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Research report

Reliability and component structure of the modified Daily Symptom Report (DSR-20) ☆,☆☆,★

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ABSTRACT

Objectives: The purpose of the present study was to modify Freeman et al.'s (1996) Daily Symptom Report (DSR) for premenstrual syndrome (PMS) by adding items depicting aggressive and impulsive symptoms, to explore the component structure of this revised measure (DSR-20) in a sample of PMS sufferers, and to compare their scores with those from controls during the follicular and luteal cycle phases.

Methods: The DSR-20 was administered to 140 PMS sufferers who were seeking treatment for PMS and 54 controls who considered themselves to be free from premenstrual complaints daily for three menstrual cycles.

Results: Cronbach's α was 0.95 for the luteal DSR-20 scores of the PMS sufferers, indicating very high internal consistency of the 20 items. Exploratory Principal Components Analysis (PCA) of the luteal ratings of the PMS sufferers identified two components with high internal consistency (>0.90), describing psychological and physical premenstrual symptoms. PMS sufferers scored significantly higher than the controls on each of these components during the luteal, but not follicular, phase.

Conclusions: The DSR-20 total scale score is an internally consistent global measure of the intensity of PMS. The division of PMS symptoms into psychological and physical components, both of which significantly differentiated PMS sufferers from controls during the luteal phase, sheds further light on the description of PMS and provides a clinically relevant and practical means by which to summarise and interpret daily symptom ratings, necessary for the identification and investigation of the syndrome.

1. Introduction

The premenstrual syndrome (PMS) refers to a variety of cyclic and recurrent negative emotional and somatic symptoms that occur in the 7–10 days prior to the onset of menses and which are relieved shortly following the commencement of menstruation (Freeman, 2003; Halbreich et al., 2003; O'Brien et al., 1983; Reed et al., 2008; Rubinow et al., 1988). PMS severity falls along a continuum (Borenstein et al., 2007; Canning et al., 2010; Johnson, 2004). Women with particularly severe symptoms may be diagnosed with premenstrual dysphoric disorder (PMDD) (APA, 1994). Epidemiological surveys have estimated that up to 75% of women experience mild to moderate

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premenstrual symptoms (Steiner and Wilkins, 1996), whilst approximately 3–8% of women experience symptoms at a severity to warrant a diagnosis for PMDD (Steiner and Born, 2000). The term 'PMS' is used in this article when discussion is relevant to all levels of premenstrual symptom severity, whilst the term 'PMDD' is used when discussion is relevant only to the severe end of the PMS spectrum.

Over 65 instruments, both retrospective and prospective in nature, have been constructed to diagnose PMS and/or assess treatment outcomes (Budeiri et al., 1994; Haywood et al., 2002). However, it is now widely accepted that symptoms should be prospectively documented through daily ratings (Freeman, 2003; Johnson, 2004; Steiner and Wilkins, 1996). Item-specific scales are particularly respected because they are easily understood, target specific symptoms and are sensitive to treatment effects (Bryant and Dye, 2004; Steiner et al., 1999). However, interpretations of daily ratings present challenges and many researchers and clinicians resort to assessing symptom change in terms of individual items (Endicott et al., 1986).

Describing symptoms in terms of underlying components is a useful way to summarise and interpret menstrual cycle data (Endicott et al., 1986). Some researchers who have developed PMS measures have utilised Principal Components Analysis (PCA) as a data reduction technique to reduce their data to a manageable size whilst gaining greater insight into the structure of the items and the clinical description of PMS (Allen et al., 1991; Choi and Salmon, 1995; Clare and Wiggins, 1979; Futterman et al., 1988; Moos, 1968). One such measure is the Daily Symptom Report (DSR) (Freeman et al., 1996), which was designed for research and clinical utility for the identification and investigation of premenstrual symptoms. Freeman et al. (1996) conducted a PCA using orthogonal (Varimax) rotation on the luteal daily symptom ratings of women seeking medical treatment for PMS. Their analysis categorised the 17 DSR items into four components, describing mood, behavioural, pain and physical symptoms. This measure has been widely adopted as a diagnostic tool (Atmaca et al., 2003; Bryant et al., 2005) and as an instrument to assess treatment response (Freeman et al., 1993, 1994, 1995; Rickels et al., 1990).

