A longitudinal investigation into anxiety and depression in the first 2 years following a spinal cord injury

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This study is a 1 year extension of a controlled 1 year follow up study of spinal cord injured persons. The study assessed the extent of spinal cord injury (SCI) persons' depression and anxiety in comparison to an able bodied control group matched for age, sex, education and as far as possible, occupation. Psychological adjustment to SCI was assessed in terms of scores on the Trait Anxiety Inventory and the Beck Depression Inventory. Results obtained at the 2 year follow up were not significantly changed from those obtained over the first year. There was no significant improvement in anxiety and depression scores in the SCI group 2 years post injury. Examination of the SCI scores suggest that psychological morbidity was confined to a group of approximately 30% of persons, whilst the remaining persons were not severely anxious or depressed. Traditional stage models of adjustment to SCI which suggest that the passage of time is associated with better adjustment were not supported by the present data.

Keywords: spinal cord injury; anxiety; depression.

Introduction

Past opinions suggested that depression following SCI was a universal reaction,[1–5] and that denial was occurring if a patient was not depressed. However, the current literature suggests that the psychological response to SCI is an individual one, with empirical studies reporting depression to be present in only 20–45% of patients.[6–8] While the quality of objective research has improved in recent years, methodological problems persist. The major problems with the current literature are that very few studies have employed control groups, research is predominantly cross-sectional rather than longitudinal, and definitions of adjustment are often not given. These problems have been discussed in an earlier publication by the authors.[9]

Before the growth of empirical studies into the psychological consequences of SCI, there were many popular theories about adjustment to SCI, with variations on the idea that patients pass through a series of stages in adjusting to their injury. Not all theorists agree on the nature of the stages or the sequence in which they occur, but a common example of the stages includes shock, denial, anger, depression and acceptance. The passage of time was thought to relieve psychological distress. Evidence supporting this theory has been equivocal, and recent research published by the authors indicates that this is not the case up to 1 year following SCI.[9] However, it is important to follow up patients into the long term as indicators of long term adjustment such as suicide, self neglect and divorce rates amongst people with SCI suggest that not everyone adjusts well.[10]

The following is a 2 year follow up of a controlled longitudinal study investigating the psychological impact of spinal cord injury. The study initially assessed the extent of SCI persons' depression and anxiety over the first year in comparison to an able

bodied control group matched for age, sex, education and occupation. This study followed those patients from hospitalisation through to 2 years post injury, providing a clearer picture of the long term psychological consequences of SCI.

Methods

Subjects

Spinal cord injured group. A more detailed description of the selection process and subject characteristics can be found in a previous publication in this journal.[9] Briefly, 41 subjects (34 male, 7 female, mean age 31 years) who were newly injured participated, once they were mobile in a wheelchair, in rehabilitation therapies. Only subjects who had permanent neurological loss, had no head injuries or any preexisting psychopathology, were at least 17 years of age, and able to speak English were selected for the study. The sample was evenly divided in terms of paraplegia and tetraplegia. The majority of subjects (68%) had complete lesions, while 32% were incomplete. All injuries were the result of trauma. Subjects were assessed on four occasions over the 2 years (see below). The sample 1 year post injury consisted of a total of 41 subjects. However, there was an attrition of 10 subjects for the 2 year data, as a result of difficulties in locating subjects, and death in the case of one person (which was not suicide). Thus 31 subjects participated in the two year study. The 10 subjects who did not complete the 2 year data were evenly divided in terms of level and completeness of lesion, and their mean depression and anxiety scores up to 1 year were not significantly different to the scores of those who completed the 2 year data.

Control group. The controls were a group of able bodied persons matched to the SCI group for age, sex, education and as far as possible, occupation. Controls were matched for the level of education achieved, from secondary school levels, to tertiary training. Occupation was matched as closely as possible using categories of occupation such as trades, secretarial clerical, professional, self-employed, unemployed and

unskilled. Subjects who volunteered were recruited from technical colleges, hospital ancillary staff, and acquaintances known to the research team to fit the selection criteria. The time frame for assessment was the same as for the SCI group. Only those subjects matched to the final 31 SCI persons were included in the final analysis. It is possible that by matching subjects, an element of bias selection has occurred. For instance, acquaintances may be reluctant to reveal their true mood state and depressed persons may be less prepared to volunteer. However, none of the persons approached refused to act as a control, and the levels of depression and anxiety seen in the controls were similar to the norms for the two measures used. We believe therefore that potential bias from matching subjects was minimised.

