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In this study 81 women with recurrent miscarriages completed questionnaires designed to assess depression, anxiety and general health. This data was matched with data from their medical notes to ascertain demographic and reproductive variables. The results indicated that 33% of patients could be classified as depressed with 9.9% of women being moderately depressed and 7.4% suffering from severe depression. Twenty-one percent of patients had levels of anxiety that were equal or higher to a typical psychiatric outpatient population. Neither age, cigarette consumption, alcohol intake, previous live birth, number of miscarriages, lateness of miscarriage nor length of time since last miscarriage were found to affect the degree of psychiatric morbidity. These findings add to our understanding of the degree to which recurrent miscarriage can affect mental health.

Key words: recurrent miscarriage, psychiatric morbidity, anxiety and depression scales

INTRODUCTION

Miscarriage may be defined as the loss of a pregnancy before 24 weeks. Recurrent miscarriage is usually considered to be the loss of three or more consecutive pregnancies and affects approximately 1% of women¹. Some clinicians, however, consider two or more consecutive miscarriages to warrant a diagnosis of recurrent miscarriage² resulting in approximately 3% of women falling into this category. The causes of recurrent miscarriage include genetic, disease, hormonal, anatomical and immunological factors. Although it has been suggested that there is no identified cause in approximately 50% of women who attend recurrent miscarriage clinics³ this figure probably represents an underestimate.

Although clinicians have noted that women who have experienced recurrent miscarriages often feel depressed, anxious and unhappy there has been little empirical data to describe or quantify the reactions patients experience following recurrent miscarriage. Several studies have suggested

that increased rates of psychiatric morbidity may occur after a single spontaneous miscarriage⁴⁻⁶. Rates of clinical depression have ranged from 40-55%. Anxiety after miscarriage has been investigated less. Thapar and Thapar⁶, however, found that women who had experienced a previous miscarriage had significantly higher scores on anxiety measures (as measured on the Hospital Anxiety and Depression Scale) than women who had not. There are, however, only two studies to date that have attempted to assess psychiatric morbidity amongst women with recurrent miscarriage using standardized tools.

Klock and colleagues⁷ carried out a study that specifically aimed to assess the degree of psychiatric morbidity amongst patients who had experienced recurrent miscarriage. Their study was limited by a number of factors including sample size ($n = 40$), a failure to correlate levels of depression and anxiety with factors such as the time after miscarriage at which they were interviewed, and

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a poor response rate (57%). Thus increasing the possibility of selection and response bias. Scores on the Beck Depression Inventory (BDI-II) revealed that 32% of the women had total scores of 14 or more which is indicative of clinical depression. Scores on the Spielberger State-Trait Anxiety Inventory (STAI-II) found the mean scores for state and trait anxiety indicative of high levels of both acute and chronic anxiety.

Bergent and associates⁸ carried out a study that was designed to assess the importance of psychological factors in the 'etiology' of recurrent miscarriage. This study analyzed psychiatric morbidity 6–8 weeks after the second miscarriage in 36 women desiring children. In addition they assessed a control group of 36 who were matched for age and occupation that had visited the hospital for a pre-conception check-up and had not suffered from recurrent miscarriage. Women in the recurrent miscarriage group were then telephoned two years later to enquire about their obstetric history. The study however, has a number of shortcomings including the sample size ($n = 36$), that two thirds of the women had experienced two (as opposed to three) miscarriages and only including women 6–8 weeks after recurrent miscarriage. Scores on the STAI-II revealed mean scores of 46 (range 36–71) and 45 (range 36–71) in the recurrent miscarriage and control group respectively. These results suggest that both groups contain women with scores similar to those in a typical neurotic psychiatric outpatient population (i.e. > 55). Scores on the BDI-II revealed scores of 3 (0–18) and 3 (0–14) in the recurrent miscarriage and control group respectively. These results indicate that a minority of women in the recurrent miscarriage group had scores of 14 or more, indicative of mild clinical depression.

