples (n=214).

Demographic characteristics	N	%
Age (years)		
≤30	67	31.3
31-40	124	57.9
>40	23	10.7
Mean	33.05	
SD	6.66	
Relationship status		
Single	30	14.0
Married	184	86.0
Sex		
Male	12	5.6
Female	202	94.4
Educational level		
≤High school	56	26.2
Bachelor	118	55.1
Master or higher	34	15.9
Other	6	2.8
Medical condition		
Have not consulted a doctor	42	19.6
The consultation did not have a diagnostic test	34	15.9
Have consulted and have diagnostic tests	40	18.7
Have consulted, diagnostic tests and started treatment	98	45.8

The online FertiQoL questionnaire is a new psychometric measurement that has been adapted to Indonesia, especially in Yogyakarta. Therefore, the researchers collected answers from participants to find out the respondents' understanding of each question item on FertiQoL. The results of this questionnaire were easy to understand, which was demonstrated by the 85.1% 'yes' answers from participants.

Score of FertiQoL

The distribution of the FertiQoL scores is shown in Table 2. The mind/body subscale was the lowest score among the other subscales: namely 59.52. This score was in line with the results in the previous table that indicated 97.2% stated that their health condition was mediocre to very bad. A low mind/body value indicates that infertility problems had an impact on their physical health, including pain/discomfort, draining energy, and changes in behavior because their infertility interferes with daily activities/activities and cognitive function, namely concentration and frequent feelings of being unable to achieve life goals and other plans attributable to problems in infertility.

Table 2: Assessment of health conditions and satisfaction with QoL.

Assessment	N	%
Assessment of health conditions		
Very poor	20	9.4
Poor	76	35.5
Neither good/nor poor	112	52.3
Good	6	2.8
Very good	0	0
Satisfaction with QoL		
Not answering	2	0.9
Very dissatisfied	26	12.2
Dissatisfied	58	27.1
Neither satisfied/nor dissatisfied	113	52.8
Satisfied	15	7.0
Very satisfied	0	0
FertiQoL questions are easy to understand		
Yes	182	85.1
No	32	14.9

The average total score of FertiQoL was 64.14 (Table 3), with the score closer to 100 indicating that the patient's QoL is high. By examining the number of participants in the range of interval values per subscale, it can be seen that many have scores below 50 points. In the emotional subscale, the percentage value below 50 points was the largest compared to other value ranges, which was only 43%. This result means that infertility has an emotional impact by causing sadness/loss, anger, hatred, and feelings of loss, as well as sadness/depression.

As a cycle, the inability to make decisions creates jealousy and hatred, which causes further emotional insecurity and inability to solve infertility problems.

Table 3: Recapitulation of FertiQoL scores per subscale.

Sub scale	Mean (SD) scale score 0-100	Median	Min	Max	Q1	Q3
Mind/body	59.52 (16.65)	58.33	16.67	100	50	70.83
Emotional	60.65 (17.44)	62.50	16.67	100	50	73.96
Relational	77.12 (14.75)	79.17	4.17	100	62.50	87.50
Social	63.69 (18.84)	62.50	12.50	100	50.00	79.17
Core FertiQoL	64.72 (13.87)	65.63	21.88	97.92	55.21	97.92
Environment	61.69 (14.50)	62.50	29.17	100	50	70.83
Tolerability	64.94 (20.02)	68.75	6.25	100	50	81.25
Total treatment	62.93 (12.50)	62.50	35	97.50	55	72.50
Total FertiQoL	64.14 (12.33)	65.31	25	97.92	55.58	72.70

Validity

Usually, it is important to conduct a validity test with the correlation coefficient at 0.05, in order to determine the feasibility of the items to be used in the psychometric measurement. It indicates that the level of an item was considered valid when it is significantly correlated to the overall score. In the data tabulation, the bold letter indicates the first item in each domain. The validity measurement uses the Pearson correlation test with the full N=214 (Table 4) and an r table of 0.1341, indicating all question items are considered valid. R table is calculated using the t distribution. At the 5% significance level, all H0 were rejected because r table<r count, so that all questionnaire items are considered valid. The Pearson correlation of 34 FertiQoL questions can be classified into 4 categories. The first category is low (8.8%), moderate (11.8%), high/strong correlation (55.9%) and very high/very strong correlation (23.5%). Table 5 explains the value of the Pearson correlation test in each question.

Table 4: Test the validity of online FertiQoL filling data in people with infertility.

