

## Post-Stroke Depression and Stroke Rehabilitation: Literature Review

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### ABSTRACT

Post-Stroke Depression (PSD) is a common and disturbing complication of stroke that affects rehabilitation outcomes. A past history of depression and severe stroke are risk factors for PSD, and thus, more attention should be paid to such patients. Appropriately diagnosing and screening for PSD is important because proper treatment could improve depressive symptoms and disturbed abilities. Treatment for PSD includes psychological care, nutritional care, pharmacotherapy, and exercise. Pharmacotherapy is currently the leading treatment for PSD, but antidepressants are associated with various adverse effects. Psychological and nutritional care can help manage depressive symptoms and exercise has been proven to be an effective treatment associated with fewer contraindications than pharmacotherapy. These non-pharmacological approaches could be expected to expand in clinical practice.

**Keywords:** Post-stroke depression; Psychological care; Nutritional care; Antidepressant; Exercise

### INTRODUCTION

Depression after a stroke event is called Post-Stroke Depression (PSD), the prevalence of which is about 30% [1]. PSD is important in the field of rehabilitation medicine because of not only its high prevalence, but also its seriously negative influence on the recovery of patients recovering from stroke, who tend to have an impaired ability to carry out Activities of Daily Living (ADL) and a higher risk of subsequent stroke and mortality [2]. In addition, caring for and treating patients with PSD can improve their prognosis. People who engage in stroke rehabilitation are required to have knowledge about PSD, pay attention to the psychological condition of such patients, and provide support enabling them to maintain good mental health. Some non-pharmacological treatments should also be provided as a part of rehabilitation.

### LITERATURE REVIEW

#### Screening for and diagnosing PSD

Screening for and diagnosing PSD is important because it can lead to appropriate and effective treatment. However, PSD symptoms are atypical and often difficult to identify, making an accurate diagnosis difficult.

Major depressive symptoms as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition [3], include the following: 1) a depressed mood for most of the day nearly every day, and 2) markedly diminished interest or pleasure in all or almost all activities most of the day nearly every day. However, sometimes, patients with PSD do not express either of these typical psychological symptoms or cannot describe their psychological condition appropriately because of speech or mental disabilities. Thus, they tend to experience physical symptoms only, such as insomnia, appetite loss, fatigue, and a loss of energy, which are all very common among patients after stroke and are difficult to be perceived as mental problems. A meta-analysis of diagnostic validity studies on screening for PSD reported that the Center of Epidemiological Studies-Depression Scale (CESD), Hamilton Depression Rating Scale (HDRS), and Patient Health Questionnaire (PHQ)-9 appeared to be the optimal screening measures [4]. Among these measures, the CESD and PHQ-9 are self-reported and the HDRS is applied by clinicians. If patients have difficulties expressing their psychological status in words, the HDRS is the first-line screening measure because it includes items that check for sleep disturbance and physical impairments, the knowledge of which would be beneficial.

However, these are not diagnostic tools. Clinicians and other medical professionals should assess the psychological status of

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such patients using these screening tools and then refer suspected cases to psychological specialists for proper treatment.

### Risk factors for PSD

It is sometimes difficult to detect PSD, so understanding the risk factors for PSD and paying more attention to patients with these factors would be helpful.

Pre-stroke depression is one of the most important risk factors to identify in association with PSD [5]. A history of depression suggests a possible association between some genetic factors and depression or some fragile psychological tendencies in cognition. Stroke severity is another strong predictor of PSD [6].

This association is not surprising because severe stroke often leads to greater physical and psychological stress in patients. This association can also be explained by a major pathophysiological mechanism theory stating that inflammatory cytokines play a crucial role in the pathogenesis of PSD.

Severe stroke can cause severe inflammation in the brain, and elevated inflammatory cytokines negatively regulate the neuroendocrine stress response system, suppressing neurotransmitters or neurotrophic factors and causing depressive symptoms [7]. The association between the location of lesions and PSD risk has been investigated in many studies, but the findings have been inconsistent [8].

In practice, physicians should pay more attention to patients with a history of depression. Lesion localization does not always predict the risk for PSD, but if the lesion is large or the stroke is severe, patients should be regarded as being at high risk for PSD.

### Psychological care

Physical, psychological, and social stress give rise to depression among patients recovering from stroke. Physical stress includes motor impairments, pain, sleep disturbance, and fatigue. Psychological stress includes changes in body image, lower self-esteem, and a loss of functions, environment, and roles. These types of stress are usually too high and persistent for some patients, especially those at high risk of developing PSD, to overcome, thereby resulting in adjustment disorder or depression.

To reduce physical stress, appropriate pain and sleep management is vital and physical rehabilitation or exercise is helpful. Psychological stress can be reduced by psychoeducation, care management, and family support.

At the onset of serious diseases such as stroke, patients express negative feelings such as denial, anger, obsession, and regret. Medical staffs and family members, among others, may have a receptive attitude, which can help them express their feelings without hesitation and adjust to their stress. In addition to adjustment, access to various coping skills (Table 1) [9] that help suffering patients know how to think or manage their stress would also be helpful.

