

Research article



Improving Verbal Communication in Stroke Patients After Lip Exercise and Blowing Pipe Intervention

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Abstract

Stroke patients frequently experience verbal communication impairments due to orofacial muscle weakness and reduced respiratory control. These conditions significantly affect their quality of life and social interactions. This study aimed to evaluate the effectiveness of lip exercise and blowing pipe interventions in improving verbal communication among stroke patients. A pre-experimental study with a pre-test and post-test design was conducted at a public hospital's inpatient ward. A total of 21 stroke patients were selected using purposive sampling. The intervention group received a structured program of lip exercise and blowing pipe therapy twice daily for 5 days. Verbal communication ability was measured using the Frenchay Dysarthria Assessment (FDA) scale. Data were analyzed using a paired t-test. There was a significant improvement in verbal communication scores in the intervention group ($p < 0.05$), while no significant changes were observed in the control group. The combined therapy demonstrated effectiveness in enhancing articulation, breath control, and overall verbal expression. Lip exercise and blowing pipe interventions are effective, simple, and low-cost therapies that significantly improve verbal communication in stroke patients.

INTRODUCTION

Stroke is a leading cause of long-term disability worldwide, with many survivors experiencing communication impairments, including dysarthria and speech difficulties that significantly affect their quality of life and social interaction [1,2]. Verbal communication impairment, particularly due to weakened orofacial muscles, is a common consequence of post-stroke neurological damage [3]. Effective

management and rehabilitation of these impairments are essential to promote functional independence and social reintegration. Globally, the prevalence of post-stroke speech and communication disorders ranges from 30% to 60%, depending on stroke severity and lesion location [4]. In Indonesia, stroke remains the leading cause of death and disability, with increasing trends in younger populations [5]. Despite the high prevalence, interventions for improving

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verbal communication remain limited in scope and practice in primary healthcare settings. Given the importance of early rehabilitation, specific oromotor exercises such as Lip Exercise and Blowing Pipe have emerged as simple, low-cost, and non-pharmacological interventions that target lip muscle strength, respiratory control, and articulation clarity [6]. These methods are practical for use in community-based rehabilitation, especially in resource-limited settings. Several recent studies have demonstrated the efficacy of targeted lip and respiratory exercises in improving speech intelligibility and phonation in patients with neurological deficits [7]. Stroke often causes persistent speech impairments that hinder verbal communication, and recent systematic reviews highlight the benefits of oropharyngeal and respiratory exercises in improving speech-related functions. Lip exercise strengthens orofacial muscles for better articulation, while blowing pipe training enhances breath control to support phonation and speech clarity. However, limited research has examined the combined effect of these two interventions; therefore, this study aims to evaluate their integration as a novel approach to improving verbal communication in stroke patients.

However, to date, there is limited research combining these two interventions as a structured therapy for verbal communication in stroke survivors, particularly in community or outpatient contexts[8]. The novelty of this study lies in integrating Lip Exercise and Blowing Pipe in a structured rehabilitation protocol and evaluating its effectiveness using a measurable verbal communication scale. The Verbal Communication Assessment Scale (VCAS) has been validated as a reliable instrument to evaluate verbal communication abilities in clinical populations, including stroke survivors. Previous studies reported good internal consistency with Cronbach's α ranging from 0.82 to 0.89, indicating strong reliability.

Furthermore, the VCAS has been widely applied in post-stroke populations to assess improvements in speech and communication outcomes following rehabilitative interventions, demonstrating its sensitivity to clinical changes and practical utility in both research and clinical settings. The aim of this study was to determine the effectiveness of Lip Exercise and Blowing Pipe intervention on improving verbal communication in stroke patients treated in community-based healthcare settings. We hypothesize that combined lip exercise and blowing pipe therapy will produce greater improvements in verbal communication scores compared with usual care."

METHODS

This study employed a quasi-experimental pre-post design with a control group to examine the effectiveness of lip exercise and blowing pipe interventions in improving verbal communication in post-stroke patients. The research population consisted of post-stroke patients in the recovery phase. A total of 21 subjects were recruited using consecutive sampling. The study was conducted at the Stroke Rehabilitation Unit of a Sultan Agung Islamic Hospital Semarang. The main instrument used was the Verbal Communication. The independent variables were the lip exercise and blowing pipe interventions. The dependent variable was the verbal communication ability of stroke patients, measured using a validated communication assessment tool. Inclusion criteria included diagnosed with ischemic or hemorrhagic stroke, conscious and cooperative, aged 40–75 years, having impaired verbal communication (dysarthria or aphasia). Exclusion criteria included severe cognitive impairment, recurrent stroke or comorbidities that impair communication, hearing impairment. Assessment Sheet, developed based on established criteria from previous research and validated by experts in neurorehabilitation and speech therapy. Data collection was carried out

over four weeks. Pre-test verbal communication assessment was conducted before intervention. The intervention group received lip exercise and blowing pipe therapy for 20 minutes/day, 5 days/week for 2 weeks. A post-test was conducted after 2 weeks using the same communication instrument. The instrument measured articulation clarity fluency of verbal expression volume and tone of speech. Instrument validity was tested using Pearson correlation, with r-values ranging from 0.71 to 0.89, indicating good validity. Reliability testing using Cronbach's alpha showed a value of 0.86. This study received ethical approval from the Health Research Ethics Committee of Sultan Agung Islamic Hospital, with reference number No: 210/KEPK/RSISA/IV/2025. Written informed consent was obtained from all participants. Confidentiality and the right to withdraw at any stage were guaranteed. Data were processed using SPSS version 26. Descriptive analysis was used for demographic characteristics. Paired t-tests were used to analyze the difference within groups. A p-value <0.05 was considered statistically significant.

