

# Headache in Hypertension Patients: A Concept Analysis

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## ABSTRACT

**Background:** Headache is a complaint that is often expressed by hypertensive patients and is the reason for visits to the hospital's emergency department.

**Aims:** To develop the concept of headaches in hypertensive patients.

**Methods:** A literature search was conducted using the CINAHL, PubMed, Embase, and Cochrane databases from 1989 to 2022 and found 14 articles. The search process uses the terms "Headache", AND "Hypertension" AND "Adult". The analysis used the eight steps of concept analysis developed by Walker and Avant.

**Results:** The study found four attributes to define headache in hypertension: (1) Elevated Blood Pressure, (2) Dizziness, (3) Cephalgia, and (4) Discomfort in the head. Antecedents are grouped into physiological factors, psychological factors, and situational factors. The significant consequences are impairments in quality of life, life-threatening cardiovascular complications, diminished patient activity, disability, anxiety, and impairments in a person's daily.

**Conclusions:** This concept analysis clarifies the meaning of headaches in hypertensive patients compared to headaches due to other disorders. The identified attributes of headaches in hypertension play vital roles in nursing assessments, developing research on headache assessment instruments in hypertension, and providing appropriate nursing care for hypertensive patients with headaches.

## KEY WORDS

headache, hypertension, cephalgia

## INTRODUCTION

Hypertension is another major cause of cardiovascular disease. Management of hypertension is the key to preventing complications of other diseases (Mancia, 2007). Hypertension is undeniably a cause of stroke and cardiovascular disease (4). The Global Burden of Disease study 2017 (GBD 2017) estimates that high systolic blood pressure is the cause of 10.4 million deaths globally, and 218 million live with disabilities (Stanaway *et al.*, 2018). Hypertension is a silent disease before it becomes a risk factor for other diseases. The symptoms most associated with hypertension are headaches or other neurological disorders such as migraines and tension-type headaches (Olesen & Steiner, 2004). Headaches in hypertensive patients were initially associated with malignant hypertension or lack of antihypertensive medication (Law *et al.*, 2005b). Most essential hypertension patients complain of headache episodes (Hansson *et al.*, 2000).

The International Headache Society recognizes headache as a common symptom in patients with a sudden increase in blood pressure ( $> 25$  mm Hg increase in diastolic blood pressure). Furthermore, headaches also occur in patients with malignant (accelerated) hypertension, hypertensive encephalopathy, preeclampsia, and eclampsia (Dodick, 2000). Hypertension and headache disorders are recognized as major public health problems worldwide, particularly for low- and middle-income (LAMI). Active headache disorders occur in about half of the world's adult population (Stovner *et al.*, 2007). Headache occupies the second position as the leading cause of disability worldwide. GBD2015 previously recorded tension-type headaches in second place and migraine in fifth position (Vos *et al.*, 2017).

GBD 2019 reports that migraine has shifted to the second highest position as a cause of disability and occurs in adults under 50 years of age, where this group is the most economically active (Vos *et al.*, 2020).

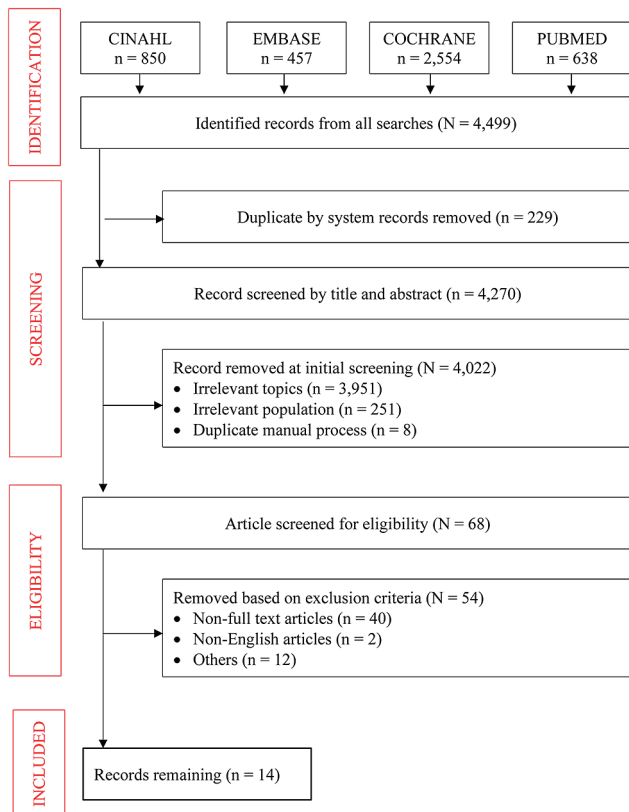
The results of previous studies showed varied results regarding the relationship between hypertension and headache. One survey showed no relationship between blood pressure values and headaches (Waters, 1971). In contrast, Krogh-Rasmussen and Olesen found that as many as 11% of people with hypertension reported having headaches (Rasmussen & Olesen, 1992). Mathew said that hypertension causes more severe headaches and is a risk factor for chronic migraine (Mathew, 1999).