**Table 1:** Coping strategies associated with improved psychological health.

Coping strategies	
1. Active-positive strategies	Increasing patients' involvement in their own care, planning action and enjoying life 'one day at a time'
2. Active-expressive strategies	Talking with others to gain information or to offer support to others
3. Active-reliance strategies	Seeking a friends or relative for instrumental or emotional help or a physician for intervention
4. Cognitive-positive strategies	Seeking understanding of the illness, finding some meaning attached to having the illness and thinking about positive changes
5. Distraction strategies	Going out more socially or doing something nice for one's self

During rehabilitation sessions, some means employing these coping skills are adopted to support the psychological health of patients. For example, to help them maintain their sense of self-control, it might be good to give patients the opportunity to make even small decisions by themselves, such as "today's rehabilitation menu". Positive feedback during rehabilitation could also be helpful to lessen their negative perceptions. Patients at risk for depression tend to think negative thoughts, such as "I've not done enough". Appropriate feedback could help such patients think more positively, such "I've done enough".

Managing physical discomfort is the first step in preventing stress from descending into depression. To teach physical relaxation methods, stretching and breathing techniques would be helpful. If patients are already showing depressive symptoms, they should be referred to specialists for psychological therapy such as structured cognitive behavioral therapy or pharmacotherapy.

### Nutritional care

Nutritional care is another important method for preventing and treating PSD. An intervention study revealed that long-term (7-year average) treatment with daily folic acid and vitamins B6 and B12 had positive effects and reduced the risk of major depression among patients recovering from stroke [10], while a cross-sectional study reported that higher total energy, riboflavin, and niacin intake was associated with less anxiety and depression in such patients [11]. These vitamins may induce antidepressant effects through mechanisms such as mitigating oxidative damage and facilitating the synthesis of neurotransmitters

Several studies have reported other "neuroprotective diets" for patients recovering from stroke. Increased intake of protein (low carbohydrate/protein ratio), the Mediterranean-DASH (Dietary Approaches to Stop Hypertension) diets, and foods rich in omega-3 fatty acids and polyphenols have also been shown to improve physical or cognitive function among patients

recovering from stroke [12,13]. The effectiveness and clinical impact of these diets in regard to PSD should be examined further in future studies.

In addition to these proven “neuroprotective diets”, the ketogenic diet and antioxidants such as vitamins E and C are thought to be effective against PSD [12,13]. In addition to nutritional supplementation, the proper treatment of metabolic diseases, especially diabetes mellitus, is necessary to prevent PSD, which supports the clinical importance of “individualized diet management” [14].

### Treatment 1: Pharmacotherapy

Pharmacotherapy is the leading treatment for PSD, but it should be kept in mind that antidepressants are sometimes associated with a variety of adverse outcomes.

Tricyclic antidepressants, Selective Serotonin Reuptake Inhibitors (SSRIs), and Serotonin-Norepinephrine Reuptake Inhibitors (SNRIs) are major antidepressant drugs available to patients with PSD. Each of these drugs has confirmed efficacy in reducing depressive symptoms [7] and achieving better functional outcomes [15]. Some trials have compared these drugs with other treatments, but none found any remarkable differences. The most important thing when selecting antidepressants is to consider their adverse effects because they can sometimes lead to suicide, hemorrhagic complications, falls, and gastrointestinal bleeding, especially in older patients (age 65 years or older). Antidepressants also have various contraindications; for example, SNRIs are contraindicated for patients with renal failure, which is a common comorbid disease in patients after stroke. In addition, antidepressants have some interactions with many other drugs. Patients recovering from stroke often suffer various medical complications and are prescribed numerous medications, some of which have interactions with antidepressants. Warfarin, an anticoagulant, is known to have interactions with SSRIs. Tizanidine, a muscle relaxant commonly used to treat patients after stroke with spasticity, cannot be used with fluvoxamine, an SSRI.

Antidepressants can be very helpful if used safely, so they must be selected and prescribed carefully considering each patient’s comorbidities and interactions with other prescribed drugs.

### Treatment 2: Exercise

The importance of exercise is rapidly increasing in treatment for PSD. As mentioned earlier, antidepressants are a vital treatment, but cannot be tolerated by some patients following stroke. By contrast, exercise can be applied to almost all patients because it involves few contraindications or adverse effects.

## DISCUSSION

A meta-analysis of exercise interventions for PSD found that exercise significantly reduced depressive symptoms [16]. Exercise is also thought to normalize the metabolic system, elevate serum serotonin levels, and exert anti-inflammatory effects, which could directly reduce depressive symptoms. Exercise also improves patients’ physical fitness and ability to carry out ADL,

thereby fostering a sense of achievement, which can result in a better psychiatric condition.

