

THESIS

**THE EFFECT OF A COMBINATION OF PROPRIOCEPTIVE NEUROMUSCULAR
FACILITATION (PNF) AND HANDBALL GRASPING ON INCREASING UPPER
EXTREMITY MUSCLE STRENGTH IN POST-STROKE PATIENTS
IN THE WORK AREA OF THE SAWAH LEBAR COMMUNITY
HEALTH CENTER, BENGKULU CITY, IN 2026**



Compiled by:

SAPNA TRIYANINGSIH
NIM: P01720322091

**MINISTRY OF HEALTH OF THE REPUBLIC OF INDONESIA
BENGKULU MINISTRY OF HEALTH POLYTECHNIC
NURSING DEPARTMENT APPLIED BACHELOR OF
NURSING PROGRAM 2026**

THESIS TITLE PAGE

**THE EFFECT OF A COMBINATION OF PROPRIOCEPTIVE NEUROMUSCULAR
FACILITATION (PNF) AND HANDBALL GRASPING ON INCREASING UPPER
EXTREMITY MUSCLE STRENGTH IN POST-STROKE PATIENTS
IN THE WORK AREA OF THE SAWAH LEBAR COMMUNITY
HEALTH CENTER, BENGKULU CITY, IN 2026**

Submitted as a requirement for obtaining the degree of Bachelor of Applied
Science in Nursing (S.Tr.Kep) from the Bachelor of Applied Science in Nursing
Study Program, Department of Nursing, Health Polytechnic of the Ministry of
Health Bengkulu.



**MINISTRY OF HEALTH OF THE REPUBLIC OF INDONESIA
BENGKULU MINISTRY OF HEALTH POLYTECHNIC
NURSING DEPARTMENT APPLIED BACHELOR OF
NURSING PROGRAM 2026**

THESIS APPROVAL PAGE

**THE EFFECT OF A COMBINATION OF PROPRIOCEPTIVE NEUROMUSCULAR
FACILITATION (PNF) AND HANDBALL GRASPING ON INCREASING UPPER
EXTREMITY MUSCLE STRENGTH IN POST-STROKE PATIENTS
IN THE WORK AREA OF THE SAWAH LEBAR COMMUNITY
HEALTH CENTER, BENGKULU CITY, IN 2026**

Prepared and presented by:

SAPNA TRIYANINGSIH
NIM: P01720322091

Applied Bachelor's Degree Program in Nursing
Poltekkes Kemenkes Bengkulu

This thesis has been approved by the supervisor
Date: 12 June 2026

Thesis Supervisor

Supervisor 1

Supervisor II



Ns. Hendri Heriyanto, S.Kep.,M.Kep
NIP. 198205152002121004



Ns. Sahran, S.Kep.,M.Kep
NIP. 197709132002121002

THESIS VALIDATION PAGE

**THE EFFECT OF A COMBINATION OF PROPRIOCEPTIVE NEUROMUSCULAR
FACILITATION (PNF) AND HANDBALL GRASPING ON INCREASING UPPER
EXTREMITY MUSCLE STRENGTH IN POST-STROKE PATIENTS
IN THE WORK AREA OF THE SAWAH LEBAR COMMUNITY
HEALTH CENTER, BENGKULU CITY, IN 2026**

Compiled by :
SAPNA TRIYANINGSIH
NIM: P01720322091

Has been tested before the thesis examiners
Applied Bachelor's Degree Program in Nursing
Nursing Department, Health Polytechnic of the Ministry of Health, Bengkulu

Date : 22 June 2026, and declared
GRADUATE

Chair of the Board of Examiners


Ns. Mardiani, S.Kep,MM
NIP. 197203211995032001

Examiner I


Ns. Anditha Ratnadhiani, M.Kep,Sp.Kep.MB
NIP. 198406152008042003

Examiner II


Ns. Hendri Heriyanto, S.Kep,M.Kep
NIP. 198205152002121004

Examiner III


Ns. Sahran, S.Kep,M.Kep
NIP. 197709132002121002

This thesis has fulfilled one of the requirements for obtaining the degree of
Bachelor of Applied Science in Nursing

