

**Mini Review**

Stroke Rehabilitation in India: Addressing Gender Inequities

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Gender inequality has a significant and complex impact on stroke recovery and rehabilitation outcomes. Moreover, the influence of gender on post-stroke recovery is multifactorial, primarily biological, social, and behavioral issues. The recovery paths for men and women may have different outlines in relation to stroke occurrence, injury sites, and hormonal effects. These collectively influence the effective summarization of recovery strategies and outcomes. Furthermore, societal and cultural elements play a significant role in shaping access to resources, social support networks, and participation in rehabilitation programs, which consequently affect the outcomes. Considering the gender-specific nuances is important in developing effective rehabilitation strategies. Furthermore, effective stroke rehabilitation programs are needed to achieve equitable and improved recovery outcomes for all stroke survivors and to create inclusive interventions that consider these differences.

Keywords: Gender equity, Men, Recovery of function, Stroke, Women

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INTRODUCTION

The Global Burden of Disease database, 13.7 million new cases of stroke worldwide reported. Data published in a article 2021, showed 80.1 million stroke survivors, 5.5 million deaths resulting from stroke, and a total of 116.4 million disability-adjusted life years (DALYs) [1]. Men had a 30% higher incidence of stroke when compared to women, and they experienced their first stroke at a younger age. Brain infarction and intracerebral hemorrhage were more common among men, whereas women experienced a larger proportion of severe cardioembolic strokes. Furthermore, strokes were more serious in women, resulting in a higher fatality rate within one month compared to men [2]. The notion that genetics is responsible for women experiencing fewer strokes than men is not well-supported. Contrary to expectations, recent studies actually indicate that women who have had strokes are more likely than men to have a family history of stroke [3]. An alternative perspective could be the positive impact of estrogen on cerebral circulation [4]. Continuous exposure to ovarian estrogens over one's lifetime could potentially confer a shield against no cardioembolic ischemic stroke [5]. Studies have repeatedly shown that women who suffer a stroke often experience less favorable outcomes compared to men. Specifically, women patients are less likely to be discharged to their homes when compared to men patients [6,7]. Post-stroke motor impairments are frequently enduring and debilitating, with women showing a reduced probability of recovery and experiencing poorer functional outcomes [8]. Post-stroke outcomes vary based on sex, influenced by biological and psychological factors. Testosterone, which affects muscle growth, leads to muscle atrophy in immobilized elderly stroke survivors. Women face greater challenges in regaining muscle mass during rehabilitation. Hormonal differences, including sex hormones, contribute to gender variations in stroke incidence, impacting brain plasticity and rehabilitation. Additionally, men and women experience different stroke symptoms, with women more likely to have incontinence, dysphagia, and loss of consciousness [9]. The escalating incidence of strokes has prompted the World Health Organization's Global Stroke Initiative to not only collect population-based stroke data but also leverage this information as a cornerstone for developing comprehensive strategies in stroke prevention and management, thereby propelling global health advancements [10]. Apart from biological influences, variations in the availability of acute treatments, preventive stroke therapies, and access to rehabilitation services might also add to these inequalities [11]. This paper addresses the sex differences in rehabilitation within Indian contexts.

GENDER VARIATIONS IN STROKE RISK FACTORS

Poorer outcomes among women stroke survivors are likely to be attributed to older age and other variables that may serve as confounding factors, such as cardioembolism [12]. Women stroke survivors usually present with more severe conditions before thrombolysis in comparison to men patients. Nevertheless, thrombolytic treatment might assist in mitigating the disparity in disease severity between the two genders [13-16]. A higher prevalence of atrial fibrillation and increased stroke severity could be the underlying causes. These characteristics have been linked to a poorer pre-morbid functional status in the secondary prevention of small subcortical strokes [17]. Pre-existing co-morbidities such as diabetes mellitus and hypertension, pose a higher risk for stroke development in women when compared to men and higher stroke severity are, in turn, connected to negative functional outcomes following a stroke [18-20]. Women face a higher susceptibility to strokes because of their longer life expectancy. Additionally, after experiencing a stroke, they typically exhibit poorer functional outcomes and a lower quality of life compared to men [21-23].

Previous studies on patients with acute stroke have isolate that gender to influence outcomes following intravenous thrombolysis (IVT) treatment, while outcomes were comparable between men and women treated with a placebo, women demonstrated better outcomes after IVT [15]. One potential explanation acceptable for this phenomenon could be, the variation in recanalization. It has been noticed that women often experience more cardioembolic strokes, marked by uniform fibrin-rich clots. Consequently, alteplase, a medication that dissolves clots, may exhibit a stronger affinity for these clots in women. This might result in more frequent, quicker, and more thorough recanalization [24-26]. Comprehending gender disparities in stroke mortality holds critical significance for epidemiologists, clinicians, and physiotherapists and other allied health professionals.

PRESENT RESEARCH ON GENDER IN STROKE

Recent understanding may serve as the foundation for creating gender-specific stroke prevention and management strategies, ultimately improving outcomes for women and reducing the burden of DALYs associated with stroke worldwide [27]. Retardation in the rehabilitation of women may contribute to elevated disability levels compared to men, necessitating attention in towards program development. This underscores the imperative to prioritize reha-

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bilitative care for women. Between 2014 and 2017-2018, the mean daily expenditure for men and women exhibited a trend toward convergence. However, within the highest expenditure bracket, men consistently maintained a significantly higher ratio of actual expenditure compared to women, irrespective of medical or rehabilitative costs. This suggests that in the absence of financial constraints, societal spending patterns tend to favor men, potentially presenting challenges for women in asserting their care needs within households, resulting in diminished resource allocation [28]. A stroke is an acute medical emergency that demands hospitalization, gender disparities are not immediately evident during the initial phase of hospitalization. However, discrepancies do arise in the provision of follow-up care.

This holds great significance from a policy perspective, especially for a nation such as India, which grapples with a scarcity of specialized stroke units and comparable challenges in accessing rehabilitation services, much like other low- and middle-income countries [29]. A study conducted by Mathur et al. [30] and colleagues emphasize the necessity of gathering comprehensive data on variables affecting gender-specific disparities in stroke outcomes for both men and women in the Indian Council of Medical Research National Stroke Registry. The authors recommend to disaggregate the data by sex in order to ensure accuracy and relevance. To stress the significance of giving priority to follow-up care, particularly for women, is of utmost importance. Additionally, in order to ethically and effectively improve health outcomes for women stroke patients in India, it is crucial to consider ethical concerns such as ensuring equality, obtaining informed consent, protecting privacy and confidentiality, and being culturally sensitive to diverse social norms and practices when designing gender-specific programs. These considerations can help bridge the gender gap and achieve better results [30].

CONCLUSION

The lack of effective surveillance has resulted in a stroke crisis in Stroke systems of care in South-East Asia Region, particularly India. To address this issue, it is crucial to implement artificial Intelligence-driven diagnostics, telemedicine for remote care, and gender-specific rehabilitation programs that include cognitive behavioral therapy and customized physical therapy. Additionally, community-based programs, nutritional counseling, regular follow-ups, and collaboration with the government can improve outcomes and reduce the burden of stroke while enhancing the quality of life for survivors.

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