Attributing Factors of Depressive Symptoms in Women Undergoing Infertility Treatment

Heni Indrawati Dalimunthe[1,2(✉)], Elmeida Effendy[2], Vita Camellia[2], and Binarwan Halim[3]

[1] Department of Psychiatry, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia
heniindrawatimunthe@gmail.com
[2] Department of Psychiatry, Universitas Sumatera Utara, Medan, Indonesia
[3] Department of Obstetrics and Gynecology, Universitas Sumatera Utara, Medan, Indonesia

Abstract. Clinical depression occurs in 5–10% of the infertile population, and even bigger proportion up to 30% exhibits symptoms with varying intensities throughout their lives. Current studies on risks related to depressive symptoms among infertile women are limited and inconsistent. Therefore, this study aims to investigate contributing factors related to depressive symptoms among women undergoing fertility treatment. Non-probability consecutive sampling was used to obtain a total of 103 infertile women undergoing fertility treatment at Halim Fertility Clinic, Medan, Indonesia. Beck Depression Inventory (BDI-II) was used to assess depressive symptoms severity while multiple linear regression with a predictive conceptual framework was used to determine the relationships of each independent factor to depressive symptoms score. The multi variate end results showed that attributing factors related to the development of depressive symptoms among women undergoing infertility treatment include age $p < 0.001$, $r = 0.283$, length of education $p < 0.001$, $r = -0.384$, monthly in come $p < 0.001$, $r = -0.308$, type of infertility $p < 0.001$, $r = 0.242$, as well as the duration of infertility $p = 0{,}032$, $r = 0{,}165$. These factors were attributed to depressive symptoms by 66.4%. Based on the results, age, length of education, monthly income, type of infertility, and the duration of infertility are attributing risk factors of depressive symptoms in women undergoing infertility treatment.

Keywords: depression · infertility · infertility treatment · women

1 Introduction

Clinical depression occurs in 5–10% of the infertile population, and even bigger proportion up to 30% exhibits symptoms with varying intensities in over 50% of women [1, 2]. Meanwhile, infertility is defined as the failure to conceive after routine unprotected sexual intercourse consecutively for 12 months or failure to conceive due to an individual decrease/impaired reproductive function [3, 4]. It affects approximately 80 million reproductive couples worldwide, and specifically in Indonesia, it is estimated that 4–6 million couples undergo treatments for infertility [5]. Globally, conception and fertility are considered femininity, culminating in socially constructed pressure on women who

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appear to be incapable of producing an heir for the family which leads to the development of either clinical depression or depressive symptoms [6, 7]. Current evidence commonly used to assess the risk or independent factors contributing to depression among infertile women are limited to those who are undergoing infertility treatment. Therefore, this study was conducted to bridge the gap in investigating the attributing factors related to the development of depressive symptoms among women undergoing infertility treatment.

2 Method

2.1 Study Design

This cross-sectional study was conducted at Halim Fertility Centre, Medan, Indonesia from July–October 2021. The multivariate predictive conceptual framework was used to assess the relationships of independent factors related to depressive symptoms.

2.2 Samples

The participants were obtained using non-probability consecutive sampling, while the inclusion and exclusion criteria were applied to obtain eligible subjects. Meanwhile, the sample size was determined in two different ways; (1) by applying a significance level (α) of 5% power (β) 20% and determinant coefficient of 0.25, which demonstrated that the minimum sample size was 50 subjects, (2) a sample calculation was also conducted for each bivariate analysis using the following formula:

$$n1 = n2 = 2x[(Z\alpha + Z\beta)S^2]^2/[X1 - X2]$$

and it was found that minimum sample size was 103 subjects. Therefore, the largest sample requirement namely 103 subjects were selected for this study.

2.3 Variables

Independent variables that were initially assumed to attribute to depressive symptoms are age, length of education, employment, monthly income, length of marriage, type of infertility, as well as the duration and type of infertility treatment. Meanwhile, the dependent variable was the depressive symptom score among women undergoing infertility treatment.

2.4 Measurement

Beck Depression Inventory (BDI-II) is a 21 item self-report questionnaire that has been widely used in screening the severity of depressive symptoms in the general population. Each item is scored from 0–3, the Indonesian version has been validated by Ginting et al. in 2013, with minimum and maximum scores of 0 and 63 respectively. The higher the score, the more intense the symptoms experienced by the individual. Scores ranging from 0–13 indicate minimal depression, 14–19 mild, 20–28 moderate, and 29–63 severe [8, 9].