Acknowledged by
Head of the Bachelor of Applied Nursing Study Program
Department of Nursing
Bengkulu Health Polytechnic, Ministry of Health


Ns. Hendri Heriyanto, S.Kep,M.Kep
NIP. 198205152002121004

BIOGRAPHY



Name : Sapna Triyaningsih

Place and Date of Birth : Bengkulu, September 29, 2003

Religion : Islam

Gender : Female

Order of Birth : 4th child (of four)

Educational Background : 1. Elementary School 60, Bengkulu City (2010–2016)
2. Junior High School 18, Bengkulu City (2016–2019)
3. Senior High School 4, Bengkulu City (2019–2022)

Address : Jalan Mangga V E, No. 27, RT 025, RW 007, Lingkar Timur Sub-district, Singaran Pati District, Bengkulu City, Bengkulu Province

Study Program : Bachelor of Applied Nursing

Institution : Bengkulu Health Polytechnic, Ministry of Health

Year of Admission : 2022

Email : sapnatriyan@gmail.com

TATEMENT OF ORIGINALITY

The undersigned:

Name : Sapna Triyaningsih
Student ID (NIM) : P01720322091
Thesis Title : The Effect of Combination of Proprioceptive Neuromuscular Facilitation (PNF) and Hand Ball Grasping on the Increase of Upper Extremity Muscle Strength in Post-Stroke Patients at the Working Area of Sawah Lebar Community Health Center, Bengkulu City

Declare that this thesis is my own original work, and that its content does not contain any work previously submitted by another person to obtain an academic degree at any educational institution. To the best of my knowledge, it also does not contain any work or opinion previously written and/or published by another person, except where explicitly cited within the text and listed in the bibliography.

I make this statement truthfully, and should it later be found that this thesis contains any element of plagiarism, I am willing to accept full responsibility in accordance with the applicable regulations.

Bengkulu, June 22, 2026

The undersigned,

Sapna Triyaningsih
NIM. P01720322091

MOTTO AND DEDICATION

“Allah does not burden a soul beyond what it can bear.”

(QS. Al-Baqarah: 286)

DEDICATION:

Among all the pages in this thesis, the dedication sheet is the most meaningful page, because this is where the author expresses gratitude that cannot be expressed in words. Bismillahirrahmanirrahim, I dedicate this thesis to:

- ❖ To the Sole Owner of all things and of the entire universe, who governs, regulates, and holds power over everything — Allah SWT, the Great Owner of all directions. Thank You for being the only home I could always return to when the world felt blurred and loud.
- ❖ The Prophet Muhammad SAW, for through his mercy and blessing we have all been freed from darkness into an age of light, and are able to enjoy the privilege of education as we do today.
- ❖ To my beloved father and mother, thank you for every prayer that was never missed, every sacrifice that was never spoken of, and every support that was always given unconditionally. You are the greatest reason the author was able to endure every hardship. No words are enough to describe the author's gratitude and love for you. May this achievement be one form of happiness the author can offer to Father and Mother.
- ❖ My beloved siblings, my brother Andi, and my sisters Novi and Irma, who have always given encouragement, laughter, and color to this journey. Thank you for being a home to return to when tired, and a reminder that the author never had to struggle alone.
- ❖ To my beloved nieces and nephews, Khayla, Denova, Kevin, Yusuf, Yhoga, Yhola, Rhagil, Daffa, Dzaki, and Dzilfa, thank you for being a source of happiness and spirit in every step the author has taken. May you

grow into good, intelligent people, and may you be able to walk even further and reach even greater dreams.