Questions	Question	Core FertiQoL				Optional treatment FertiQoL module	
		Emotional	Mind/ body	Relational	Social	Treatment environment	Treatment tolerability
Angry	Q23	0.770					
Grief/loss	Q8	0.783					
Sad/depressed	Q16	0.815					
Fluctuate hope/despair	Q9	0.778					
Jealously and resentment	Q7	0.745					
Unable to cope	Q4R	0.353					
Fatigue	Q18		0.757				
Pain/discomfort	Q24		0.603				
Feel worn out	Q3		0.782				
Disrupt activities	Q12		0.638				
Concentration	Q1		0.688				
Life on hold	Q2		0.593				
Affectionate	Q11R			0.910			
Difficult to talk	Q20			0.891			
Negative impact on relationship	Q19			0.910			
Content relationship	Q21R			0.876			
Strengthen relationship	Q15R			0.899			
Satisfied sexual relationship	Q6			0.888			
Family understand	Q14R				0.493		
Friend support	Q5				0.497		
Society expect	Q22				0.760		
Isolated	Q10				0.803		
Handle/pregnant, other	Q17				0.772		
Shame, embarrassment	Q13				0.817		
Interaction with staff	**T10**					0.920	

Continued.

Questions	Question	Core FertiQoL				Optional treatment FertiQoL module	
		Emotional	Mind/ body	Relational	Social	Treatment environment	Treatment tolerability
Quality treatment information	T9					0.914	
Quality surgery and medical treatment	T8					0.921	
Fertility staff understand us	T5R					0.831	
Quality emotional services	T7						0.819
Medical services desired available	T2R						0.831
Bothered effect daily activities and work	T4						0.914
Bothered physical effects	T6						0.904
Complicated medication and procedures	T3						0.847
Treatment effect on mood	T1						0.893

Table 5: Classification of Pearson's correlation test results.

Classification	Question	r	N	%
Low r= <0.49	Q4R	0.354	3	8.82
	Q5	0.498		
	Q14R	0.493		
Moderate r= 0.50-0.69	Q2	0.593	4	11.76
	Q12	0.639		
	Q1	0.688		
	Q24	0.604		
High or strong r= 0.70-0.89	Q6	0.888	19	55.88
	Q7	0.745		
	Q8	0.783		
	Q9	0.778		
	Q16	0.816		
	Q23	0.770		
	Q3	0.782		
	Q18	0.757		
	Q20	0.892		
	Q21R	0.876		
	Q10	0.803		
	Q13	0.818		
	Q17	0.772		
	Q22	0.760		
	T2R	0.813		
	T5R	0.832		
	T7	0.820		
	T10	0.893		
	T23	0.847		
Very high or very strong correlation r= 0.9-1	Q11R	0.910	8	23.53
	Q15R	0.900		
	Q19	0.910		
	T8	0.921		
	T9	0.914		
	T10	0.920		
	T4	0.914		
	T6	0.904		

Reliability

The reliability level was empirically indicated by a number known as the reliability coefficient value. The value of xx close to number 1 shows high reliability. The general understanding is that reliability, if 0.7, is considered to be satisfactory. If the alpha value is >0.7, the sufficient reliability is adequate, while if it is >0.80, it means all items are considered reliable, and all of the test items consistently have a strong reliability (Table 3).

The results shows that all four main dimensions and two optional dimensions have an alpha value >0.7, so that the conclusion is that all question items have good reliability. Recapitulation of the results of the 6 subscales of FertiQoL sometimes showed that physically infertility was felt by the public in general not as a disease but we assessed the patients' health conditions and satisfaction with the QoL survey only with participants who experience infertility problems (Table 6).

Table 6: Reliability test of online FertiQoL filling data for people with infertility.

Scale	N	QoL domain	Number of items	Cronbach alpha	Mean (SD) scaled
Core subscales					
Emotional	214	Impact on emotions (eg. causes sadness, resentment, grief)	6	0.80	60.65 (17.438)
Mind-body	214	Impact on physical health (eg. fatigue, pain), cognition (eg. poor concentration) and behavior (eg. disrupted daily activities)	6	0.76	59.52 (16.651)
Relational	185	Impact on partnership (eg. sexuality, communication and commitment)	6	0.95	77.12 (14.751)
Social	214	Impact on social aspects (eg. social inclusion, expectations and support)	6	0.79	63.69 (18.841)
Core FertiQoL	214	Average quality of life in all core domains	24	0.89	64.72 (13.873)
Treatment subscales					
Environment	180	Impacts related to treatment environment (eg. access, quality, interactions with staff)	6	0.93	61.69 (14.501)
Treatment tolerability	179	Impacts due to consequences of treatment (eg. physical and mode effects, daily disruptions)	4	0.84	64.94 (20.021)
Treatment FertiQoL	214	Average quality of life for all treatment domains	10	0.94	62.93 (12.503)
Total FertiQoL	214	Average quality of life for all core and treatment domains	34	0.92	64.14 (12.325)