The present study was initiated to examine the degree of psychiatric morbidity within a larger population of women than previously studied, who had experienced recurrent miscarriage, in an attempt to assess more fully the extent of morbidity, in contrast to sub-clinical distress, amongst this patient population. This study is also concerned with ascertaining whether there were additional factors that might help to isolate women at greatest risk of suffering the psychiatric sequelae of recurrent miscarriage. Potential risk factors that are investigated include: age, alcohol and cigarette consumption, presence of other children, time since miscarriage, latest miscarriage, total number of mis-

carriages, infertility treatment prior to conception and ethnicity.

METHODS

Subjects

A total of 120 consecutive women at the recurrent miscarriage clinic at St Mary's Hospital, London were asked to participate in this study. Thirty-four of these patients were, however, found to either have had a single or no previous miscarriage or in some cases stillbirths, which had been incorrectly counted as miscarriage. These women were not included in the study leaving 86 women remaining in the analysis.

Measures

Patients were given a confidential questionnaire pack while waiting for their initial consultation at the recurrent miscarriage clinic. They were informed that the purpose of the questionnaire was to gain some idea of any psychological problems that people may be experiencing in order to improve future treatment of women coming through the clinic. The questionnaire pack included the following:

- Beck's Depression Inventory (BDI-II)⁹: A 21-item questionnaire widely used to detect depression in a variety of clinical and other populations. Scores range from 0–63 with scores between 14–21 indicating mild depression; 21–29 moderate depression and a score of greater than 29 severe depression.
- Spielberger Trait Anxiety Inventory (STAI-II)¹⁰: The trait anxiety scale (Y2) is a 20-item measure designed to assess anxiety in a wide variety of populations. Scores can range from 20–80. Mean trait anxiety scores for healthy populations tend to fall within the range of 32–40, while a mean score of 55 represents that of a typical neurotic psychiatric outpatient population.
- General Health Questionnaire (GHQ)¹¹: A 12-item instrument spanning a range of items related to psychiatric symptomatology. It provides both a dimensional measure of psychological distress, when scored 0–36, and an index related to the probability that a respondent is suffering from a formal psychiatric disorder i.e. a 'case', when scored 0–12. Several investigators^{12,13} have employed a cut-off of 2 or 3, above which an individual is deemed to

be likely to merit a psychiatric diagnosis, albeit of an unspecified nature.

- **St Mary's Miscarriage Questionnaire (SMMQ)*.** A locally developed 15-item instrument aimed at determining the level of psychological distress specific to women suffering miscarriage. Each item is scored on a five-point scale 1–5 whereby symptoms are rated as applying 'not at all' to 'very much' respectively. Scores can range from 15–75. The questionnaire has demonstrated good internal reliability and a principal components analysis indicated that it was useful as a single measure of specific distress following miscarriage.

All questionnaires were scored and matched with case notes of the individual patients. The patients were informed that the results were confidential and would be anonymous to the recurrent miscarriage clinic.

Data analysis

In order to examine the level of psychiatric morbidity in the present sample, descriptive statistics of primary psychometric measures were employed with known cut-off scores for the formal measures of psychopathology. A logistic regression analysis was employed to explore the possibility of constructing a model identifying specific predictors capable of correctly classifying patients in terms of their level of psychiatric morbidity i.e. whether they were above or below relevant cut-off scores. Additionally, Pearson Product Moment correlation coefficients were used to examine the association between measures of psychiatric morbidity and specific clinical data, whereby significant correlations would indicate a greater association of these classes of variable. Although, general expectations were that significant positive correlations would be found between psychiatric morbidity and key clinical variables, it was not possible to exclude the possibility that the latter might exert a protective effect and so two-tailed tests of significance were employed.

RESULTS

Eighty-one out of the 86 women asked to participate in the study completed their questionnaires (95% response rate). Reasons for non-completion included time constraints

and one woman explicitly stated that she felt that it was too upsetting. Subsequent analysis was therefore carried out on the remaining 81 women.

