



Depression Following Cerebrovascular Accident

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As the third leading cause of death and the most common disabling disease, stroke has an enormous emotional impact on both patients and their family members (1). King (2) reported that 30% of the stroke patients scored in depressed range. Since only one third of the stroke patients have depression, there must be some factors which cause depression in some and not in all stroke survivors. The aim of this study is to review the demographic, neurological, cognitive and psychosocial factors that contribute to the problem of depression, with a special focus on depression among the stroke survivors. For this purpose various neurology, social work, psychology and other related journals published during the last three decades were studied.

This paper has threefold purposes. Firstly, it reviews the various studies published on depression and enlists the empirically established determinants of poststroke depression. Secondly, it enlists the clinically significant outcome issues and lastly, implications are drawn for the future research and the management of depression among post stroke survivors.

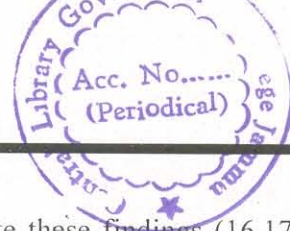
Depression haunts the lives of many. It exists in many forms, takes various guises and has been recognized for many centuries. Over two thousand years ago the Greek

physician Hippocrates labelled it melancholia. The Greeks believed depression arose from a disturbance of the body humours, specifically black bile. Early reports of depression can be found in numerous biblical texts. King Solomon is believed to have suffered from an evil spirit and dark moods from which he eventually killed himself. Evidences point to the fact that the depression has been there with us for a very long time. Indeed, it is not even unique to humans, and various animal models of depression have been advanced and researched (3).

Post stroke depression is a frequent problem. It is often severe and persistent and interferes with both rehabilitation and mentation. However, it responds to treatment (4). The causes of depression after a stroke are not fully known. Associated factors have been identified and a number of hypotheses explored. Thomas (4) reported that, age is not an important factor, and socio-economic status has not been shown to be important. Social ties and activities have a complex relation to depression, and poor social functioning is more likely a result of depression than a cause of it. Previous personality or mood disturbance may play a part, especially since alcoholism and drug use are themselves associated with strokes. The degree of

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disability after stroke has some relation to depression. Neurological features such as lesion size, the presence of cerebral atrophy, and lesion location appear to be important.

In some studies there has been an association between location of the stroke and depression with more anterior lesions in the left hemisphere being more likely associated with depression (5). A study on women by Warren *et.al.* (6) revealed that the higher depression scores were associated with less perceived life control, less perceived accomplishment, higher derived identity and lower social support. With regard to demographic variables higher depression scores were associated with lower education, lower or non-employment, younger age and lower family income.

Herrmann *et. al.* (7) in a study explained that there is increasing evidence that post stroke depressive changes may have an organic basis due to biochemical derangement. Depressive stroke patients exhibit alterations of cortical receptor sensitivity (8,9) and neurotransmitter metabolite concentrations in cerebrospinal fluid (10), as well as abnormalities in electrophysiological parameters (e. g. shortening of rapid eye movement latency (11). Grasso *et. al.* (12) were able to demonstrate a local decrease of cerebral blood flow in poststroke depressed patients. Interest in the relationship between lesion location and type and severity of depression has motivated a series of studies focussing on the pathoanatomic correlates of depressive disorders. Robinson *et. al.* (13-15) demonstrated in a series of articles that left hemisphere (LH) lesions may be associated with a higher incidence of depression and that within the left hemisphere, severity of depression may be correlated with the distance between lesion and anterior pole of the hemisphere. Some groups were able

to replicate these findings (16,17), others found no significant correlation between lesion location and depressive alterations after stroke (18, 19, 20). On the other hand, some data indicate a higher incidence of depression among right hemisphere lesions (21,22). Lesions localized in the left frontal lobe or basal ganglia seem to be more often associated with severe depressive disorders than lesions localized in other brain areas (23-25). Other pathoanatomic parameter such as volume of lesion (26-29), or cortical / sub cortical atrophy (17, 30) showed no clear-cut association with type or severity of depressive disorders. Herrmann *et. al.* (7) reported that lesions in the vicinity of the left hemisphere basal ganglia tend to play a crucial role in the development of major depression after the acute stage of stroke. Endogenous depression is considered to involve a basic biological susceptibility and to be largely uninfluenced by life stresses (31,32).