However, some issues can be raised with Freeman et al.'s (1996) PCA. Firstly, although components should not be made up from less than three items (Zwick and Velicer, 1986), their 'physical' component only comprises the items 'food craving' and 'swelling.' Secondly, a good component structure "makes sense" (Tabachnick and Fidell, 2007, p608). In Freeman et al.'s (1996) model, the symptom 'headache' could load more meaningfully onto the 'pain' rather than the 'behavioural' component, since the other items on the behavioural subscale do not relate to pain, whilst headaches are a form of pain. Most importantly, Freeman et al. used the K1 rule (Kaiser, 1960) to extract their components and opted for a forced four component solution. Although the K1 rule demonstrates the maximum number of components that should be retained (Gorsuch, 1997), Freeman et al. (1996) did not explore component solutions with fewer than four components for their theoretical plausibility and interpretability, despite two components having three or less items. Furthermore, this method of component extraction has been criticized for being arbitrary (Fabrigar et al., 1999) and for severely overestimating component number (Fabrigar et al., 1999; McWilliams et al., 2001; Zwick and Velicer, 1986). This can result in solutions that are difficult to interpret and replicate (Zwick and Velicer, 1986), focus attention on minor components at the expense of major components, and create components which only comprise one high loading item (Comrey, 1978).

A further concern with the DSR in its current form is that it does not contain items relating to the common and distressing premenstrual symptoms of anger, aggression and impulsiveness (Elliott, 2002; Endicott et al., 1999; Halbreich, 2003; Halbreich et al., 2003; Hallman et al., 1987; Hsu et al., 2007; Hylan et al., 1999; Landen and Eriksson, 2003; Lurie and Borenstein, 1990; Matsumoto et al., 2007; Warner and Bancroft, 1990). Women with PMS often experience extreme distress and guilt arising from impulsive and uncontrollable outbursts of anger and aggression premenstrually (Swann and Ussher, 1995). Furthermore, anger, aggression and impulsiveness are the symptoms which often propel women to seek treatment (Hartlage and Arduino, 2002), often to reduce the impact their PMS has on family members (Ussher, 2003). As such, the purpose of the present study was to revise the DSR (Freeman et al., 1996) for use in diagnostic and treatment settings through the addition of items relating to anger, aggression and impulsiveness, to examine the component structure of this revised scale in a PMS sample using a reliable component extraction method, and to compare the ratings from this sample with those from controls considering themselves to be free from premenstrual complaints during the follicular and luteal phases of the menstrual cycle.

2. Method

2.1. Participants

PMS sufferers were respondents to advertisements and publicity in the local media, which requested volunteers who suffered from premenstrual symptoms (n = 140). Some PMS sufferers also participated in a clinical trial assessing the effectiveness of *Hypericum perforatum* for PMS (n = 91) (Canning et al., 2010). PMS sufferers were required to be between 18 and 45 years of age and to have regular menstrual cycles (25–35 days). Women who were taking hormonal contraception or treatment, pregnant or breastfeeding were excluded. PMS sufferers were asked to complete Daily Symptom Ratings (DSRs) (Freeman et al., 1996) for three menstrual cycles to confirm PMS diagnosis. During this phase, women were required to demonstrate at least a 30% increase between their follicular (averaged ratings from cycle days 5–10) and luteal (averaged ratings from 6 days preceding menses) DSR total scale scores (30% increase criterion) in at least two out of the 3 cycles to continue in the study (n = 135) (Hamilton et al., 1984). Some women withdrew from the study before they had completed DSRs for three menstrual cycles. However, all women who completed DSRs for long enough for a PMS diagnosis to be confirmed were included (n = 92). This included those women who only completed DSRs for two complete menstrual cycles but who met the 30% increase criterion in each of these.

To confirm PMS diagnosis, symptoms should be limited to the luteal phase (Freeman, 2003; Halbreich et al., 2003;