ORIGINAL RESEARCH

The Impact of Progressive Rehabilitation Nursing on Physical Rehabilitation and Quality of Life in Patients with Cerebral Infarction

Liyun Bao, BSc; Jurui Wei, BSc; Zhenping Chen, BSc

ABSTRACT

Aim • Cerebral infarction, a common type of stroke, results from a sudden interruption of blood flow to the brain, leading to a myriad of challenges and complications for patients. Among these complications, decreased muscle strength is a prominent issue that can have profound implications for patients' overall well-being and functional independence. Decreased muscle strength in cerebral infarction often manifests as weakness, loss of mobility, and impaired ability to perform activities; the psychological impact of these physical limitations can lead to anxiety and depression, further exacerbating the patient's condition. To investigate the effect of progressive rehabilitation nursing on the physical rehabilitation and quality of life of patients with cerebral infarction, to provide valuable insights and guidance for enhancing the functional recovery of individuals affected by cerebral infarction.

Design • 100 cerebral infarction patients combined with decreased muscle strength admitted to our hospital between October 2019 and October 2020 were randomly selected as the study subjects for prospective analysis.

Methods • They were divided into a control group (n = 50) and an experimental group (n = 50) using the random number table method. Patients in the control group underwent rehabilitation treatment, while patients in the experimental group underwent progressive rehabilitation nursing intervention guided by quality nursing intervention. The Fugl-Meyer Assessment (FMA) motor function score, National Institute of Health Stroke Scale (NIHSS) neurological function score, Barthel Index (BI), Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) scores, nursing efficiency and the incidence rate of adverse mood after 1, 2 and 3 weeks of nursing were recorded and compared between the two groups.

Results • The FMA and BI index scores of patients in the experimental group were notably higher than those in the control group, and the comparison was statistically significant ($P < .05$); The NIHSS, SAS and SDS scores of patients in the experimental group were notably lower than those of the control group, and the results of the comparison were statistically significant ($P < .05$); The nursing efficiency and nursing satisfaction of patients in the experimental group was remarkably higher, and the results of the comparison were statistically significant ($P < .05$); The incidence of bad mood in the experimental group was significantly lower than that in the control group after 1, 2 and 3 weeks of nursing, and the incidence rate of adverse mood in the experimental group was improved with time, that is, 1>2>3 weeks in descending order ($P < .05$).

Patient or Public Contribution • Progressive rehabilitation nursing not only enhances muscle strength and restores their physical functions to a certain extent while reducing the incidence of adverse reactions and physical function but also mitigates the risk of adverse mood states. Ultimately, it contributes to an improved overall quality of life and psychological well-being of patients affected by cerebral infarction. (*Altern Ther Health Med.* [E-pub ahead of print.])

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INTRODUCTION

Cerebral infarction is vascular occlusion caused by insufficient blood supply to the brain over a certain period of time or atherosclerosis and generally occurs in middle-aged and elderly groups.[1] As each part of the human brain is in charge of different functions or parts of the human body, patients with cerebral infarction may exhibit inconsistent sequelae depending on the location of the infarct focus.[2,3] The more effective treatment for the sequelae of cerebral infarction

patients at present is professional rehabilitation that includes proper exercise, reasonable diet, adequate nutrition, etc.[4] Among the many sequelae of cerebral infarction, dyskinesia caused by decreased muscle strength is one of the most common sequelae of cerebral infarction, mainly manifesting as limb weakness, inability to stand or walk, inability to take nursing of themselves, or the patient's lack of judgment of distance during walking and prone to falls.[5] It is likely to cause secondary injuries of patients and has a terrific impact on the daily life of patients and their families. Additionally, patients with cerebral infarction may not accept their condition psychologically, developing negative emotionsthat rone to psychological diseases in long-term negative emotions.[6] Therefore, it is important to implement relatively effective nursing interventions during the treatment period to promote the recovery of neurological and limb motor functions and improve the quality of life of the patients. Rehabilitation nursing mainly refers to the nursing staff giving patients targeted rehabilitation guidance in conjunction with their condition, featuring a phased two-way interaction and flexibility in terms of the patient's psychological state, physical health, and lifestyle habits, and is a nursing tool that is more adapted to the current medical environment than the traditional nursing model.