- ❖ My dear friends of “Bismillah Mengejar Ridho Allah,” Abillah Almubaroqah, Alda Bhumi Nuli, Annisa Dewi, Fitrotin Nufus, Mervita Five Melina, Sendi Tri Wahyu, and Shakila Mutiara, who have been present through joy and sorrow alike. Thank you for being good listeners, a place to share stories, and a source of strength whenever the author felt like giving up. Your presence made this journey feel lighter and more meaningful.
- ❖ To Putri Desi Riani and Rizki Amelia Putri, my close friends since high school until today, thank you for being part of a colorful life journey. Even though time and distance have not always kept us together, the memories, laughter, and support you have given remain a source of strength in every step I take.
- ❖ Thesis Supervisor I, Ns. Hendri Heriyanto, S.Kep., M.Kep, and Thesis Supervisor II, Ns. Sahran, S.Kep., M.Kep, who provided knowledge, guidance, and motivation throughout the course of study and the writing of this thesis. Thank you for the patience and dedication you have given.
- ❖ Last but not least, thank you to a sweet, simple, strong, and independent woman — myself, Sapna Triyaningsih. Thank you for the long journey travelled thus far, for the many processes endured, the many tears wiped away by my own hands, the many exhaustions and complaints kept to myself, and the many things faced, undertaken, and completed alone. Up to this moment, I have remained strong because of my own effort to make everything appear all right. Proud of every small step, even though tears come easily, I never stopped trying and never gave up. Congratulations on celebrating the anxieties of the next staircase, on venturing into the next level of life, on continuing to battle the endless question of ‘when,’ on living through the phase where you find that not everyone can help carry your life, and on continuing to fight, even alone. There is nothing more beautiful than witnessing one's own process and growth.

PENGARUH KOMBINASI *PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION* (PNF) DAN *HAND BALL GRASPING* TERHADAP PENINGKATAN KEKUATAN OTOT EKSTREMITAS ATAS PADA PASIEN PASCA STROKE DI WILAYAH KERJA PUSKESMAS SAWAH LEBAR KOTA BENGKULU TAHUN 2026

***Sapna Triyaningsih, **Hendri Heriyanto, **Sahran**

*Prodi Sarjana Terapan Keperawatan Poltekkes Kemenkes Bengkulu

**Dosen Jurusan Keperawatan Poltekkes Kemenkes Bengkulu

Email: sapnatriyan@gmail.com

ABSTRAK

Stroke merupakan gangguan neurologis yang terjadi akibat terhambatnya aliran darah ke otak sehingga menyebabkan kerusakan jaringan otak dan berbagai gangguan fungsi tubuh. Salah satu masalah yang sering dialami pasien pasca stroke adalah kelemahan otot ekstremitas atas yang berdampak pada keterbatasan aktivitas sehari-hari. Upaya rehabilitasi diperlukan untuk meningkatkan kekuatan otot dan fungsi motorik. Kombinasi terapi *Proprioceptive Neuromuscular Facilitation* (PNF) dan *Hand Ball Grasping* merupakan intervensi nonfarmakologis yang dapat merangsang aktivasi neuromuskular, meningkatkan koordinasi gerak, serta memperbaiki kekuatan otot ekstremitas atas pada pasien pasca stroke. Mengetahui pengaruh kombinasi *Proprioceptive Neuromuscular Facilitation* (PNF) dan *Hand Ball Grasping* terhadap peningkatan kekuatan otot ekstremitas atas pada pasien pasca stroke di Wilayah Kerja Puskesmas Sawah Lebar Kota Bengkulu. Jenis penelitian ini menggunakan desain *quasi experimental* menggunakan rancangan *pre-test and post-test with control group design*. Teknik pengambilan sampel menggunakan *purposive sampling*. Jumlah partisipan sebanyak 60 responden yang dibagi menjadi kelompok intervensi sebanyak 30 responden dan kelompok kontrol sebanyak 30 responden. Kelompok intervensi diberikan kombinasi terapi PNF dan *Hand Ball Grasping*, sedangkan kelompok kontrol diberikan *dumbbell exercise*. Pengukuran kekuatan otot dilakukan menggunakan *Manual Muscle Testing* (MMT). Hasil uji statistik menggunakan metode Mann-Whitney menunjukkan nilai p-value sebesar $0,012 \leq 0,05$ sehingga dapat disimpulkan bahwa kombinasi terapi *Proprioceptive Neuromuscular Facilitation* (PNF) dan *Hand Ball Grasping* berpengaruh terhadap peningkatan kekuatan otot ekstremitas atas pada pasien pasca stroke.