Headaches, directly and indirectly, can be a burden socially and economically (Hu *et al.*, 1999). The appearance of a headache can be a sign of a severe underlying illness, but attention to the presence of a headache still receives little priority (Kryst & Scherl, 1994). The results showed that the presence of migraine-type headaches, especially with aura and a high frequency of  $> 12$  times/year, increased the risk of stroke in young women with OR = 10(2.18-49.4) (Donaghy *et al.*, 2002). Treatment of hypertension, together with management for migraine prevention, is expected to reduce the risk of cardiovascular and cerebrovascular disease. Early and accurate diagnosis and appropriate treatment will help reduce pain and suffering and the economic burden. Based on this description, the writer takes the topic of headaches intending to analyze the concept of headaches in hypertensive patients.

## METHODS

### 1. Concept Analysis

This concept uses Walker and Avant's (2005) approach by compiling attributes to define and describe. This method requires conceptual examples and documents (Walker & Avant, 2005). The stages in draft-



**Figure 1: Flowchart of literature search and article extraction**

ing the concept consist of the following.

- a. Selection of concepts
- b. Determination of the purpose of the analysis
- c. Identification of all the concepts referred to in various literatures
- d. Definition of the attributes
- e. Identification of a case model
- f. Identification of cases in different contexts
- g. Identification of the antecedents and consequences
- h. Definition of empirical references

## 2. Data Sources

The study used a systematic review using the terms "Headache", AND "Hypertension" AND "Adult" in the PubMed, CINAHL Plus, Cochrane Library, and Embase databases on November 18, 2022. Search for articles that fit this topic using the Population-Concept-Context (PCC) guide (Briggs, 2015). The population on this topic are hypertensive patients, Concept in the form of Headaches, and Context in adults. Manuscripts were selected using inclusion criteria in English and full text. Manuscripts containing headaches due to Idiopathic intracranial hypertension (IIH), Pulmonary Hypertension, Renal hypertension, Pheochromocytoma, and pregnancy are excluded from this topic.

## RESULTS

A total of 4,499 articles were obtained at the time of initial identification. A total of 229 articles were recorded as duplicates, so the initial screening obtained 4270. After selection based on titles and abstracts, it was found that 3,951 articles needed to follow the topic, and 248 needed to follow the population. After the reduction process, 76 articles were obtained, and a manual check was carried out; there were eight duplicate articles. A total of 68 articles are eligible for the next stage. Subsequent examinations were based on inclusion and exclusion criteria. A total of 40 articles did not have full text, two non-English articles, 1 article about Pheochromocytoma, 1 article about Pulmonary Hypertension, 1 article about Renal hypertension, and nine articles about Idiopathic intracranial hypertension (IIH). A total of 14 articles

met the inclusion and exclusion criteria. The process of searching for articles is presented in figure 1.

## 1. Selection of Concept

Based on Walker and Avant, selecting concepts to be used is suggested according to the domain and area of interest (Walker & Avant, 2005). The concept chosen in this study concerns the headache as a symptom in hypertensive patients.

## 2. Determination of the Purpose of the Analysis

The second stage in drafting the concept is the importance of narrowing down the selected area so that further discussion is more focused. In addition, it is also to facilitate and guide the preparation of the following stages. The purpose of analysis in this study is to analyze the concept of headaches in adult hypertensive patients.