In order to further investigate the impact of progressive rehabilitation nursing under quality nursing mode on the muscle strength rehabilitation and psychological status of patients with cerebral infarction, this research took patients with cerebral infarction combined with decreased muscle strength as the subjects, and provided patients with conventional nursing and progressive rehabilitation nursing under quality nursing mode, respectively. The FMA motor function score, NIHSS neurological function score, BI index, SAS, SDS anxiety and depression scores, nursing efficiency, nursing satisfaction rate and the incidence of adverse emotions after 1, 2, and 3 weeks of nursing of the two groups were recorded and compared. The specific research reports are as follows.

INFORMATION AND METHOD

General information

100 patients with cerebral infarction admitted to our hospital from October 2019 to October 2020 were enrolled for prospective analysis and divided into a control group and an experimental group using the random number table method, with 50 cases in each group. Patients in the control group underwent rehabilitation treatment, while patients in the experimental group underwent progressive rehabilitation nursing intervention guided by quality nursing intervention. The institutional review board approved the protocol before the start of the study, and all registered patients signed an informed consent form.

Inclusion and Exclusion Criteria

Inclusion criteria. (1) Patients who meet the clinical manifestations of the sequelae of reduced muscle strength in cerebral infarction; (2) 18≤age ≤ 80 years old; (3) PAtients with no other organic disease; (4) Patients with no history of drug allergy, drug abuse, and bad habits; (5) The study received approval from the hospital's Ethics Committee, and all participants voluntarily provided informed consent by signing the necessary documentation.

Exclusion criteria. (1)Patients with no cerebral infarction sequela; (2) Patients who are unconscious; (3) Patients with severe liver and kidney dysfunction.

Method

Patients in the control group received traditional nursing, that is, nurses paid attention to the development of patients with cerebral infarction. Within 3 to 5 days of the onset of acute cerebral infarction, drowsiness and aggravation of disease may occur due to brain edema. The nursing staff should inform the patient's family of the situation and the cause in a timely manner and take appropriate protective measures. Nursing staff should pay attention to the changes in vital signs of patients undergoing thrombolytic therapy, check in every 2h, and provide proper bed protection to prevent patients from falling out of bed. Psychological nursing is provided to conscious patients, with attention paid to the patient's psychological status and emotional changesand timely counseling if patients appear taciturnity and pessimism. Sequelae of patients were alleviated through progressive rehabilitation nursing. An appropriate exercise plan was developed for bedridden patients to move their limbs through flexibility exercises, to ensure that patients have certain exercises every day.[1,5,7] Diet structure was under strict control, adhering to low salt and low fat, high fiber, and high vitamin, with an appropriate amount of protein intake being ensured.

In the experimental group, patients were given progressive rehabilitation nursing on the basis of the control group. Firstly, during the admission and subsequent nursing, a detailed assessment of the patient's condition was carried out, and a tailor-made nursing care plan was developed for the patient. The restoration of limb function included bed training, sitting balance, standing balance, walking, and daily living. (1) Bed training. Patients with severe disease require prolonged bed rest, so it is important to instruct them to change position and position their limbs correctly to prevent pressure sores and, joint deformities and contractures. Patients were given appropriate muscle massage and supplementary exercises such as scapular movements. Later on, as the patient recovers, passive exercises are gradually changed to active exercises, including lateral turning, crossed arms, bridging exercises, wrist dorsiflexion ,ankle dorsiflexion, and a series of other tension exercises. (2) Sitting balance and standing balance. After the patient has adapted to bed training, gradually increase the semi-sitting posture training, instruct the patient to adopt a 15-30° lying position, and gradually increase the angle by 15 every 2-3 days for 10 min each time until the patient can sit up at a right angle, 4-6 times a day. After the patient can sit up independently,

instruct the patient to perform upright balance training in the parallel bar, first instructing the patient to flex the head and neck, then flex the trunk, and then stand-up training. (3) Walking. After the patient has completed the standing balance training, walking training is carried out, including stepping in place, walking with assistance, andpracticing table transfers. After completing the preparatory activities, the patient should walk with the assistance of the nursing staff, paying attention to maintaining the stability of the knee joint, with particular attention to the bending movement. After the patient has gradually adapted to walking training, stair training is carried out, with the principle of the healthy leg going up first and the affected leg going down first, 2-3 times a day for 5-10 minutes each time. (4) Daily life training. Daily living skills such as dressing, getting in and out of bed, eating and drinking, brushing teeth, eating, toileting, and bathing.