Kata Kunci: *Hand Ball Grasping*, *Kekuatan Otot Ekstremitas Atas*, *Pasca Stroke*, *Proprioceptive Neuromuscular Facilitation* (PNF).

**THE EFFECT OF COMBINATION PROPRIOCEPTIVE NEUROMUSCULAR
FACILITATION (PNF) AND HAND BALL GRASPING ON THE INCREASE
OF UPPER EXTREMITY MUSCLE STRENGTH WITH POST-STROKE
PATIENTS AT THE WORKING AREA OF SAWAH LEBAR
COMMUNITYHEALTH CENTER,
BENGKULU CITY 2026**

***Sapna Triyaningsih, **Hendri Heriyanto, **Sahran**

*Applied Nursing Bachelor's Program, Poltekkes Kemenkes Bengkulu

**Lecturer, Nursing Department, Poltekkes Kemenkes Bengkulu

Email: sapnatriyan@gmail.com

ABSTRACT

Stroke is a neurological disorder caused by the obstruction of blood flow to the brain, resulting in brain tissue damage and various impaired bodily functions. One common problem experienced by post-stroke patients is upper extremity muscle weakness, which impacts daily activities. Rehabilitation efforts are needed to improve muscle strength and motor function. The combination of Proprioceptive Neuromuscular Facilitation (PNF) and Hand Ball Grasping therapy is a non-pharmacological intervention that can stimulate neuromuscular activation, improve motor coordination, and improve upper extremity muscle strength in post-stroke patients. To determine the effect of the combination of Proprioceptive Neuromuscular Facilitation (PNF) and Hand Ball Grasping on increasing upper extremity muscle strength in post-stroke patients in the Sawah Lebar Community Health Center Work Area, Bengkulu City. This study employed a quasi-experimental design with a pre-test and post-test with a control group design. The sampling technique used purposive sampling. A participants of 60 respondents was divided into an intervention group of 30 respondents and a control group of 30 respondents. The intervention group received a combination of PNF therapy and Hand Ball Grasping, while the control group received dumbbell exercises. Muscle strength was measured using Manual Muscle Testing (MMT). The results of statistical tests using the Mann-Whitney method showed a p-value of $0.012 \leq 0.05$ so it can be concluded that the combination of Proprioceptive Neuromuscular Facilitation (PNF) and Hand Ball Grasping therapy has an effect on increasing upper extremity muscle strength in post-stroke patients.

Keywords: Hand Ball Grasping, Post Stroke, Proprioceptive Neuromuscular Facilitation (PNF), Upper Extremity Muscle Strength.

FOREWORD

All praise and gratitude are offered to God Almighty for His abundant mercy and blessings, which have enabled the author to complete this thesis entitled "The Effect of Combination of Proprioceptive Neuromuscular Facilitation (PNF) and Hand Ball Grasping on the Increase of Upper Extremity Muscle Strength in Post-Stroke Patients at the Working Area of Sawah Lebar Community Health Center, Bengkulu City." In completing this thesis, the author received a great deal of support, both material and moral, from various parties. The author would therefore like to express sincere gratitude to:

