

THESIS

**RISK FACTORS AND CLINICAL CHARACTERISTICS OF ADULT
PATIENTS WITH INTRACRANIAL HAEMORRHAGE AT DR. SOETOMO
GENERAL ACADEMIC HOSPITAL, SURABAYA, INDONESIA IN 2020**



Author

Nabeel Usama Okbah

NIM. 011911133080

INTERNATIONAL CLASS MEDICAL EDUCATION PROGRAM

FACULTY OF MEDICINE

UNIVERSITAS AIRLANGGA

SURABAYA

2022

Thesis

**The Risk Factors and Clinical Characteristics of Adult Patients with Intracranial
Haemorrhage at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia
in 2020**

Research Paper

To fulfil the obligation of Research Methodology and Biostatistics Module Faculty of
Medicine Universitas Airlangga

Author

Nabeel Usama Okbah

NIM. 011911133080

INTERNATIONAL CLASS MEDICAL EDUCATION PROGRAM

FACULTY OF MEDICINE

UNIVERSITAS AIRLANGGA

SURABAYA

2022

FORM OF APPROVAL

Approved for examination

Date 16 December 2022

Supervisor I



Prof. Viskasari P. Kalaniga dr., M.Kes, PA(K), Ph.D (UQ)

NIP. 197603202005012003

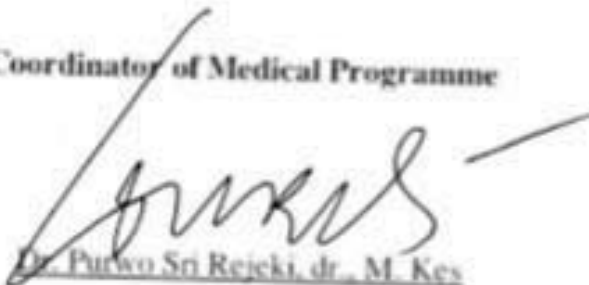
Supervisor II



Dr. dr. Astra Al Fauzi, SE, MM, Sp.BS(K), FICS, FACS, IFAANS

NIP. 197010012000031010

Coordinator of Medical Programme



Dr. Purwo Sri Rejeki, dr., M. Kes

NIP. 197506122005012003

EXAMINER DECISION FORM

**THE RISK FACTORS AND CLINICAL CHARACTERISTICS OF ADULT
PATIENTS WITH INTRACRANIAL HAEMORRHAGE AT DR. SOETOMO
GENERAL ACADEMIC HOSPITAL, SURABAYA, INDONESIA IN 2020**

THESIS

Author:

Nabeel Usama Okbah

NIM. 011911133080

Approved and accepted after being assessed by the Examiner Team of the
Medical Program, Faculty of Medicine, Universitas Airlangga

Surabaya, 28 December 2022

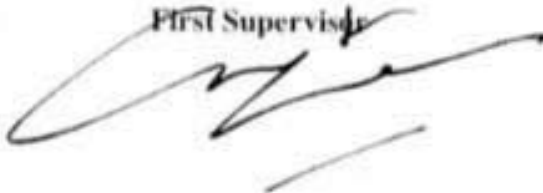
Approved by,
Chief Examiner



Nurina Hasanatuludhhiyah, dr., M. Si

NIP. 198110062008012018

First Supervisor



Prof. Viskasari P. Kalanjati dr.,

M.Kes, PA(K), Ph.D (UQ)

NIP. 197603202005012003

Second Supervisor



Dr. dr. Asra Al Fauzi, SE., MM,

Sp.BS(K), FICS, FACS, IFAANS

NIP. 197010012000031010

STATEMENT OF ORIGINALITY

The undersigned, I:

Name : Nabeel Usama Okbah

NIM : 011911133080

Study Program : Medical Program

Faculty : Medicine

Stage : Bachelor

Stating that I have not committed plagiarism in the writing of my thesis entitled:

The Risk Factors and Clinical Characteristics of Adult Patients with
Intracranial Haemorrhage at Dr. Soetomo General Academic Hospital,
Surabaya, Indonesia in 2020

If one day it is proven to have committed plagiarism, then I will receive the sanctions
that have been set.

Thus, this statement letter I made in real terms.