Observation index

The FMA motor function score, NIHSS neurological function score, BI index, SAS, SDS anxiety and depression score, nursing efficiency, nursing satisfaction rate and the incidence of adverse emotions after 1, 2 and 3 weeks of nursing were compared between the two groups.

The full score of FMA motor function is 100 is divided into upper and lower limb function tests, with 66 points for upper limb function and 34 points for lower limb function, with the higher score being superior, that is, the higher the score, the better the patient's motor function.

The NIHSS neurological function score ranges from 0-42, with higher the score indicating more severe neurological deficits. 0-1 indicates normal, 1-4 indicates mild stroke, 5-15 indicates moderate stroke, 16-20 indicates moderate and severe stroke and 21-42 indicates severe stroke.

The full score of BI index is 100. A score of 100 indicates that the patients do not require nursing and could take care of themselves; 61-99 indicates that patients require nursing occasionally and can basically take care of themselves; 41-60 indicates that patients require nursing in most cases and basically cannot take care of themselves; less than 40 indicates that patients totally cannot take care of themselves and need intensive nursing.

SAS anxiety scores are based on a cut-off score of 50, with scores below 50 indicating normal, 50-59 indicating mild anxiety, 60-69 indicating moderate anxiety and 70 or more indicating severe anxiety.

The SDS depression score is based on a reference value of 53, with a score below 53 indicating normal, 53-62 mild depression, 63-72 moderate depression and over 72 severe depression.

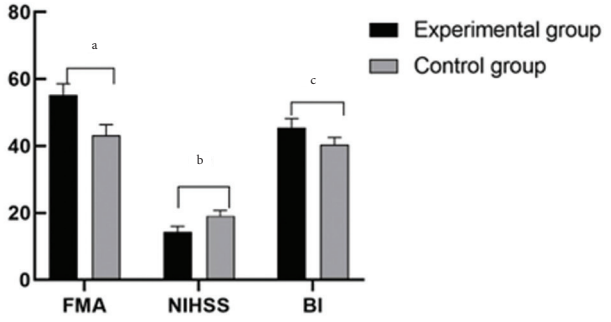
Statistical analysis

The data processing software chosen for this study was SPSS20.0 software, and GraphPad Prism 7 (GraphPad Software, San Diego, USA) was used to map graphics. The items included in the study were count data and measurement data. The counting data were expressed as [n (%)], and tested by χ^2 test, and measurement data were expressed as (mean ± s), and performed by t test. $P< .05$ indicates that the difference is statistically significant.

Table 1. Comparative statistics of general information

Groups		Experimental group	Control group	t/χ^2	*P* value
Gender (male / female)		26/24	24/26	0.16	.69
Age (year)		62.58±4.33	63.00±4.67	0.47	.64
Height (cm)		163.21±8.52	163.38±8.60	0.10	.92
Body weight (kg)		70.00±6.33	69.55±6.29	036	.72
Medical history (month)		1.38±0.75	1.39±0.70	0.07	.95
Smoking history (year)		8.86±1.51	8.69±1.63	0.54	.59
Drinking history (year)		10.92±2.00	10.55±2.37	0.84	.40
Type of sequelae	Dyskinesia	26	28	0.16	.69
	Neurological dysfunction	11	10	0.06	.81
	Language barrier	8	6	0.33	.56
	Facial paralysis	5	6	0.10	.75

Figure 1. Comparison of FMA motor function score, NIHSS neurological function score and BI index score between the two groups



[a]means that the comparison of FMA motor function score of the experimental group (55.21±3.37) with that of the control group (43.20±3.15) was statistically significant, $t = 18.41$, $P < .001$

[b]means that the comparison of NIHSS score of the experimental group (14.39±1.58) with that of the control group (19.09±1.65) was statistically significant, $t = 14.55$, $P < .001$

[c]means that the comparison of BI index score of the experimental group (45.51±2.66) with that of the control group (40.37±2.18) was statistically significant, $t = 10.57$, $P < .001$

Note: the abscissa shows FMA motor function score, NIHSS neurological function score and BI index score from left to right. The ordinate shows the score.