DISCUSSION

Based on the results above, the Indonesian version of the FertiQoL is indicated as a valid and reliable measuring tool to assess the patients' pretreatment condition and infertility problems as well as the treatment effect on the QoL of people with infertility. These results are also aligned with the systematic review of the results from researches using FertiQoL in 23 countries.[15]

In the FertiQoL Indonesia, for question A for satisfaction of QoL, 92.1% answered mediocre to very dissatisfied, and those who expressed very little satisfaction were only 7.0%. These percentages prove that the problem of infertility is very significant on satisfaction with their QoL and how the patients experience an immaterial burden that considerably affects their health condition, as summarized in Table 2.

In this study, the subscale with the lowest average value was the mind/body and emotional domain, with 59.52 and 60.65 (Table 3), and the highest was the relational subscale, with 77.12.The results of the FertiQoL generally describe the conditions felt by most people with infertility in Indonesia, which have an impact on their physical health, such as causing fatigue, pain, cognitive disorders such as low concentration, which have an effect on behavior, namely disrupting daily activities.

The same results obtained from a study in France that evaluated the impact of ART on painful symptoms and QoL in 206 women undergoing ART (IVF, IUI) at fertility

clinic including those with and without endometriosis measured during treatment. The quality of those studies was moderate. In a prospective and controlled cohort study, it was found that women with infertility, whether having endometriosis or not, had similar FertiQoL scores, whereas those with endometriosis had a poorer quality of life in the mind-body domain.[16] One study conducted by Santoro et al. in 2016 found out that women suffering from polycystic ovary syndrome (PCOS) had lower FertiQoL scores, in all domains except the relational subscale, than women with unexplained infertility. However, additional analyses indicated that the dissimilarity was due to the variation in disease symptoms, i.e. more body weight and hirsutism in the PCOS group.[17]

In another study with average quality, Jordanian couples were observed to have a lower QoL in emotional, mind-body, and relational domains than Hungarian and German ones.[18,19] A study by Chi et al in 2016 revealed that core subscale scores of a Korean sample were lower than the FertiQoL development sample.[12] A study conducted by Valsangkar et al in 2011 also obtained similar results in comparing this FertiQoL development sample with a sample obtained from the Indian population.[20] Another study by Madero et al in 2017 compared the scores of FertiQoL in men and women coming from France, Germany, as well as Italy who underwent cross-border oocyte donation in Spain.[21] This study found that French patients presented lower quality of life in emotional and mind-body domains than Italian ones. Both German and French patients showed poorer QoL in the relational domain than those from Italy. However, in terms of social domain, Italian patients had a lower QoL than that of German patients.[15]

Notably in this study, the average score of the relational subscale on FertiQoL Indonesia is the highest among other subscales with 77.12 and SD=14.75. This result differentiates this research from other studies. Based on the current analysis in Indonesia, the domain of relational infertility has not become a serious problem because Indonesian culture tends to see such a problem as a women's problem. Therefore, women prefer to accept the situation and try to live a married life even without children. Many infertile couples are aware that getting married is not always about having children. In many Asian countries, divorce is still considered a taboo subject.

Different countries have different cultures. A positive correlation among Italian couples who were approaching their first ART cycle was seen in the relational subscale and scores of FertiQoL on a relationship adjustment scale.[22] Women experiencing a high marital distress indicated considerably poorer QoL in relational domain than those without troubled marriage.[23] A study conducted by Lo et al in 2016 found the FertiQoL scores in relational domain of those suffering from sexual dysfunction were remarkably lower than people without it.[24] Higher Treatment FertiQoL scores were linked to the measures of an improved patient-centered care in cross-sectional studies.[25-27]

In this study, the reliability numbers in all domains are more significant than in previous studies which are marked by the size of Cronbach α for the total value of the questionnaire that was 0.92 and the value for each domain was >0.70 for an outline of the Cronbach's coefficient alpha for each study that presented these data. In general, reliability is considered sufficient when ≥0.70.[28] In every study, the core FertiQoL reliability was >0.80. Furthermore, it was reported that the emotional, social, and mind/body subscales reliability was sufficient (>0.70) by excluding the social domain.[19] On the other hand, an insufficient reliability was normally reflected in the relational subscale, with nearly all studies indicating alpha coefficients between 0.60 and 0.70. The reliability of the treatment module, as well as its environment and tolerability subscales, were >0.70 in all studies except the one conducted in Iran and another research in Turkey. [29,30] Among five studies that reported it, all of them stated that the total reliability coefficient of FertiQoL was >0.90.