Measures

Following their consent, SCI persons were assessed on four occasions: approximately 2 weeks following placement in a wheelchair (usually 2–4 months post injury); 2 weeks prior to discharge from hospital or 3–4 months following the first assessment (whichever came first); and 6 months following the second assessment (usually 1 year post injury) and 2 years post injury. The rationale for this time frame has been previously discussed.[9] However, a fourth assessment did not take place for the controls as there was no significant movement of their scores over the first three measures. One would therefore not expect their mean levels of anxiety and depression to change significantly in the following year. As a result, the repeated measures multivariate analysis of variance (MANOVA) results for the first three measures will be given for the two groups. To test for differences across the four occasions for the SCI group, one-way repeated measures analysis of variance (ANOVA) were performed.

A comprehensive battery of instruments was used to assess the extent of psychosocial morbidity. For this study only the BDI[11] and the Spielberger State–Trait Anxiety Inventory (STAI)[12] will be reported. The BDI is a valid self-report measure of depression,

consisting of a list of 21 descriptive statements assessing symptoms of depression. Other research into depression following SCI has found the BDI to be useful for assessing depression in a SCI context, shown to be test–retest reliable, to have construct validity and to be sensitive to change.[11,13] The STAI is a 20 item self-report measure of trait anxiety. It has been widely used with well demonstrated reliability and construct validity.[12]

Statistical analysis

Data were analysed using two repeated measures MANOVA to test for differences between the two groups (SCI and controls) and changes over time. Group was the between subjects independent variable (IV), and occasions the within subjects variable. Depression and anxiety were entered separately as the dependent variables (DVs). A multivariate analysis was used as the time variables are considered dependent variables. A repeated measures MANOVA was used as controls and subjects form matched pairs with differences between pairs examined over time (the first three time measures). One way repeated measures ANOVA were performed to test for differences across time for the SCI on the DVs.

Results

Table I presents the mean depression and anxiety scores over the first 2 years of injury. Table II reports the repeated measures MANOVA between and within subject variance for anxiety and depression. Significant differences were found between the spinal injured and control groups on anxiety and depression (F(1,60) = 5.9, $p <$ 0.01 for anxiety; F(1,60 = 33.2, $p < 0.01$ for depression), with the SCI group being more anxious and depressed than the control group. There were no significant differences overall across time for anxiety or depression (F(3,180) = 1.5; $p =$ NS for anxiety; F(3,180) = 1.9; $p =$ NS for depression), nor were there any significant interactions

Table I Depression and anxiety means and standard deviations for SCI and controls. BDI1 is the Beck Depression Score on the first assessment, BDI2 is the second, BDI3 is the 1 year, third depression assessment, and BD14 the 2 year assessment. ANX1 is the Spielberger Trait Anxiety Score on the first assessment, ANX2 is the second, ANX3 is the 1 year, third anxiety assessment and ANX4 is the 2 year assessment. Missing data ($n = 41$) were pairwise deleted

Scale	SCI		Control	
	Mean	SD	Mean	SD
BDI1	10.5	6.6	3.9	4.7
BDI2	9.9	8.6	3.2	4.4
BDI3	9.1	8.8	2.4	2.4
BDI4	9.3	8.2	Not taken	
ANX1	40.0	8.9	34.4	7.4
ANX2	38.0	11.1	33.4	8.4
ANX3	36.8	10.7	34.2	6.9
ANX4	37.6	11.7	Not taken	

Table II Showing between and within group variance for the repeated measures MANOVA analyses across the first three measures for the SCI and control groups