RESULT

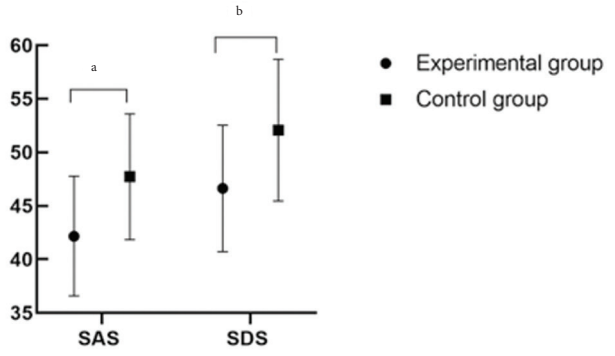
General information

Patients in the experimental group were aged 55-73 years, and those in the control group were aged 55-75 years. There was no statistical significance ($P > .05$) in the comparison of the general data of gender, age, disease duration, and sequelae manifestations between the two groups ($P < .05$). See Table 1.

Comparison of FMA motor function score, NIHSS neurological function score, and BI index score

It is revealed from the present study that compared to the control group, the NIHSS neurological function score of the experimental group was notably lower than that of the control group, and the comparison result was statistically significant ($P < .05$); the FMA motor function score and BI index score of the experimental group were significantly higher than that of the control group, and the comparison result was statistically significant ($P < .05$). See Figure1.

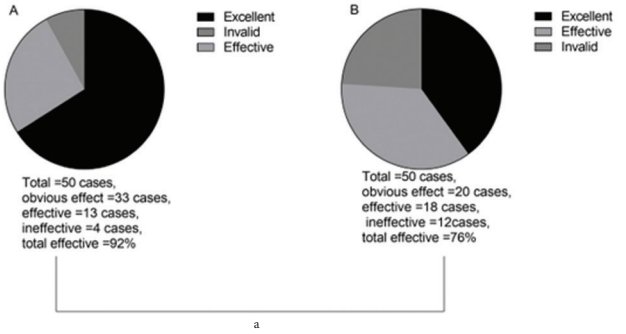
Figure 2. SAS, SDS anxiety and depression scores of the two groups



[a]means that the comparison of SAS anxiety score of the experimental group (42.16±5.59) with that of the control group (47.72±5.88) was statistically significant, $t = 4.85$, $P < .001$;
[b]means that the comparison of SDS anxiety score of the experimental group (46.63±5.91) with that of the control group (52.07±6.62) was statistically significant, $t = 4.33$, $P < .001$.

Note: the abscissa shows SAS and SDS from left to right, and the ordinate shows the scores.

Figure 3. Comparison of nursing efficiency between the two groups **(A)** The nursing efficiency in the experimental group, including 33 cases of obvious effect, 13 cases of effective and 4 cases of no effect, with a total effective rate of 92%; **(B)** The nursing efficiency in the control group, including 20 cases of obvious effect, 18 cases of effective and 12 cases of no effect, with a total effective rate of 76%.



[a]indicates the comparison of nursing efficiency between the experimental group and the control group, $\chi^2 = 4.76$, $P = .03$. The comparison result was statistically significant.

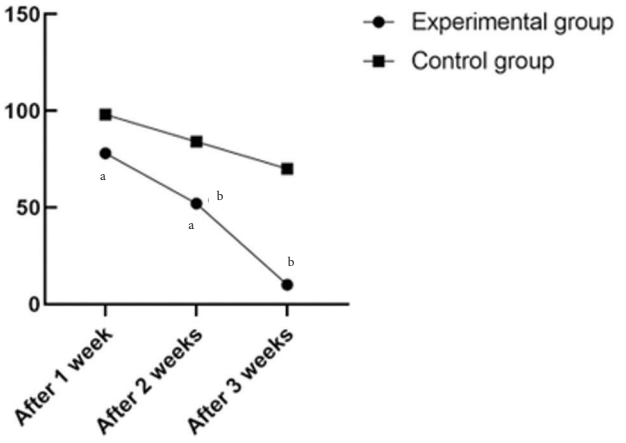
Table 2. Comparison of nursing satisfaction rate between the two groups

Groups	Very satisfied	Satisfied	Dissatisfied	Total satisfaction rate (%)
Experimental group	42	8	0	100%
Control group	21	14	15	70%
χ^2				17.65
P value				<.001

SAS, SDS anxiety and depression scores

The SAS and SDS scores of the two groups of patients were compared, and the results showed that the experimental group reported remarkably lower SAS and SDS scores than those of the control group, and the comparison results were statistically significant ($P < .05$, Figure 2).