A total of 31 FertiQoL studies, which were conducted in various countries, indicated that the relational subscale was less reliable compared to other subscales.[15] The same relational scales in the other measures of QoL seemed less trustworthy as well (e.g. WHO) QoL, factor loadings <0.50, reliability coefficients 0.60 to 0.70.[31] The problems in the measurement are often connected with clinical characteristics, i.e. functional status.[32] However, the analysis suggested possible cultural and conceptual underpinnings. For example, components with the lowermost factor loadings on the subscale of Social domain demanded that individuals have talked about their problems regarding fertility, by asking questions such as "Are you content with the supports from your friends?" or "Does your family comprehend what you are experiencing?'. Numerous people with infertility are not open to discuss about their fertility problems. In-depth, multi-country analyses would aid the determination of the finest measure to deal with the problems, such as item re-wording, item removal, usage of total scores, and drop subscale. It is possible that the subscales of core and treatment should be tested on their own and not included in the total score. It is because the core and treatment FertiQoL are more reliable than the overall number of individuals. Finally, despite its promising application, there are infrequent studies on FertiQoL's factorial validity, and so is the measurement invariance test. Therefore, FertiQoL should be used conscientiously until further psychometric studies are done.[15]

The validity of the data from the FertiQoL questionnaire Indonesian version also shows that all question items are considered valid with a sample size of more than 200, r table 0.1341 and all question items (36 questions) have a calculated r value>r table (Table 2). The above-mentioned research demonstrated that fertility QoL could be analyzed through women, people with psychological vulnerability,

as well as people with infertility in longer period of time with a lower score of QoL. These findings are in line with former studies in infertile populations. A study by Verhaak et al in 2007, for example, proved that infertile patients are vulnerable to depression and anxiety.[33] Meanwhile, Chachamovich et al in 2010 applied other measures and found that patients with infertility had a lower quality of life. Another gender analysis suggested that men from lower socio-economic backgrounds (i.e. having less education, being unemployed) could possibly be at greater risk of low QoL. Since numerous researches were cross-sectional, the causation continues to be debated.[34] One literature review also gives reliable data that FertiQoL was able to be enhanced by aiming at the adaptable risk factors for poor FertiQoL, or, by improving the protective factors through interventions, i.e. a cognitive-behavioral intervention.[35]

FertiQoL is proved useful in practice. As a result, the less prosperous QoL of several groups of patients (e.g. those with endometriosis, PCOS) could be better understood. Treatment QoL forecasted decisional conflict and regret as well as objectives in the perseverance of treatment, despite not being actual dropout.[36,37] Likewise, pretreatment FertiQoL scores predicted successful live birth and pregnancy in certain groups.[17] More studies are required to confirm these linkages as the prospective studies and confounder analyses propounded that such projection could appear as a result of a variety of QoL factors (e.g. longer duration of infertility, more attempts in treatment, obesity) which might also influence the outcomes of the treatment. In addition, FertiQoL could also be able to detect the aspects of treatment which might affect the improvement of patients' QoL. One review implied that the patient-centered care had a relation to greater level of QoL, including the assistance from professional medical workers such as nurses and doctors in reinforcing the partner relationship.[38]

This study's main limitation is that its design does not consist of comparing the psychiatric level of infertile people receiving treatment to those who do not, which could help clarify some of the challenges encountered by couples in receiving infertility treatment. Therefore, our results can be used in future studies as control scores for further comparisons. The relatively large and controlled sample size is one of the strengths of this study. This study also contributes to the literature as one of the rare studies that assessed the psychometric characteristics of the FertiQoL questionnaire in Indonesia. The internal consistency of FertiQoL's online version in Indonesian reached sufficient levels in the current research for further studies.

CONCLUSION

The review proved FertiQoL as a valid tool to reliably measure the QoL of those with fertility problems, which holds potential in a variety of settings for research and practical purposes. While several conceptual and methodological challenges still exist, the problems have already been well-handled and studied. Future efforts with FertiQoL can strive for better understanding of potential problems in the measurements such as invariance of FertiQoL across samples, producing a valid population normative scores, expanding clinical applications (e.g. identifying clinically significant thresholds), and broadening the comprehension of reported associations with FertiQoL through further challenging research designs (i.e. prospective studies).

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