For patients with depression, moderate strength endurance and aerobic exercises are recommended, the same as that for patients with PSD. However, patients prescribed exercise that is too strenuous frequently drop out and tend to lose their confidence. On the other hand, exercise that is too easy also leads to dropouts because patients cannot sense efficacy or satisfaction. Patients with PSD, who easily lose confidence and motivation, must be prescribed precisely adjusted exercises. In practice, aerobic exercise starts with low intensity (about 40%-50% heart rate reserve) and a short duration (about 15-20 min). Muscle strength exercises also begin with a low burden (<50% one-repetition maximum). Subsequently, intensity, duration, and load can be gained in small steps, allowing patients to feel a sense of achievement. Baek [17] reported that grouped, task-oriented circuit training is a better exercise method than traditional ones. “Task-oriented” exercise could promote increased patient satisfaction and motivate them to continue, leading to better than expected functional recovery and ADL achievements. “Group” exercise could also help patients with PSD feel supported.

We cannot conclude that “group task-oriented circuit training” is the best exercise method, but if treatment was appropriately prescribed and adjusted, and patients were given feedback regarding their achievements to feel supported and confident, the effectiveness of exercise as a treatment for PSD would be improved.

## CONCLUSION

Evidence about PSD about its etiology, risk factors, evaluation, and pharmacotherapy has been accumulating. On the other hand, few studies have reported the results of non-pharmacological therapies such as psychological care, nutritional care, or exercise. The older stroke patients are, the more important non-pharmacological therapy becomes. These findings suggest that such care and exercise programs could be applied in daily rehabilitation sessions.

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## CONFLICT OF INTEREST

None

## REFERENCES

1. Hackett ML, Pickles K. Part I: Frequency of depression after stroke: An updated systematic review and meta-analysis of observational studies. *Int J Stroke*. 2014;9(8):1017-1025.
2. Bartoli F, Lillia N, Lax A, Crocamo C, Mantero V, Carrà G, et al. Depression after stroke and risk of mortality: A systematic review and meta-analysis. *Stroke Res Treat*. 2013;862978.
3. Edition F. Diagnostic and statistical manual of mental disorders. Am Psychiatric Assoc. 2013;21.

4. Meader N, Moe-Byrne T, Llewellyn A, Mitchell AJ. Screening for poststroke major depression: A meta-analysis of diagnostic validity studies. *J Neurol Neurosurg Psychiatry*. 2014;85(2):198-206.
5. Taylor-Rowan M, Momoh O, Ayerbe L, Evans JJ, Stott DJ, Quinn TJ. Prevalence of pre-stroke depression and its association with post-stroke depression: A systematic review and meta-analysis. *Psychol Med*. 2019;49(4):685-696.
6. Robinson RG, Jorge RE. Post-Stroke Depression: A Review. *Am J Psychiatry*. 2016;173(3):221-231.
7. Guo J, Wang J, Sun W, Liu X. The advances of post-stroke depression: 2021 update. *J Neurol*. 2021;1-4.
8. Wei N, Yong W, Li X, Zhou Y, Deng M, Zhu H, et al. Post-stroke depression and lesion location: A systematic review. *J Neurol*. 2015;262(1):81-90.
9. Fawzy FI & Fawzy NW. Handbook of psychotherapy in cancer care. In Watson M & Kissane D (eds). John Wiley & Sons Ltd, USA, 2011.
10. Almeida OP, Marsh K, Alfonso H, Flicker L, Davis TM, Hankey GJ. B-vitamins reduce the long-term risk of depression after stroke: The VITATOPS-DEP trial. *Ann Neurol*. 2010;68(4):503-510.
11. Kim Y, Kim MC, Park HS, Cho IH, Paik JK. Association of the anxiety/depression with nutrition intake in stroke patients. *Clin Nutr Res*. 2018;7(1):11-20.
12. Aquilani R, Sessarego P, Iadarola P, Barbieri A, Boschi F. Nutrition for brain recovery after ischemic stroke: an added value to rehabilitation. *Nutr Clin Pract*. 2011;26(3):339-345.
13. Zielińska-Nowak E, Cichon N, Saluk-Bijak J, Bijak M, Miller E. Nutritional Supplements and Neuroprotective Diets and Their Potential Clinical Significance in Post-Stroke Rehabilitation. *Nutrients*. 2021;13(8):2704.
14. Shimazu S, Yoshimura Y, Kudo M, Nagano F, Bise T, Shiraishi A, et al. Frequent and personalized nutritional support leads to improved nutritional status, activities of daily living, and dysphagia after stroke. *Nutrition*. 2021;83:111091.
15. Chollet F, Tardy J, Albucher JF, Thalamas C, Berard E, Lamy C, et al. Fluoxetine for motor recovery after acute ischaemic stroke (FLAME): A randomised placebo-controlled trial. *Lancet Neurol*. 2011;10(2):123-130.
16. Eng JJ, Reime B. Exercise for depressive symptoms in stroke patients: a systematic review and meta-analysis. *Clin Rehabil*. 2014;28(8):731-739.
17. Baek IH, Lee T, Song M, Goo BO. Effect of circuit class training for eight weeks on changes in ratios of F-Trp/BCAAs and depression in people with poststroke depression. *J Phys Ther Sci*. 2014;26(2): 243-246.