Demographic variables

The mean age of the patients was 34.5 (standard deviation, SD: 5.09, range 23–48). The majority of women were Caucasian (85%), the remainder being Afro-Caribbean (9%) or Asian (6%). The majority of women's partners were also Caucasian (88%) with Afro-Caribbean (8%) and Asian men (3%).

Reproductive history

The mean number of previous miscarriages was 3.27 (SD 1.44, range 2–7). Seventeen women had only 2 previous miscarriages whereas 69 women had 3 or more recurrent miscarriages. The mean gestational length of the latest miscarriage was at 9.33 weeks (SD 4.24, range 4–24). The mean length of time between last miscarriage and arrival at the recurrent miscarriage was 44.13 weeks (SD 52.0, range 3–285). The median of this somewhat skewed distribution was 32 weeks. The mean number of previous live childbirths was 0.48 (SD 0.64, range 0–2). Only four patients had required assisted conception in order to conceive at least one of their pregnancies.

Psychological measures

Approximately 21% of women in the present sample had only experienced 2 recurrent miscarriages. These patients were analyzed separately and a summary of the results from the psychological questionnaires for all patients is shown in Table 1.

Although it appears that the level of psychiatric morbidity amongst patients with 2 consecutive miscarriages was less than that amongst patients with 3 or more miscarriages, post hoc independent *t*-tests revealed that the means of the psychological data for the two groups did not significantly differ (*p* values = > 0.1). Consequently for the remaining analyses these groups were considered together.

Scores on the BDI-II indicated that 16.1% were in the 'mildly depressed' (BDI-II 14–20) and 9.9% of patients were 'moderately

*Space presentations preclude a more detailed presentation of the SMMQ, although copies of this instrument are available from the second author at Department of Psychology, Paterson Centre, St. Mary's Hospital, 20 South Wharf Road, London W2 1PD. A report of the psychometric properties and distribution of scores in a RECURRENT MISCARRIAGE population has been prepared and submitted for publication: Tata, P., Craig, M., Steel, C. & Regan, L. (2001) The St Mary's Miscarriage Questionnaire: Initial Psychometric Properties (Unpublished Manuscript)

Table 1 Sample mean $\pm$ SD for psychometric data

Previous miscarriages (n)	Beck's Depression Inventory	STAI (trait anxiety)	General Health Questionnaire (Raw)	General Health Questionnaire (Transformed)	St. Mary's Miscarriage Questionnaire
Two (17)	9.06 $\pm$ 7.87	44.75 $\pm$ 9.6	14.06 $\pm$ 4.34	3.24 $\pm$ 3.55	41.8 $\pm$ 7.22
Three + (64)	13.21 $\pm$ 10.74	42.45 $\pm$ 12.79	16.27 $\pm$ 6.62	5.2 $\pm$ 4.8	44.35 $\pm$ 5.85
Total (81)	12.33 $\pm$ 10.29	42.91 $\pm$ 12.19	15.8 $\pm$ 6.25	4.79 $\pm$ 4.62	43.84 $\pm$ 6.18

SD, standard deviation; STAI, state trait anxiety inventory

depressed' (BDI-II 20–30) categories respectively. Whilst, 7.4% of women, were in the 'severely depressed' category (BDI-II $\geq$ 29).

For the GHQ-12 Transformed scores, the overall mean for the present sample was clearly above a cut-off score of 3 (53.1%). Total scores for the SMMQ appeared normally distributed with a mean of 44, and minimum and maximum scores of 21 and 67, respectively. The SMMQ total score showed moderate significant positive correlations with all four indices of psychological disorder, i.e. trait anxiety (STAI-Y2, $r = 0.3$, $p < 0.05$), depression (BDI-II, $r = 0.27$, $p < 0.05$) and GHQ scores (Raw score, $r = 0.3$, $p < 0.05$; Transformed score, $r = 0.35$, $p < 0.05$).