1. Ms. Linda, SST., M.Kes, Director of Bengkulu Health Polytechnic, Ministry of Health.
2. Ns. Erni Buston, SST., M.Kes, Head of the Department of Nursing, Bengkulu Health Polytechnic, Ministry of Health.
3. Ns. Hendri Heriyanto, S.Kep., M.Kep, Head of the Bachelor of Applied Nursing Study Program, Bengkulu Health Polytechnic, Ministry of Health, and Thesis Supervisor I, who has generously given his time, effort, and thought to provide patient guidance and direction to the author in preparing this thesis.
4. Mr. Ns. Sahran, S.Kep., M.Kep, Thesis Supervisor II, who has generously given his time, effort, and thought to provide patient guidance and direction to the author in preparing this thesis.
5. Ms. Ns. Mardiani, S.Kep., MM, Chairperson of the Examination Board, who provided invaluable criticism, suggestions, and input that helped improve this thesis.
6. Ms. Ns. Anditha Ratnadhiyanti, M.Kep., Sp.Kep.MB, Examiner I, who provided direction, corrections, and constructive input toward the refinement of this thesis.
7. The author's parents and entire family, who have prayed for, supported, and encouraged the author both morally and materially.

8. All lecturers and educational staff of the Department of Nursing, who have patiently taught and guided the author.
9. The author's fellow classmates, who have provided support and encouragement throughout the preparation of this thesis.

The author recognizes that this thesis is not free from limitations and imperfections due to the author's limited knowledge, experience, and ability. The author therefore sincerely welcomes constructive criticism and suggestions from all parties, so that the author may produce better and more optimal work in the future. May every piece of criticism and suggestion given be rewarded by God Almighty. The author hopes that this thesis may be of benefit to all parties.

Bengkulu, June 22, 2026



TABLE OF CONTENTS

THESIS TITLE SHEET	i
APPROVAL SHEET	ii
VALIDATION SHEET	iii
BIOGRAPHY	iv
ORIGINALITY STATEMENT.....	v
MOTTO AND DEDICATION	vi
ABSTRACT	vii
ABSTRAK	ix
FOREWORD.....	xi
TABLE OF CONTENTS	xiii
LIST OF TABLES.....	xv
LIST OF FIGURES	xvi
LIST OF DIAGRAMS	xvii
LIST OF APPENDICES.....	xviii
LIST OF ABBREVIATIONS	xix
 CHAPTER I INTRODUCTION	
A. Background	1
B. Research Problem.....	7
C. Research Objective.....	8
D. Research Significance	9
 CHAPTER II LITERATURE REVIEW	
A. Concept of Stroke.....	10
B. Concept of Body Extremities	18
C. Concept of Muscle Strength.....	22
D. Concept of Proprioceptive Neuromuscular Facilitation (PNF) Therapy	30
E. Concept of Hand Ball Grasping Therapy	36
F. Concept of Dumbbell Exercise	38
G. Effect of Proprioceptive Neuromuscular Facilitation (PNF) and Hand Ball Grasping Therapy	41
H. Theoretical Framework	43

CHAPTER III CONCEPTUAL FRAMEWORK, HYPOTHESIS, AND OPERATIONAL DEFINITIONS

A. Conceptual Framework	44
B. Research Hypothesis	45
C. Operational Definitions	45

CHAPTER IV RESEARCH METHOD

A. Type and Design of Research	48
B. Research Variables	48
C. Research Location and Time	49
D. Population and Sample	49
E. Data Collection	52
F. Data Processing	54
G. Data Analysis	55
H. Research Flow	56
I. Research Ethics	57
J. Research Schedule	58

CHAPTER V RESEARCH RESULTS

A. Research Process	59
B. Univariate Analysis	61
C. Bivariate Analysis	64

CHAPTER VI DISCUSSION

A. Interpretation and Discussion of Findings	66
B. Research Limitations	78

CHAPTER VII CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions	79
B. Recommendations	80