Theories of Etiology

Several theories attempt to identify factors in the etiology of depression. The full discussion of each of those cited in the literature is beyond the scope of this article. In fact, this disorder probably is of multifactorial etiology and can involve individual, family, social and biological factors among others. Biological theory postulate that children who may be genetically vulnerable to loss and who suffer an early loss, experience an altered biochemical state that causes depression. According to family-genetic theory, certain family features are found to be associated with depression. Peffer (33) stated that when the family dynamics reach to an overwhelmingly stressful state, the child may experience a state of extreme helplessness, that causes depression. According to cognitive-behavioural theory depression has been correlated with



low self-esteem. According to developmental theory depression has different symptoms and syndromes at each developmental stage because the individuals differ at different stages, dynamically, morally, cognitively and physically. Researchers in transactional theory assert that certain environmental and sociological changes, such as family disruption, increased substance abuse and pressures to be successful and to achieve, have resulted in a significant increase in the occurrence of depression through out the society (34). Sociological theory also asserts that recent negative life events and lack of social support cause depression (35).

Research on adults suffering from unipolar depression largely supports a cognitive explanation, with Aaron Beck's theory of negative cognitive triad enjoying the most popularity (36). Beck postulated that depression is the consequence of negative beliefs regarding oneself, the world, and the future. These beliefs influence how depressives process and perceive everyday situations and result in dysphoria, apathy, and withdrawal.

Depressives maintain negative beliefs in the face of contradictory environmental evidence through distorted information processing styles involving overgeneralization, magnification, black and white thinking and selective perception. Several studies reported that adult depressives often state that their parents ignored or rejected them (37). Simons et.al(38) reported that low self-esteem, feeling of alienation, and powerlessness regarding every day events, and hopelessness concerning the future are associated with adolescent depression. His study also reported the relationship between socio-environmental factors and depression. In an interesting study Altman *et. al.* (39) reported the association between personality type and depression among women group. This study revealed

that the personality type of depressed and non-depressed women differ with each other.

During the last few decades, research focussing on relation of stressful life events to depressive symptomatology has increased substantially (40). Several studies have investigated the relationship between life stress and susceptibility to physical and psychological problems. Most of these studies have been based on the assumptions that (a) life changes require adaptation on the part of the individual and are stressful and, (b) persons experiencing marked degrees of life change during the recent past are susceptible to physical and psychological problems (41). Vinkur *et. al.* (42) also found life stress to be related to the occurrence of depression.

Stressful events such as separation and loss have long been implicated as possible precipitants of or antecedents to depression. Researchers have sought to define the relationship of separation events to the development of clinical depression. In these studies separation events are anything a person may experience as a 'loss' whether it be the death of a loved one, separation by divorce, loss of a job or one's status in the community, the loss of some goal or even a position (43). In a path analysis by Nezu *et. al.* (44), of direct, indirect and total effects of negative life stress, current problems and problem solving on depressive symptomatology, the study revealed that each of these variables is significantly related to depressive symptomatology. With respect to the effect of negative life events on depression, it was observed that additional exacerbating effects exist when considering the indirect effects via current problems. It was found to be related to ineffective problem solving, which in turn is associated with higher levels of depressive symptoms. Furthermore, the direct effect of

problem solving on depressive symptoms is significant, suggesting that poorer problem solving is also associated with higher levels of depressive symptomatology. In total, the effects due to these three variables (negative life stress, current problems and problem solving) account for 42% of the variance in predicting depressive level.

