RBM ONLINE

ELSEVIER

Review

Depression and state anxiety scores during assisted reproductive treatment are associated with outcome: a meta-analysis

Satvinder Purewal [a,*], Sarah CE Chapman [b], Olga BA van den Akker [c]

[a] *Institute of Psychology, Faculty of Education, Health and Wellbeing, University of Wolverhampton, Wolverhampton, WV1 1AD, UK*

[b] *Department of Pharmacy and Pharmacology, University of Bath, Claverton Down Road, Bath, BA2 7AY, UK*

[c] *Department of Psychology, Faculty of Science and Technology, Middlesex University, London, NW4 4BT, UK*

Satvinder Purewal is a lecturer in Psychology at the University of Wolverhampton. Her research interests centre on health psychology and reproductive health; infertility and infertility treatment; impact of chronic illness on reproductive health; gamete donation and surrogacy; ethnicity; and motherhood. She is a chartered member of the British Psychological Society.

KEY MESSAGE

Depression and state anxiety during ART treatment are associated with poor ART outcome, but there is no evidence that changes in anxiety and depression scores from baseline to during ART treatment are associated with ART outcomes. Depression and state anxiety during ART may have a stronger effect on ART outcomes than baseline depression/anxiety.

A B S T R A C T

This meta-analysis investigated whether state anxiety and depression scores during assisted reproductive technology (ART) treatment and changes in state anxiety and depression scores between baseline and during ART treatment are associated with treatment outcome. PubMed, PsycInfo, Embase, ScienceDirect, Web of Science and Scopus were searched and meta-analytic data analysed using random effects models to estimate standardized mean differences. Eleven studies (2202 patients) were included. Women who achieved pregnancy had significantly lower depression scores during treatment than women who did not become pregnant (−0.302; 95% CI: −0.551 to −0.054, $z = -2.387$, $P = 0.017$; $I^2 = 77.142\%$, $P = 0.001$). State anxiety scores were also lower in women who became pregnant (−0.335; 95% CI: −0.582 to −0.087, $z = -2.649$, $P = 0.008$; $I^2 = 81.339\%$, $P = 0.001$). However, changes in state anxiety ($d = -0.056$; 95% CI: −0.195 to 0.082, $z = -0.794$; $I^2 = 0.00\%$) and depression scores ($d = -0.106$; 95% CI: −0.296 to 0.085, $z = -1.088$; $I^2 = 0.00\%$) from baseline to treatment were not associated with ART outcome. Clinics should aim to promote better psychosocial care to help patients manage the psychological and physical demands of ART treatment, giving realistic expectations.

* Corresponding author.
E-mail address: Satvinder.purewal@wlv.ac.uk (S Purewal).

https://doi.org/10.1016/j.rbmo.2018.03.010
1472-6483/

Please cite this article in press as: Satvinder Purewal, Sarah C.E. Chapman, Olga B.A. van den Akker, Depression and state anxiety scores during assisted reproductive treatment are associated with outcome: a meta-analysis, Reproductive BioMedicine Online (2018), doi: 10.1016/j.rbmo.2018.03.010

Introduction

Infertility is experienced by nearly one in six couples and many of these go on to seek assisted reproductive technology (ART) treatment to help them conceive (Farquhar et al., 2015). However, it is estimated that only a quarter of women will get pregnant after a single ART cycle in the UK (Kushnir et al., 2017), so most couples will experience negative pregnancy results and repeat treatment. A recent meta-analysis found that rates of depression and anxiety increased after ART treatment failure, but depression decreased after successful treatment (Milazzo *et al.*, 2016). Another recent meta-analysis also found no increased risk of depressive symptoms in women after they conceived using fertility treatment compared with those with spontaneous pregnancies (Gressier et al., 2015).

However, common psychological reactions during ART include stress, anxiety and depression (Eugster and Vingerhoets, 1999). Many women experience ART treatments as stressful, with stress and state anxiety levels increasing during oocyte retrieval and pregnancy test stages (An et al., 2013; Boivin and Takefman, 1995). Turner et al. (2013) found that women with higher stress and anxiety levels on the day prior to oocyte retrieval had a lower chance of obtaining positive pregnancy results. It is perhaps not surprising that some women drop out of treatment due to a variety of psychological and physical burdens (Gameiro et al., 2012).