Surabaya, 28 December 2022



Nabeel Usama Okbah

NIM. 011911133080

ACKNOWLEDGEMENT

All praise is due to the presence of Allah SWT for the abundance of His Grace and Mercy so I could complete this thesis, entitled “The Risk Factors and Clinical Characteristics of Adult Patients with Intracranial Haemorrhage at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia in 2020”, in due time. Additionally, I recognize that the completion of this thesis could not be achieved without the assistance and guidance of several parties. With humility, I would like to express my utmost gratitude to the following:

1. Prof. Dr. Mohammad Nasih, SE.MT., Ak, as the Rector of Universitas Airlangga (2015-2025), for giving me the opportunity to pursue quality education in Faculty of Medicine, Universitas Airlangga.
2. Prof. Dr. Budi Santoso, dr., Sp.OG(K), as the Dean of Universitas Airlangga (2020-2025), for giving me the opportunity to pursue quality education in Faculty of Medicine, Universitas Airlangga.
3. Dr. Purwo Sri Rejeki, dr., M.Kes., as the Coordinator of the Study Program of Medicine (2020-2025) for permitting the completion of this thesis.
4. Dr. Pudji Lestari, dr., M. Kes., as the Head of the Research Module, for assisting and facilitating the completion of this thesis.
5. Prof. Viskasari P. Kalanjati dr., M.Kes, PA(K)., Ph.D (UQ), as my first supervisor, for guiding me and providing inputs and feedbacks throughout the process of completing this thesis.
6. Dr. dr. Asra Al Fauzi, SE, MM, Sp.BS(K), FICS, FACS, IFAANS, as my second supervisor, for guiding me and providing inputs and feedbacks throughout the process of completing this thesis.

7. Nurina Hasanatuludhhiyah. dr., M.Si., as the examiner of this thesis, for taking the time to examine and provide feedback and criticism to the presentation of this thesis.
8. All the lecturers, medical staff and administrative staff of Faculty of Medicine, Universitas Airlangga and Dr. Soetomo General Academic Hospital for permitting and facilitating the progression and completion of this thesis.
9. Family of Author : Usama Okbah, my father, for all the emotional, mental and financial support and prayers throughout the completion of this thesis.
Soviyah Alamudi, my mother, for all the emotional, mental and financial support throughout the completion of this thesis.
10. My beloved friends from GPN XXXI and Ahmed Eliaan Abu Ajwa, Alimin Bin Alias, Muhammad Brahma and many others I could not mention for their support and prayers throughout the completion of this thesis.

Surabaya, 12 December 2022

Nabeel Usama Okbah

SUMMARY

Intracranial haemorrhage (ICrH) is a life-threatening disease characterized by the presence of haemorrhage within the intracranial compartment. Nontraumatic ICrH often refers to intracerebral haemorrhage (ICH) or subarachnoid haemorrhage (SAH), marked by spontaneous rupture of cerebral blood vessels due to various factors, including hypertensive crisis, cerebral amyloid angiopathy, arteriovenous malformation, and cerebral aneurysms. While many prior studies have linked comorbidities, such as hypertension and diabetes, to the incidence of ICrH, data with regards to their collective influence to ICrH is scarce. This study aims to identify the risk factors and demonstrate their potential associations to the clinical characteristics of adult patients with ICrH.

A retrospective cross-sectional study design was used, and data from medical records of adult patients with ICrH at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia in 2020 was collected for descriptive and analytical studies. The risk factors collected were hypertension and Type 2 Diabetes Mellitus (T2DM), and the clinical characteristics noted were headache, level of consciousness, hemiparesis, vomiting and seizure. Additionally, demographic data was collected including age, sex and educational level. Fisher's Exact Test and Pearson's correlation test was used to identify potential association between risk factors and clinical characteristics.

Eighty-seven ICH patients and 24 SAH patients were admitted into Dr. Soetomo General Academic Hospital in 2020. The mean age of ICrH patients was 57.6 ± 11.0 and the patients were predominantly male sex (58.6%). Vomiting (72.4%) and headache (79.2%) were most frequently presented for ICH and SAH patients respectively. Hemiparesis was found significantly higher among ICH patients as compared to SAH patients. T2DM were found in 29.7% of ICrH patients. Stage 2

hypertension was most frequently recorded among both ICH and SAH patients. Hypertension was associated with level of consciousness and hemiparesis among SAH patients; however, no association with clinical characteristics was found among ICH patients.