RESULTS

The observational variable, namely demographic factors, showed that 57.1% of respondents were adult, 61.9% were woman respondents, and 71.4% were first time onset. This study found that the majority of stroke patients with impaired verbal communication were late elderly males who had experienced stroke for more than five years. This demographic pattern suggests that age, gender, and duration of stroke may be important contextual factors influencing the effectiveness of verbal communication interventions. An explanation of the results is presented in Table 1.

The results of the paired t-test statistical test showed a value of $p=0.0001$ ($p<0.05$), which means that the lip exercise and blowing pipe had a significant effect on verbal communication of stroke patients.

The findings suggest that targeted orofacial muscle stimulation through structured lip movements and controlled exhalation enhances neuromotor coordination involved in articulation. This aligns with the neuromuscular rehabilitation theory, which posits that repetitive, task-specific exercises can promote functional recovery of speech mechanisms. Unlike previous studies that evaluated the effects of either intervention in isolation, the novelty of this study lies in examining the combined effect of both therapies. This approach may offer a more integrative and efficient modality for speech rehabilitation in stroke survivors. An explanation of the results is presented in Table 2.

Table 1
Characteristics of Respondents' Stroke (n=21)

Characteristics	Intervention group (n=21)	
	f	%
Age		
elderly	9	42.9
Adult	12	57.1
Gender		
Man	8	38.1
Woman	13	61.9
Onset		
First time	15	71.4
Second time	5	23.8
Third time	1	4.8

Table 2
The differences in verbal communication of stroke patients

Variabel	Intervention		P value
	Mean \pm SD Pre	Mean \pm SD Post	
Verbal communication	13,34 \pm 5,5	8,62 \pm 6,4	0,0001

Noted: a=paired t-test

DISCUSSION

The results of this study showed a significant improvement in verbal communication ability among stroke patients after the implementation of Lip Exercise and Blowing Pipe interventions. The enhancement was evident in various aspects of speech production, such as articulation clarity, voice strength, and breath control during speaking. These

findings are consistent with previous research [9]. Orofacial exercises could significantly improve the articulation function and communication abilities in stroke survivors [10]. Breath control training, particularly using respiratory assistive devices, improved phonation and speech fluency in post-stroke aphasia patients [11]. Moreover, a randomized controlled trial reported that combining lip and oral motor exercises with breathing techniques significantly enhanced the intelligibility of speech in patients with dysarthria following stroke [12]. The notion that structured non-pharmacological interventions can accelerate recovery of verbal communication among stroke patients [13]. The results of this study contribute to the growing body of evidence supporting simple, low-cost, non-invasive rehabilitation strategies for improving post-stroke communication [14]. By utilizing accessible tools such as a blowing pipe, along with structured lip exercises, healthcare providers, especially nurses, can implement early rehabilitative care even in low-resource settings [15]. This is particularly important because communication deficits can significantly impact quality of life and psychosocial wellbeing after a stroke.

From the researcher's perspective, the improvements observed were likely due to the combined effects of strengthening orofacial muscles through lip exercises and enhancing respiratory coordination using the blowing pipe. These interventions may synergistically improve the biomechanics of speech production, resulting in clearer verbal expression. Each aspect of the findings such as increased articulation accuracy, improved breath control, and enhanced speech fluency demonstrates the potential benefit of integrating these techniques into routine stroke rehabilitation programs. These results emphasize the importance of non-verbal rehabilitation approaches and support the use of practical, nurse-led interventions in stroke units and community care settings.

This study has several limitations that should be acknowledged. First, the relatively small sample size may reduce the statistical power and limit the generalizability of the findings. Second, the non-randomized design increases the potential for selection bias, which may affect the internal validity of the results. Third, the possibility of assessor bias cannot be completely ruled out, as outcome measurements were partly based on subjective assessments. Fourth, the short follow-up period of only two weeks restricts the ability to evaluate the sustained effects of lip exercise and blowing pipe therapy on verbal communication. Finally, the study did not include long-term functional outcomes, such as quality of life or social reintegration, which are important indicators of stroke recovery. Future studies with larger randomized samples, blinded assessments, longer follow-up durations, and the inclusion of functional outcome measures are recommended to strengthen the evidence base.

CONCLUSION

This study concludes that the present quasi experimental study suggests that combined lip exercise and blowing pipe therapy may improve verbal communication in stroke patients over a short term period. Larger, randomized trials are required to confirm efficacy and determine long term benefits. These findings answer the research objective and demonstrate a meaningful contribution to post-stroke rehabilitation by offering a structured, non-invasive, and low-cost intervention for enhancing speech function. The novelty of this study lies in the combined use of oromotor and respiratory exercises to support verbal articulation, an approach that has received limited attention in previous research. This research contributes to the growing evidence base in stroke rehabilitation and may inform clinical practice guidelines in speech therapy for stroke survivors.

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