Figure 4. Comparison of the incidence of adverse emotions after 1, 2 and 3 weeks of nursing between the two groups



[a]indicates that the incidence of adverse emotions in the experimental group was 78% after 1 week of nursing and 52% after two weeks of nursing, $\chi^2 = 7.43$, $P = .006$, with statistical significance
[b]indicates that the incidence of adverse emotions in the experimental group was 52% after 2 weeks of nursing and 10% after 3 weeks of nursing, $\chi^2 = 20.62$, $P < .001$, with statistical significance.

Note: the abscissa shows 1 week, 2 weeks and 3 weeks after nursing from left to right. The ordinate shows the incidence of adverse emotions. The figure showed that after 1 week of treatment, the incidence of adverse emotions in the experimental group was 78%, compared with 98% in the control group, $\chi^2 = 9.47$, $P = 0.002$. The comparison result was statistically significant; After 2 weeks of treatment, the incidence of adverse emotions in the experimental group was 52%, compared with 84% in the control group, $\chi^2 = 11.76$, $P = .001$. The comparison result was statistically significant; After 3 weeks of treatment, the incidence of adverse emotions in the experimental group was 10%, compared with 70% in the control group, $\chi^2 = 37.50$, $P < .001$. The comparison result was statistically significant.

Nursing efficiency

Comparing the nursing efficiency of the two groups, the comparison results showed that the nursing efficiency of the experimental group was 92% and that of the control group was 76%, demonstrating that the nursing efficiency of the experimental group was considerably better than the control group ($P < .05$). See Figure 3.

Nursing Satisfaction Rate

Considering the nursing satisfaction rate, the experimental group demonstrated a notably higher rate ($P < .05$). See Table 2.

The incidence of adverse emotions after 1, 2, and 3 weeks of nursing

Regarding the incidence of adverse emotions after 1, 2, and 3 weeks of nursing, the incidence of adverse emotions in the experimental group was largely lower, and the incidence of adverse emotions in the experimental group was improved with time, that is, 1>2>3 weeks in descending order ($P < .05$, Figure 4).

DISCUSSION

Cerebral infarction can lead to a range of sequelae, and the specific manifestations often depend on the location of the infarct within the brain. These sequelae can include mental dysfunction, physical movement disorders, language deficits, visual impairments, muscle strength disorders, and more. Suppose the infarct is in the frontal lobe. In that case, the sequelae may be mental dysfunction or mental confusion due to obvious memory loss, or even dementia or obvious personality changes[8,9]; If the infarction is in the parietal lobe, the sequelae may be related to physical movement disorders[10]; If the infarct is in the temporal lobe, it may lead to aphasia, hallucination and epilepsy, etc.; If the infarct is in the occipital lobe, it may affect the patient's vision and lead to visual impairment.[11,12] Additionally, infarcts in the brain's basal ganglia may lead to muscle strength disorders, while infarcts in the thalamus may lead to hemiplegia, sleep disorders, etc. The modern treatment for the sequelae of cerebral infarction is rehabilitation therapy combined with pharmacological treatment. Rehabilitation therapy for patients could notably improve sequelae and enable them to recover as much as possible.[7,13,14] Each part of the human body's muscles and bones play a crucial role in maintaining the body's balance and daily life. Reduced muscle strength in cerebral infarction results in the patient's muscle not being able to support the patient in walking or body support, and rehabilitation training is thus needed to improve muscle strength and advance sports function. Progressive rehabilitation nursing is a way to provide appropriate care for the function and role of each part of the muscle, which is more likely to ensure a smooth recovery of muscle function and to enable the patient to maintain correct muscle memory than traditional rehabilitation nursing. Walking in circles occurs in some patients with cerebral infarction after gradual recovery due to the patients' failure to maintain good walking habits during rehabilitation nursing. Which makes the patient prone to fall and even leads to the deformation of patient's leg shape. Progressive rehabilitation nursing plays an essential auxiliary role in the rehabilitation treatment of patients with cerebral infarction, helping them develop good habits of life and exercise and improving their exercise compliance. In order to investigate the impact of progressive rehabilitation nursing under the quality nursing mode on muscle strength and psychological statuss in patients with cerebral infarction combined with decreased muscle strength, this research paper takes patients with cerebral infarction as the target population. It performs different nursing modes for patients are carried out, and the nursing efficiency, nursing satisfaction, psychological status score, and motor function score of patients were recorded and compared.