2.5 Statistical Analysis

The linear regression was conducted when only all requirements are met namely normal residue shown in the histogram, residual mean = 0, no outlier proven by casewise diagnostic, constant demonstrated in the scattered plot, independent shown by Durbin-Watson test, no multicollinearity according to Pearson correlation, and linearity between both independent and dependent variables [10].

Once the above requirements are established, the Kolmogorov-Smirnov test of normality was then conducted to select the appropriate correlation test. Pearson test was used when the variable is normally distributed, while Spearman was used when there is no normal distribution. Independent variables further analyzed in the multivariate linear regression are those with $p < 0.25$ [10].

2.6 Ethics

Before conducting this study, approval was obtained from the Research Ethical Committee, Faculty of Medicine, Universitas Sumatera Utara with Number 83/KEP/USU/2021. Participants were briefed regarding the study and that personal information will be confidential. The subjects involved were those who have already provided informed consent.

3 Results

A total of 103 women undergoing infertility treatment at Halim Fertility Centre, Medan, Indonesia participated.

Table 1 showed that more than half n = 62, 60.2% of the women participated in this study were employed and clinically diagnosed with primary infertility n = 73, 70.9%. A total of 55 women or 53.4% were appointed for interventional treatment, such as surgery, assisted reproductive technology or both. The majority had already been clinically diagnosed with infertility for at least 2 years, median: 5 years, and the length of their marriage was around 2–20 years.

A bivariate analysis was further conducted to assess the relationship of each proposed risk factor with depressive symptoms scores obtained by using BDI-II questionnaire. Age, length of education, monthly income, length of marriage, type of infertility, duration of infertility, and type of infertility had $p < 0.025$, hence, they were all further assessed in multivariate linear regression analysis.

The first multivariate analysis was conducted using the backward method to screen autocorrelation among independent variables. It was found that all linear regression assumptions were already met as shown in Fig. 1, 2.

Table 2 shows that the third model was found without autocorrelation with determinant correlation or adjusted R2 of 66.4%. Therefore, variables from this model namely age, length of education, monthly income, as well as the duration and type of infertility were found to be the attributing risk factors in depressive symptoms among the participants as shown in Table 3.

Table 1. Sample characteristics

Characteristics	Median (min-max)	n (%)
Age (years)	32 (22–43)	
Length of education (years)	12 (9–24)	
Monthly income (IDR million)	7 (3–24)	
Length of marriage (years)	5 (2–20)	
Duration of infertility (years)	5 (2–20)	
Employment		
Yes		62 (60.2)
No		41 (39.8)
Type of infertility		
Primary		73 (70.9)
Secondary		30 (29.1)
Type of infertility treatment		
Pharmaceuticals		48 (46.6)
Intervention		55 (53.4)

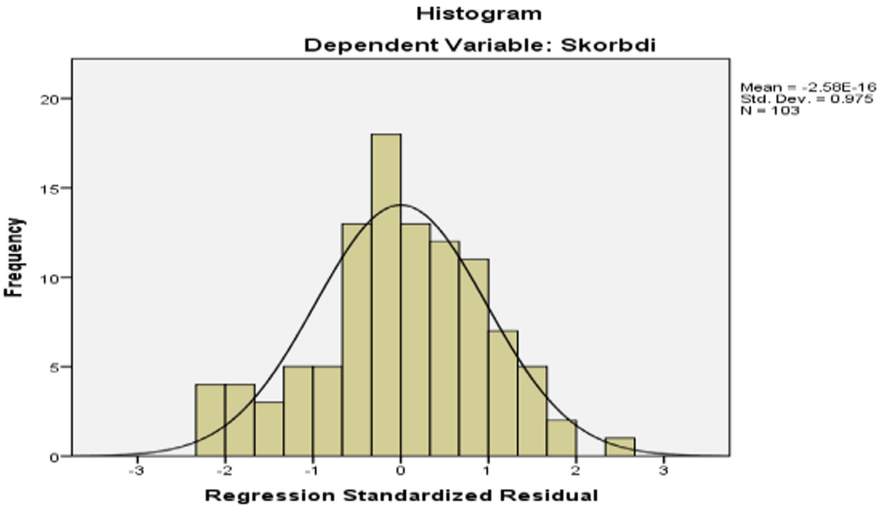

Fig. 1. Histogram showing linearity and normal frequency distribution of variables.