Psychosocial stressors are often related to the onset of depression (45). In old age, stressors such as retirement and divorce played a role at the onset of depression in a life-event study of depression conducted in a large population (46). But the findings of Fujikawa *et. al.* (45) suggest that depression in patients with silent cerebral infarction involves more neurological factors than psychosocial stressors.

Bharadwaj *et.al.* (47) compared depressed and non-depressed elderly people with regard to life satisfaction and reported that the difference in the mean score of life satisfaction of depressed and non-depressed was significant in favour of non-depressed group.

Significant correlates of depression were studied with regard to sex, hemispheric stroke scale, and history of depression, although only the latter was a significant predictor of depression as measured by both the Montgomery Asberg Depression Rating Scale and Zung Self-Rating Depression Scale when examined with multiple regression (48). The importance of previous psychiatric history has been noted by other investigations (49-53). Hermann's (48) most impressive finding is the significant correlation between depressive symptoms and measures of activities of daily living and social handicap.

Finnstroke study (54) revealed correlation of sex and Scandinavian stroke scale (SSS) associated with depression at 3 months. On multivariate logistic regression analysis, severe SSS prognostic score and old age emerged as independent contributors to depression.

In some earlier studies female sex also correlated with depression (55,56). Severe SSS score reflects the severity of stroke, and both Wade *et.al.*(55) and Sharpe *et. al.* (56), have reported that physical disability and larger lesion volume are associated with depression. In contrary to some earlier reports which found that patients with left hemispheric lesions are more depressive than those with right hemispheric lesions (14,57). Finnstroke study did not find an association between depression and side of hemiparesis. This conclusion has been the subject of much controversy and many researchers have disagreed with it (58-62). Finnstroke study revealed that the subtype of stroke (Infarct/hemorrhage), living conditions at times of stroke (alone/with family), or pre-existing disease were not associated with depression. Living alone did not reveal/predict depression in some studies (13,60), but did in another (17).

Outcome of Depression

Clinically significant outcome issues on account of poststroke depression were found to be poor longterm functional recovery (17), dysphoria, apathy and withdrawal (36), reduced social contacts outside the family (17), reduced social functioning(4), and reduced quality of life (63-65). Besides Thomas and Sinyor (4,5) reported that poststroke depression can interfere with rehabilitation because patients may not improve or be able to maintain improvement after intense rehabilitation if they are depressed. Hence it is essential to deal with the problem of depression. Unless this is done, the poststroke services provided by different professionals like physiotherapists, speech therapists etc. may not yield adequate results if the patient is depressed.

Implications

The review of earlier studies revealed that several variables individually and variables in clusters were studied, but studies have been sparse that presented



comprehensive lists of demographic, neurological, cognitive and psychosocial variables that contribute to the problem of depression among stroke survivors. Hence there is an immediate need for a study that identifies a comprehensive list of determinants of depression among poststroke patients.

Besides some of the variables which were correlated with depression in case of other populations, they have not been studied in regard to depression among stroke population. A greater understanding of multifactorial interactions from biological, psychological and social perspectives contributing to depression after stroke would enable targeted preventive strategies and more active and comprehensive treatment programmes (17).

Various studies have recommended a comprehensive treatment plan which includes drug therapy (66,67), or electroconvulsive treatment (68), psychotherapy and family work (69), support and education, and psychosocial interventions (70). Such treatment plan includes the services of professionals like neurologists, psychiatrists, social workers, and psychologists among others(71). According to Finnstroke study, in districts with active intervention programmes, depression occurred significantly less often than in districts without such programmes. This supports the idea that encouraging re-establishment of social ties may reduce the risk of depression among stroke survivors (54).

Conclusion

This study reviewed the demographic, neurological, cognitive and psychosocial variables that contribute to the problem of depression with special focus on post stroke patients. Outcome of depression has also been studied and implications were drawn for the research and the management of poststroke depression.

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