This study's results showed that the patients' nursing efficiency and nursing satisfaction in the experimental group were significantly higher than those in the control group under the conventional nursing care model, and the comparison results were statistically significant ($P < .05$). Nursing satisfaction and nursing efficiency are the basic indicators for evaluating the quality and efficiency of nursing work, and are also important criteria for promoting a good doctor-patient relationship, i.e., the higher the patient's satisfaction with the nursing work, the better the doctor-patient relationship will be formed. The results, therefore, indicate that progressive rehabilitation nursing under quality nursing helps to significantly improve nursing efficiency and work quality, creating a better clinical nursing environment for patients and thus promoting the development of the hospital's medical career and smooth work.

The NIHSS neurological function scores, SAS and SDS anxiety-depression scores, and the incidence of dysphoria after 1, 2, and 3 weeks of nursing were significantly lower in the experimental group than in the control group, and the results of the comparison were statistically significant ($P < .05$). The NIHSS neurological function score is a commonly used index to determine the degree of neurological deficit in patients with cerebral infarction. The divergence of the NIHSS could be used to obtain the degree of stroke and to understand the patient's recovery status through the change in score. Generally, patients with cerebral infarction with decreased muscle strength may be unable to accept their own condition and may suffer from self-loathing, depression, and anxiety. The SAS and SDS scales could be used to understand the patient's psychological status, which is convenient for psychological counseling in the early stage of negative emotions. Quality nursing includes psychological support and the development of good habits so that through quality nursing interventions, patients are able to maintain a better psychological state and learn to live a more suitable lifestyle, thus avoiding the recurrence of their illness due to incorrect habits. The results show that progressive rehabilitation nursing under the quality nursing mode contributes to the improvement of stroke manifestations, neurological functions, and psychological status of patients with cerebral infarction during treatment, enabling patients to maintain a good psychological state to face treatment and rehabilitation positively.

In addition, the FMA motor function score is a scale that evaluates the strength and flexibility of the upper limbs and the strength and flexibility of the lower limbs, respectively. The FMA score is an indispensable scale for the systematic rehabilitation of cerebral infarction patients with reduced muscle strength to determine the outcome of rehabilitation nursing care and also to provide the right direction for the later rehabilitation nursing program. The FMA motor function score and BI index score of the patients in the experimental group were significantly higher than those in the control group ($P < .05$), indicating that progressive rehabilitation nursing under quality nursing care could help improve the patient's motor function and muscle strength level, thus assisting the patients in living independently and achieving basic self-care, which could not only reduce the patient's pain, but also reduce the economic pressure of the patients and their families.

Mao et al[15] put forward in the research that progressive rehabilitation nursing could remarkably reduce stroke in patients with cerebral infarction, with notably improved

motor function and activities of daily living after progressive rehabilitation nursing.[16] The findings of this research are consistent with the result of the above study, which fully proves that the result of this paper is scientific and reliable.

CONCLUSION

To sum up, the progressive rehabilitation nursing mode guided by quality nursing could help improve the nursing efficiency and satisfaction rate of patients with cerebral infarction, notably ing their psychological status and motor function, helping patients to enhance their daily life ability. Therefore, progressive rehabilitation nursing under quality nursing mode has high application value in patients with cerebral infarction complicated with decreased muscle strength and is worthy of clinical promotion and application.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study received ethical approval from the Ethics Committee of Hangzhou Lin'an District First People's Hospital, and all patients and their families were informed about the research objectives and provided voluntary informed consent. The study was conducted in full compliance with the principles outlined in the Declaration of Helsinki.

AVAILABILITY OF DATA AND MATERIALS

All data generated or analysed during this study are included in this published article.

AUTHORS' CONTRIBUTIONS

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them. All authors reviewed the manuscript. All authors have read and approved the manuscript.

CONFLICT OF INTEREST

All authors declarted that they have no conflict of interest.

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