Accordingly, this study illustrates hypertension as a risk factor for the presentation of hemiparesis and reduced level of consciousness upon admission; however, further studies may be required to demonstrate an association between the risk factors, site of haemorrhage and clinical characteristics of adult patients with ICH.

ABSTRACT

Background : Intracranial haemorrhage (ICrH) is a disease with high mortality and morbidity. Nontraumatic ICrH, namely intracerebral haemorrhage (ICH) and subarachnoid haemorrhage (SAH), attributes to 19.9% of strokes in Indonesia. Hypertension and Type 2 Diabetes Mellitus (T2DM), which are highly prevalent in Indonesia, have been shown to be among the risk factors found in ICrH patients. Considering the necessity of swift recognition of ICrH, this study aims to introduce novel information regarding the risk factors and their potential association to the clinical characteristics of adult ICrH patients.

Objective : To study the presence of various risk factors and their potential associations to the clinical characteristics of adult patients with ICrH at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia in 2020.

Methods : This study is a retrospective cross-sectional study using the medical records of adult patients with ICrH admitted into Dr. Soetomo General Academic Hospital, Surabaya, Indonesia from January 2020 to December 2020.

Results : In Dr. Soetomo General Academic Hospital, a total of one hundred one adult ICrH patients, composing of eighty-seven ICH patients and twenty four SAH patients, were admitted. Collectively, the mean age of the patients was 57.6 ± 11.0 and the majority of patients were male (58.6%). Vomiting (72.4%) and headache (79.2%) were most frequently presented for ICH and SAH patients respectively. Focal neurological deficit, in the form of hemiparesis, was found significantly higher among ICH patients as compared to SAH patients. T2DM was similarly low among ICH and SAH patients and was not associated with any clinical characteristics. Stage 2 hypertension was most frequently recorded among both ICH and SAH patients.

Hypertension was associated with level of consciousness and hemiparesis among SAH patients; however, no association with clinical characteristics was found among ICH patients.

Conclusions : Hypertension was associated with an increased presentation of hemiparesis and a reduced level of consciousness of SAH patients upon admission.

Key words : Intracerebral haemorrhage, Subarachnoid haemorrhage, Risk factor, Clinical characteristic, Dr. Soetomo General Academic Hospital

TABLE OF CONTENTS

COVER PAGE	i
IMAGE OF COVER PAGE.....	ii
FORM OF APPROVAL.....	iii
EXAMINER DECISION FORM.....	iv
STATEMENT OF ORIGINALITY	v
ACKNOWLEDGEMENT.....	vi
SUMMARY	viii
ABSTRACT	x
TABLE OF CONTENTS	xii
LIST OF TABLES.....	xvi
LIST OF FIGURES.....	xvii
LIST OF ABBREVIATIONS.....	xviii
LIST OF ATTACHMENTS.....	xx
CHAPTER I INTRODUCTION	1
1.1. Background	1
1.2. Research Question	3
1.3. Objective of Study.....	3
1.3.1. General Objectives.....	3
1.3.2. Specific Objectives	3
1.4. Significance of Study.....	4
1.4.1. Theoretical Significance.....	4

1.4.2. Practical Significance.....	4
CHAPTER II LITERATURE REVIEW	6
2.1. Intracranial haemorrhage	6
2.2. Classification of ICrH.....	6
2.2.1. Intracerebral haemorrhage	6
2.2.2. Subarachnoid haemorrhage.....	10
2.3. Diagnosis of ICrH	11
2.3.1. Assessment and Physical diagnosis.....	11
2.3.2. Additional lab examinations	11
2.4. Treatment of ICrH	13
2.4.1. Non-surgery	13
2.4.2. Surgery.....	14
2.5. Prognosis.....	14
CHAPTER III CONCEPTUAL FRAMEWORK AND HYPOTHESIS	18
3.1. Conceptual Framework.....	18
3.2. Conceptual Framework Discussion.....	19
3.3. Hypothesis.....	23
CHAPTER IV METHODS	24
4.1. Study design.....	24
4.2. Population and Sample	24
4.2.1. Population	24