Age, alcohol and cigarette consumption, number of children, time since last miscarriage, latest miscarriage and total number of miscarriages were used in logistic regression analyses as potential predictors of which psychiatric morbidity groups patients fell into (using the cut-off scores described earlier). None of these analyses proved significant either in terms of the individual predictive value of the above variables nor for the overall predictive model employing all these variables.

Using Pearson Product Moment correlations no significant association was found between the level of psychiatric morbidity and age ($r = < 0.2$, $p > 0.2$), alcohol and cigarette consumption ($r = < 0.2$, $p > 0.3$), number of live children ($r = < 0.2$, $p > 0.3$) or time since last miscarriage ($r = < 0.2$, $p > 0.2$), latest miscarriage ($r = < 0.1$, $p > 0.4$) and total number of miscarriages ($r = < 0.2$, $p > 0.2$).

Only four patients in our study had undergone *in-vitro* fertilization (IVF) treatment preventing us from statistically analysing our data to determine if this was an independent risk factor for psychological morbidity. A sample of nine patients, however, could be analysed if we included patients who had been discounted due to having stillbirths or only single previous miscarriages. Amongst this group there was

no significant difference in psychological morbidity.

Similarly it was not possible to assess whether ethnicity was associated with higher levels of morbidity due to the ethnic bias in our population with approximately 90% of women and their partners being Caucasian.

DISCUSSION

This present study provides additional information on the degree of psychological disturbance experienced by women with history of recurrent miscarriage. In general, high absolute levels of psychiatric morbidity were observed such that about one sixth of the present sample's had a level of clinically significant ('moderately' or 'severely') depressed mood and one fifth had levels of chronic anxiety typical of psychiatric outpatients. Equally, about half the sample showed a level of psychological symptoms likely to merit a psychiatric diagnosis, were they to undergo a formal assessment by a psychiatrist. However, no significant association was found between degree of psychiatric morbidity and key clinical indices of recurrent miscarriage. Since recurrent miscarriage affects 0.4–3% of women^{2,3} depending on the definition adhered to, the implications of these results are of importance to the clinical management of recurrent miscarriage patients.

Klock and colleagues⁷ estimated the degree of depression to be considerably higher than our study with 32% of women scoring highly on the BDI-II. However, the latter study used a BDI-II cut-off score of ≥ 14 as opposed to ≥ 20 (used in this study). Using the same criteria our study reveals a remarkable similarity with 33% of women scoring ≥ 14 on the BDI-II. It is noteworthy, that those women scoring ≥ 14 and < 20 fell in the 'mild' depressive range which is likely to overlap significantly with non-clinical dysthymic mood states. Both studies, however, estimated the level of depression to be considerably higher than

suggested by Bergent and associates⁸. This latter study did not find any women in the recurrent miscarriage group with scores > 18 on the BDI. It is difficult to explain this gross disparity but may be partly attributable to the length of time post miscarriage that women were interviewed. In the study by Bergent and associates⁸, women were only interviewed between 6–8 weeks after miscarriage. It is possible that psychological morbidity increases significantly after this time. Although Klock and colleagues⁷ failed to examine this relationship, our study attempted to determine if there was a temporal relationship. No significant relationship between length of time since last miscarriage and degree of psychological distress or disturbance was detected. However in our study the data for this measure were significantly skewed. This bias makes any further extrapolation from the data difficult. It does, however, lend support to the hypothesis that psychological morbidity may develop after the immediate miscarriage period and persist for some time.

The age of women in the study was normally distributed with a mean of 34.5 years. We had predicted that, as fertility is well known to decline with age, older women would have higher levels of mood and psychological disturbance than their younger counterparts. However, no significant association was found between age and any of the psychological measures. These findings are consistent with those from studies of women who have experienced a single miscarriage^{5,6}.