The results further indicate that older women exhibit more intense depressive symptoms. The duration and type of infertility either primary, without a history of conception, or secondary infertility in which the woman have a history of at least one successful conception or labor were found to be proportionally correlated with depressive

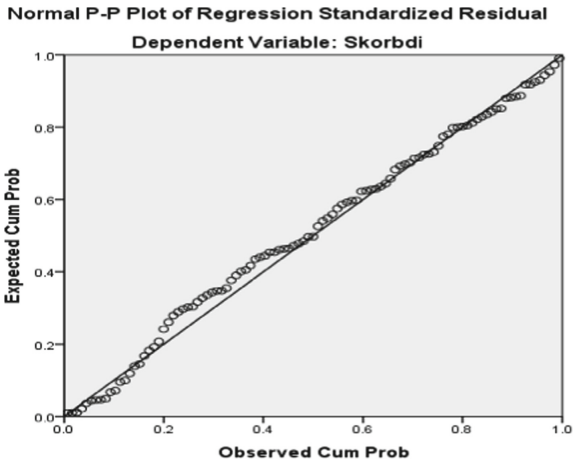

Fig. 2. Normal P-P plot indicating zero residue

Table 2. Multivariate linear regression summary model

Model	Adjusted R^2	Std. Error of the Estimate	Durbin-Watson
1	0.660	2.352	
2	0.663	2.340	1.876
3	0.664	2.340	

Table 3. Attributing factors of depressive symptoms among women undergoing infertility treatment

Factors	**Coefficient Correlation (*r*)**	**P value**
Age	0.283	<0.001
Length of education	−0.384	<0.001
Monthly income	−0.308	<0.001
Duration of infertility	0.165	0.032
Type of infertility	0.242	<0.001

symptoms. Meanwhile, the length of education and monthly income correlated negatively. Women with higher monthly income and educational background were found to exhibit less intense depressive symptoms.

4 Discussion

Married couples are socially constructed to be capable of producing an heir to the family. The inability to conceive a baby is perceived as a failure of fulfilling one's role in expanding the family which has proven to negatively affect emotions, marital and sexual dynamics between couples, self-esteem, and even body image, turning this infertility issue into a complex life crisis. Particularly among women, infertility weights even more burden and social stigma, often leading to isolation and self- assumption of worthless related to an unachieved role of motherhood [11]. Pozza et al. in 2019 stated that approximately 10% of individuals with infertility issues exhibited not only clinically diagnosed depression, but also anxiety [12].

Women are even posed with higher risks of developing depression, and evidence has shown that it is also related to their biological clock. Based on the results, reproductive function in this gender is limited to a certain age, hence, older age is regarded as an aggravating factor of severe depressive symptoms among women. Women with primary infertility namely have no history of successful conception or birth often question their self-worth and lost self-esteem over time, leading to consequences of social isolation or even divorce, thereby magnifying the symptoms of depression that might develop [13]. Studies also showed that for every one additional year of infertility duration, the risk of depression among infertile women increases by 4% [14]. Samani et al. showed that during the early years of infertility, chances of improvement and successful intervention are highest and will slowly decline as time goes by. They found that prolonged infertility for more than 3 years attribute to more intense depressive symptoms. Losing hope and the tendency to frequently visit doctors or even multiple medical referrals have been shown to contribute to more intense depressive symptoms among women [13, 14].

Furthermore, educational background and severity of depressive symptoms among infertile women are known to be negatively correlated, indicating that the higher the education, the more subtle the depressive symptoms [15, 16]. A study by Joelsson et al. Also indicated that the majority of the women exhibiting more intense depressive symptoms are those with a lower degree from the university [17]. The same context was observed in income, in which higher income is related to less intense depressive symptoms [18]. Educational background and income can be viewed from the same angle as both affect one another. From the perspective of infertility treatment, the development of assisted reproduction treatments, such as in-vitro fertilization, intrauterine insemination, and intracytoplasmic sperm injection. Are known to bring more success in overcoming infertility, but at the same time, cost a lot more money. In most societies, higher education potentially translates to more chances of getting into sig- nificantly higher-paying jobs, thereby increasing access to better infertility treatment. Meanwhile, lower income leads to less access to better infertility treatment options and even intensifies concerns and depression towards infertile women [13, 19].

5 Conclusion

Age, length of education, monthly income, type of infertility, and duration of infertility are the attributing risk factors of depressive symptoms in women undergoing infertility

treatment. The results imply that infertility is not necessarily an organic or medical issue, but the psychiatry aspect must also be inclusively considered. Therefore, a psychiatry liaison is needed to address this issue.

Conflict of Interest. None to declare.

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