Source	MS effect	df	MS error	F	p
Anxiety					
Between	1107.2	1,60	187.2	5.9	0.01
Within	50.7	3,180	33.3	1.5	NS
Interaction	57.5	3,180	33.3	1.7	NS
Depression					
Between	2744.5	1,60	82.6	33.2	0.00
Within	32.3	3,180	16.9	1.9	NS
Interaction	8.3	3,180	16.9	0.5	NS

present between group and time $(F(3,180) = 1.7; \quad p = NS \quad$ for anxiety; $F(3,180) = 0.5; \quad p = NS$ for depression). The one way ANOVA for anxiety and depression showed no significant changes across time $(F(3,90) = 1.9, \quad p = NS$ and $F(3,90) = 1.1, p = NS$ respectively).

Discussion

The results show that in comparison to matched controls, the injury does produce a significant negative impact in terms of depression and anxiety, and this has remained up to 2 years following the accident. These findings are similar to those found 1 year post injury. The lack of significant changes in scores across time is inconsistent with stage models of adjustment, which suggest that psychological disruption should decrease over time. These theories would suggest improvement after 2 years of living with SCI. Such a theory also implies that the injury itself is the primary factor influencing adjustment.[14] However, Trieschmann[15] conceptualises psychological adjustment to SCI as an interaction of person variables (e.g. personality style, method of coping with stress), organic variables (e.g. medical aspects) and environmental variables (e.g. family support, socioeconomic status). Such a complexity of factors suggests that the response to SCI is an individual one, and it therefore may be a simplification to assert that time will result in lowered depression and anxiety levels for all.

The lack of reduction in depression and anxiety in the SCI group may well be related to the daily frustration associated with the ongoing physical difficulties resulting from SCI. People with permanent neurological loss following SCI wake up every morning to the injury: it does not go away. In addition, the stresses of coping with architectural barriers, economic costs, vocational limitations, strains on family roles and relationships, and demands of others who lack an understanding of SCI persons and therefore interact unnaturally (for instance, patronise or ignore the person with SCI) also might act to maintain psychological upset. The lack of reduction in depression

and anxiety over time in the SCI group is in contrast to research into bereavement following the loss of a spouse which suggested that most bereaved people eventually recover from raised levels of anxiety and depression.[16] Whilst it seems evident that SCI maintains abnormally high levels of psychological morbidity, the present study also supports the increasing evidence that severe depression and anxiety are not inevitable following SCI. At least 60% of persons in the study had normal or slightly raised morbidity. This suggests that it is a substantial minority (up to 30% at least, determined by a cut off of 14 for depression and 42 for anxiety) that are significantly anxious or depressed in the long term. Research should be concentrated on predicting those at risk of such problems.

To assume that 'time heals' may be denying the complex processes involved with adjusting to SCI, for there was no improvement in levels of depression and anxiety over 2 years. In a group of persons with SCI, there is always the danger of assuming that the population is an homogeneous one, and that the findings relate to all persons with SCI. Research over the last two decades indicates how variable the response is to SCI. However, certain generalisations can be made as a result of the present group research: not everyone is depressed or anxious, and not everyone adjusts better as a function of time, at least up to 2 years post injury. The influence of premorbid factors in the development of post-treatment depression and anxiety must also be acknowledged as a possibility. This area needs careful investigation, as the present study controlled for its presence by eliminating those with a history of prior psychopathology.

This study has limitations in that it is not an exhaustive measure of the many ways in which adjustment may be measured. For instance, actual behavioural performances in everyday life were not reported. The use of direct behavioural observation and interview as well as psychological tests may be the best avenue for future research. Another possible limitation is that 2 years is not enough to determine the long term psychological consequences of SCI. Perhaps

2 years is the minimum time a person needs to achieve some stability in his/her life following SCI. It is difficult to place a tangible point in time at which a person can be labelled as adjusted or maladjusted. Adjustment is a lifelong process, in which the person is constantly changing in response to factors such as environmental demands. Longer term psychological effects of SCI (5 years later) will be investigated by the authors to determine whether persons with SCI reduce their mean levels of anxiety and depression found over the first 2 years of SCI.

Acknowledgements

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