The absence of psychological difference between women who had one or more children prior to recurrent miscarriage, with those who had no children, replicated those of Klock and colleagues⁷. We had anticipated that women with living children might be protected to some degree against the psychological morbidity associated with recurrent miscarriage. Explanations for this lack of association include the possibility that the offspring of some women were the product of previous partnerships. Alternatively having other young children at home may provide as much psychological stress as they provide protection against the psychological sequelae of recurrent miscarriage. Finally, women who have children and seek medical attention following recurrent miscarriage may be psychologically different to those women who have children and do not want to be referred to a clinic where they have to undergo many investigations and tests. Consequently, there

may have been a selection bias; with the only women in this group being referred also being those women who were psychologically distressed.

We had also hypothesised that high alcohol and cigarette consumption might be associated with a higher level of psychiatric morbidity. Once again, however, we were unable to find any relationship with any of the psychological measures and alcohol or cigarette consumption. It is possible that women underestimated their consumption of these substances and future studies may benefit from attempting a more objective assessment of consumption. This might include, for example, a separate estimate provided by the woman's partner.

The discovery that there was no significant difference in the psychological distress experienced by women who have encountered 2 vs. 3 or more miscarriages also confirmed previous findings⁷. This was equally the case for the more general measures of psychological health, as for the more specific index (SMMQ) of miscarriage distress, and raises the question as to whether recurrent miscarriage clinics should be reviewing patients with fewer than 3 miscarriages. The recurrent miscarriage clinic at St Mary's accepts the conventional definition of 3 or more consecutive miscarriages. A number of women had, however, managed to get a referral following 2 miscarriages. It is unclear whether this is attributable to acceptance of a different diagnosis of recurrent miscarriage by their referring physician/General Practitioner or through pressure by highly motivated patients who might subsequently be biasing the clinical population.

Empirically, the probability of a woman having 2 miscarriages is 2–3% whereas it is considerably smaller for 3 miscarriages (i.e. 0.4–0.9%)¹. Within the former group there will be a greater proportion of patients who will have had miscarriages due to chance alone. This is less likely once a woman has had 3 or more consecutive miscarriages. From an economic perspective it might, therefore, appear appropriate to assess women following 3 or more miscarriages. An awareness of the psychiatric complications of this condition, however, may confound such an approach. Depression and anxiety has been estimated to cost the country approximately 6.5 million working days per year in lost productivity¹⁴ and left untreated can become more resilient to clinical treatment¹⁵. In addition, developmental studies into the effects of postnatal

depression have found that the children of depressed mothers have lower IQs than other children¹⁶. It is possible that the psychiatric morbidity observed in the present sample of women will decrease with the birth of a live child. We suspect, however, that in some women, with long-term untreated clinical depression, symptoms may still exist after a successful pregnancy and thus could affect the subsequent cognitive and emotional development of the child.

Counselling has been shown to help after bereavement¹⁷ and to shorten the duration of mourning after perinatal death¹⁸ which begs the question as to whether or not clinics which offer counselling need to be established for all patients following recurrent miscarriage. This might serve to prevent psychiatric morbidity as opposed to screening and treating morbidity once it has arisen. Hamilton¹⁹ found that when such a clinic was offered to patients after a single miscarriage attendance was high, but gives no evidence to suggest whether it provided any form of benefit to the patients attending.

It could be argued, however, that before counselling is widely offered one would need to conduct a controlled longitudinal investigation to confirm whether the psychological distress experienced by women after recurrent miscarriages is long-lasting or transient. Our retrospective data suggests that the distress may be long lasting with significant levels of depression and anxiety amongst women after a mean of more than 10 months since their last miscarriage. Although longitudinal data following recurrent miscarriage does not exist longitudinal data after a single miscarriage suggests that significant levels of depression can be detected 12 months later²⁰. In addition to directly treating psychiatric morbidity amongst this patient group, counselling may indirectly serve as a tool in the prevention of recurrent miscarriage. A number of studies have suggested that various forms of 'tender loving care' following recurrent miscarriage have a profound affect on the success of subsequent pregnancies²¹⁻²⁴. Indeed Tupper and Weil²⁴ have argued that supportive therapy, 'more than any form of treatment', is capable of preventing pregnancy losses in recurrent miscarriage patients.