4.2.2.	Sample	24
4.2.3.	Sample Criteria.....	25
4.3.	Variable and Operational Variable Definition	25
4.3.1.	Independent and Dependent Variable	25
4.3.2.	Operational Variable Definition.....	25
4.4.	Location and Time of Research	27
4.4.1.	Location of Research.....	27
4.4.2.	Time of Research	27
4.5.	Data Collection Techniques	27
4.6.	Data Analysis	28
4.7.	Operational Framework.....	28
4.8.	Ethical Eligibility	28
CHAPTER V RESULTS.....		30
5.1.	The Risk Factors of Adult Patients with ICH and SAH	30
5.2.	The Clinical Characteristics of Adult Patients with ICH and SAH	33
5.3.	Correlations between Risk Factors and the Clinical Characteristics of adult patients (> 18 years old) with ICH and SAH	34
CHAPTER VI DISCUSSION		36
6.1.	The Risk Factors of Adult Patients with ICH and SAH	36
6.2.	The Clinical Characteristics of Adult Patients with ICH and SAH	36
6.3.	Correlations between Risk Factors and the Clinical Characteristics of adult patients (> 18 years old) with ICH and SAH	38

6.3.1. ICH	38
6.3.2. SAH	39
6.4. Strengths and Limitations	41
CHAPTER VII CONCLUSION	42
7.1. Conclusion.....	42
7.2. Further Direction.....	42
REFERENCES	43
ATTACHMENT	50

LIST OF TABLES

Table 2. 1. The presentations of ICrH in CT	12
Table 2. 2 ICH score prediction for 30-day mortality	15
Table 2. 3. FUNC score for prediction of 90-day functional independence	16
Table 2. 4. Hunt and Hess grading for SAH	17
Table 4. 1. Operational variable definition	25
Table 5. 1. Shapiro Wilk Test and Kolmogorov-Smirnov Test of normality for age distribution among ICH and SAH patients.	31
Table 5. 2. Test of homogeneity for age distribution among ICH and SAH patients .	31
Table 5. 3. Risk factors and clinical characteristics of patients with ICH and SAH...	32
Table 5. 4. Degrees of hypertension among patients with ICH and SAH	33
Table 5. 5. Level of consciousness of ICH and SAH patients upon admission	34
Table 5. 6. Fisher's Exact Test between risk factors and clinical characteristics of ICH patients.	34
Table 5. 7. Fisher's Exact Test between risk factors and clinical characteristics of SAH patients.	35

LIST OF FIGURES

Figure 2. 1. SAH. A: Convexal SAH in the right frontal lobe in a patient with reversible cerebral vasoconstriction syndrome. B: Diffuse cisternal haemorrhage in a patient with ruptured intracranial aneurysm.....	12
Figure 2. 2.. ICH. A: Thalamic haemorrhage can be observed in the axial non contrast CT images indicating hypertension-induced ICH. B: Occipital lobar haemorrhage can be seen which is characteristic with CAA-induced haemorrhage.....	13
Figure 3. 1. Conceptual framework.	18
Figure 4. 1. Operational framework.	28

LIST OF ABBREVIATIONS

AV	: Arteriovenous
CAA	: Cerebral Amyloid Angiopathy
CDC	: Center of Disease Control and Prevention
CRP	: C-reactive Protein
CT	: Computed Tomography
ECM	: Extracellular Matrix
eNOS	: Endothelial Nitric Oxide Synthase
HbA1c	: Haemoglobin A1c
HDL	: High-density Lipoprotein
ICH	: Intracerebral Haemorrhage
ICrH	: Intracranial Haemorrhage
ICP	: Intracranial Pressure
IL-1 β	: Interleukin 1 Beta
IL-6	: Interleukin 6
INR	: International Normalized Ratio
IV	: Intravenous
LDL	: Low-density Lipoprotein
MMP	: Metalloproteinase
NADPH	: Nicotinamide Adenine Dinucleotide Phosphate
NF- κ B	: Nuclear Factor Kappa Light Chain Enhancer of Activated B Cell
NO	: Nitric Oxide
oxLDL	: Oxidised Low-density Lipoprotein
PKC	: Protein Kinase C
ROS	: Reactive Oxygen Species
SAH	: Subarachnoid Haemorrhage
sdLDL	: Small Dense Low-density Lipoprotein
SMC	: Smooth Muscle Cell
T2DM	: Type 2 Diabetes Mellitus
TNF- α	: Tumour Necrosis Factor Alpha

VCAM-1 : Vascular Cell Adhesion Molecule 1
VEGF : Vascular Endothelial Growth Factor

LIST OF ATTACHMENTS

Attachment 1: Certificate of Ethical Clearance.....	50
Attachment 2: Results of Analytical Studies Using SPSS 17.....	51