BIBLIOGRAPHY

ATTACHMENT

LIST OF TABLES

Table 2.1	Manual Muscle Testing (MMT) Assessment of the Upper Extremity.....	29
Table 3.1	Operational Definitions	45
Table 5.1	Distribution of Respondents by Age, Gender, Education, and Type of Stroke in the Working Area of Sawah Lebar Community Health Center, Bengkulu City (n=30)	61
Table 5.2	Mean Distribution of Upper Extremity Muscle Strength Before Intervention in the Intervention and Control Groups	62
Table 5.3	Mean Distribution of Upper Extremity Muscle Strength After Intervention in the Intervention and Control Groups	63
Table 5.4	Difference in Mean Upper Extremity Muscle Strength Before and After Treatment in the Intervention and Control Groups in the Working Area of Sawah Lebar Community Health Center, Bengkulu City.....	64
Table 5.5	Effect of Combination of Proprioceptive Neuromuscular Facilitation (PNF) and Hand Ball Grasping on the Increase of Upper Extremity Muscle Strength	65

LIST OF FIGURES

Figure 2.1 D1 Flexion-Extension Pattern.....	35
Figure 2.2 D2 Flexion-Extension Pattern.....	35
Figure 2.3 Rubber Ball.....	36
Figure 2.4 Hand Ball Grasping Exercise Movement	37
Figure 2.5 Dumbbell Equipment.....	40



LIST OF DIAGRAMS

Diagram 2.1 Research Theoretical Framework	43
Diagram 3.1 Conceptual Framework	44
Diagram 4.1 Research Design.....	48
Diagram 4.2 Research Flow	56



LIST OF ATTACHMENT

Attachment 1 Master Table	90
Attachment 2 SPSS Output	94
Attachment 3 Research Documentation – Intervention Group	108
Attachment 4 Research Documentation – Control Group	111
Attachment 5 Respondent Request Letter	113
Attachment 6 Informed Consent and Research Explanation	114
Attachment 7 Respondent Consent Letter.....	115
Attachment 8 Respondent Demographic Data Collection Instrument.....	116
Attachment 9 Manual Muscle Testing (MMT) Instrument Format	117
Attachment 10 SOP for Proprioceptive Neuromuscular Facilitation (PNF)...	118
Attachment 11 SOP for Hand Ball Grasping	122
Attachment 12 Standard Operating Procedure for Dumbbell Exercise	127
Attachment 13 Standard Operating Procedure for Manual Muscle Testing ...	129
Attachment 14 Pre-Research Permit Letter.....	131
Attachment 15 Pre-Research Letter, Bengkulu City Health Office	132
Attachment 16 Research Permit Cover Letter, Kesbangpol Bengkulu City ...	133
Attachment 17 Recommendation Letter, Kesbangpol Bengkulu City	134
Attachment 18 Research Permit Cover Letter, Bengkulu City Health Office	135
Attachment 19 Recommendation Letter, Bengkulu City Health Office	136
Attachment 20 Research Permit Cover Letter, Sawah Lebar Community Health Center	137
Attachment 21 Ethical Clearance Letter	139
Attachment 22 Research Completion Letter	140
Attachment 23 Thesis Consultation Sheet – Supervisor I.....	141
Attachment 24 Thesis Consultation Sheet – Supervisor II	143

LIST OF ABBREVIATIONS

ADL	: Activities of Daily Living
AHA	: American Heart Association
ATP	: Adenosine Triphosphate
AVM	: Arteriovenous Malformation
CAMRY	: Hand Dynamometer
CT-Scan	: Computed Tomography Scanning
DALYs	: Disability-Adjusted Life Years
DVT	: Deep Vein Thrombosis
ECG	: Electrocardiograph
EEG	: Electroencephalogram
ICH	: Intracerebral Hemorrhage
Kemenkes	: Ministry of Health of the Republic of Indonesia
LGS	: Range of Joint Motion
MMT	: Manual Muscle Testing
MRI	: Magnetic Resonance Imaging
NDT	: Neurodevelopmental Treatment
PNF	: Proprioceptive Neuromuscular Facilitation
PTM	: Non-Communicable Disease
PPOK	: Chronic Obstructive Pulmonary Disease
ROM	: Range of Motion
SD	: Standard Deviation
SKI	: Indonesian Health Survey
SSP	: Central Nervous System
SST	: Peripheral Nervous System
WHO	: World Health Organization
WSO	: World Stroke Organization