Moreover, meta-analyses have found small but significant associations between baseline (before ART treatment has started) depression, state and trait anxiety scores and reduced pregnancy chances with ART (Matthiesen et al., 2011; Purewal et al., 2017a). However, Boivin et al. (2011) found no impact of baseline psychological distress (combined depression and anxiety scores) on ART treatment success. To date, no meta-analysis has investigated whether depression and anxiety scores during ART treatment and changes in levels of anxiety or depression from baseline (pretreatment) to treatment are associated with ART outcomes, despite studies (e.g. An et al., 2013; Boivin and Takefman, 1995) reporting increases in anxiety and depression rates over the course of treatment. The aims of this meta-analysis were therefore to (i) investigate the impact of state anxiety and depression scores during ART treatment on ART treatment outcome and (ii) investigate whether changes in levels of state anxiety and depression from baseline to during treatment predict ART treatment outcome.

Materials and methods

This meta-analysis is part of a larger project that also investigated whether baseline psychological distress is associated with ART outcome (Purewal et al., 2017a) and whether investigated lifestyle (smoking and alcohol use) and body mass index (BMI) are predictors of ART outcome (Purewal et al., 2017b).

The systematic review and meta-analysis was performed following PRISMA and MOOSE guidelines (Stroup et al., 2000).

Eligibility criteria

Eligible studies were considered if they reported as follows.

(i) Prospective studies that reported maternal depression and state anxiety scores during ART treatment (e.g. during oocyte retrieval or the day of embryo transfer) and ART outcomes, ideally with baseline measures (before treatment has started) of depression and state anxiety scores. Studies that reported depression and state anxiety scores after embryo transfer were excluded. Trait anxiety scores were excluded because the effects of treatment stage on state anxiety scores was of interest, not stable trait scores.

(ii) Studies were included if they used a standardized psychological measure (e.g. Beck's Depression Inventory [BDI] and the State-Trait Anxiety Inventory-State scale [STAI]) reporting continuous or categorical (cut-off score) data.

(iii) Studies were included if they reported only original data, reported live birth rates or pregnancy outcome data and ART treatments were included (e.g. IVF, intracytoplasmic sperm injection [ICSI], ZIFT). Other exclusion criteria were if it was not possible to calculate unadjusted effect sizes for predictor variables (e.g. predictor data grouped by outcome, only adjusted data reported, percentages without numbers reported) and therefore meta-analysis of unadjusted effect sizes could not be achieved.

Information sources and search

Six bibliographic databases were searched: PubMed, PsycInfo, Embase, ScienceDirect, Web of Science and Scopus. In PubMed, the following keywords in keywords and abstracts were used: ('Pregnancy'[Mesh] OR 'Pregnancy' OR 'pregnant' OR 'live birth' OR 'birth rate') and ('IVF' OR 'intracytoplasmic' OR 'intracytoplasmic sperm injection' OR '*in vitro* fertilization' OR 'ICSI' OR 'assisted reproductive technology' OR '*in vitro* fertilization') and ('psychological stress' OR 'depressive disorder' OR 'anxiety' OR 'anxiety disorder' OR 'adjustment disorder' OR 'emotions' OR 'psychosomatic medicine' OR 'psychological adaption' OR 'distress' OR 'depression' OR 'stress' OR 'occupation stress' OR 'stressful life events' OR 'major life events' OR 'stressors'). The searches were limited to the period from 1 January 1979 to November 2016 and humans. Hand searches of references cited in relevant papers were also conducted.

Study selection, data collection process and data items

Using PRISMA guidelines (Moher *et al.*, 2009) all authors independently screened titles, abstracts and full-text reports and disagreements were resolved by discussion between all authors. Data were extracted and independent (depression and state anxiety scores at baseline and during ART treatment) and dependent variables (live birth or pregnancy) and sample sizes were recorded. When two or more dependent variables were reported (e.g. serum pregnancy, clinical pregnancy and live birth), the data considered 'gold standard' (Maheshwari et al., 2008) were recorded (in this case, live birth; however, no study reported live birth data, so clinical pregnancy rates were used). Other data were also extracted, such as patient characteristics (e.g. average female age, whether they were first-time ART users or had previously used ART, number of oocytes retrieved, percentage with primary infertility); treatment characteristics (e.g. treatment location, ICSI use [all/some versus none used ICSI]), average number of embryos transferred, single or multiple cycles recorded, pregnancy verification (pregnancy test versus ultrasound scan) and study characteristics (e.g. publication date, design of study).

Please cite this article in press as: Satvinder Purewal, Sarah C.E. Chapman, Olga B.A. van den Akker, Depression and state anxiety scores during assisted reproductive treatment are associated with outcome: a meta-analysis, Reproductive BioMedicine Online (2018), doi: 10.1016/j.rbmo.2018.03.010