An additional bias in the population of women analyzed in this study was their ethnicity. We had been interested to determine whether there was an association between ethnic group and psychiatric

morbidity. Clinicians within the recurrent miscarriage believed that the social pressures experienced by women in certain ethnic groups (e.g. Asian women) to conceive were greater than in others. Unfortunately, the small proportion of non-white women in our study prevented us from determining whether this association was statistically significant. Further studies are therefore required to determine whether an association exists.

Likewise there were not enough women in the sample to determine whether women who had undergone IVF treatment in order to conceive suffered greater psychological morbidity after recurrent miscarriage. It had been predicted that women who had undergone the additional stress of fertility treatment would be more distressed than other women. Although this hypothesis was not supported by our small sample a larger group of women is needed to address this question further.

A further limitation of our study was the absence of a control group. Previous studies of women following a single miscarriage have used pregnant women obtained from antenatal clinics as a control group. However pregnant women might be experiencing specific alterations of mood which makes them a poor control group. The placenta, for example, is known to produce β -endorphins²⁶ that can elevate mood. In addition the awareness of being pregnant is likely to affect mood leading to women perhaps being less depressed and anxious than usual or in some cases the reverse. A control group made up of a gynaecology outpatient population could be utilized. However this group of women has also been shown to have high levels of psychological morbidity^{26,27} and would thus also represent a biased sample. The study by Bergent and associates⁸ included a control group composed of women who had attended a pre-conception clinic. This subgroup of women may, however, also represent a biased sample. Women attending pre-conception clinics represent a minority of women in the general population. They are frequently women who have an underlying medical problem that needs to be addressed prior to pregnancy (e.g. diabetes) and they may consequently be more anxious than the majority of women who only visit their physicians once they become pregnant. One control group that was considered while designing this study was to ask women at the clinic to give a duplicate set of questionnaires

to a close friend who had not experienced any miscarriages. There are, however, a number of problems associated with this approach. Firstly women attending the recurrent miscarriage may not have confided in their close friends about their miscarriages and thus feel upset about being asked to give them a set of questionnaires. Conversely their friend may have experienced miscarriages but likewise not revealed this information. Thus, although the issue of a control group is a valid one it is unclear which group of women might be the appropriate group to use.

Future research is needed to determine the precise psychiatric status of women who have experienced recurrent miscarriages. Although self-assessment questionnaires such as the BDI-II, STAI-YI, and the GHQ do suggest certain kinds of psychiatric morbidity they are not in themselves diagnostic of specific disorders. Structured psychiatric interviews are needed to determine whether the levels of depression and anxiety are elevated to the degree to which this study and the preceding study by Klock and colleagues⁷ have suggested. Future research might also be directed at determining the levels of psychological distress experienced by the partners of patients who have thus far had little attention in the literature.

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Current knowledge on this subject

- Current estimates of psychiatric morbidity amongst women who have experienced recurrent miscarriage are confined to two studies that are limited by small sample size and a preponderance of women who had experienced two as opposed to three or more miscarriages
- Estimates of depression amongst women with history of miscarriage in previous studies are inconsistent despite suggesting that the level of anxiety amongst them is high
- Previous studies have lacked in their assessment of other clinical factors that may have influenced the psychiatric morbidity in this patient group

What this study adds

- This is the largest study to date that has examined the level of psychiatric morbidity amongst women who have experienced recurrent miscarriage. Morbidity amongst women who had experienced two ($n = 17$) was assessed independently of the majority of women who had experienced three or more recurrent miscarriages ($n = 69$)
- Estimates of depression and anxiety were found to be high amongst this patient population
- Psychiatric morbidity was found to be independent of other clinical factors including age, alcohol or cigarette consumption or the presence of other children