## 3. Identification of the Use of Concepts

Headache is an experience that almost all humans in the world have felt (Rizzoli & Mullally, 2018). Headaches are one of the reasons someone goes to a general practitioner or a neurologist (Wiles & Lindsay, 1996). Headache is a feeling of pressure or tightness like a band around the head and can spread into or from the neck (Steiner & Fontebasso, 2002). Headache is a pain in the head or face that is often described as a throbbing, constant, sharp, or dull pressure. Headaches can be very different in terms of the type of pain, severity, location and frequency (Ahmed, 2012). Many factors can cause headaches, one of which is suffering from a particular disease. Many diseases have signs and symptoms of headache, such as intracranial tumours, meningitis, subarachnoid haemorrhage, temporal arteritis, primary angle closure glaucoma, idiopathic intracranial hypertension, and subacute carbon monoxide poisoning. Cardiovascular disease can also cause headaches, such as increased blood pressure in hypertension (Courand *et al.*, 2016).

The relationship between high blood pressure and headaches was first discussed in the early 20th century (Wang & Wang, 2021). Previous studies have stated that morning headaches indicate an elevation in blood pressure. Through these symptoms, patients report headaches as a complaint when their blood pressure increases (Friedman *et al.*, 2014). Headache related to hypertension was reported in patients with systolic blood pressure (SBP)  $\geq 180$  mmHg and diastolic blood pressure (DBP) of 120 mmHg (Arnold, 2018). Many diseases and disorders in the body can cause headaches, each of which causes headaches with different characteristics. Through this concept, it is hoped that the characteristic of headaches in hypertension patients will be known in more detail.

## 4. Specifying Attributes

Walker and Avant explained that determining attributes in a concept is the core of concept analysis. The definition of attributes begins by grouping most attributes related to Table 1. The attributes of this concept are:

- a. Elevated Blood Pressure  
Acute increase in blood pressure, which directly endangers the patient's life, represented by symptoms of hypertension which develop suddenly and which is caused by various etiological moments (Aggarwal & Khan, 2006)
- b. Dizziness  
The illusion of movement of the individual or his or her surrounding environment. This symptom can be caused by dysfunction of any segment of the systems related to body balance (Cabral *et al.*, 2009)
- c. Cephalalgia  
Pain in the head, caused by dilation of cerebral arteries, muscle contraction, insufficient oxygen in the cerebral blood, reaction to drugs, etc (Assarzagdegan *et al.*, 2013)
- d. Discomfort in head  
An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (Treede, 2018).

## 5. Case Model

Case models are examples of cases that use the concepts that have been analyzed, using all the definitions and attributes that have been presented. The following is an example of a case model in this concept.

**Table 1: Defining Attributes**

Defining Attributes	Sources
<b>Elevated Blood Pressure</b> Elevated Systolic Blood Pressure (SBP) Elevated Diastolic Blood Pressure (DBP) Elevated SBP & DPB SBP ≥ 180 mm Hg dan/atau DBP ≥ 120 mm Hg Sudden elevation of blood pressure	<b>References:</b> (Assarzadegan <i>et al.</i> , 2013; Courand <i>et al.</i> , 2016; Dodick, 2000; Handler, 2004; Hansson <i>et al.</i> , 2000; Hong <i>et al.</i> , 2003; Kruszewski <i>et al.</i> , 2000; Mohammadi <i>et al.</i> , 2021; Prudeniano <i>et al.</i> , 2005)
<b>Dizziness</b> Light sensitive Stiff in the shoulders Head-motion intolerance Gait instability	<b>References:</b> (Assarzadegan <i>et al.</i> , 2013; Blanchard <i>et al.</i> , 1989; Cugini <i>et al.</i> , 1992; Dodick, 2000; Hong <i>et al.</i> , 2003; Kumar <i>et al.</i> , 2017; Manandhar <i>et al.</i> , 2021)
<b>Cephalgia</b> Tightness or pressure feeling in head Pain in head Pain sensitive area of head (brain parenchyma, meninges, eyes, ear, nose, sinuses, mucous membrane, periosteum of cranium etc)	<b>References:</b> (Alyabyeva <i>et al.</i> , 2022; Assarzadegan <i>et al.</i> , 2013; Blanchard <i>et al.</i> , 1989; Courand <i>et al.</i> , 2016; Cugini <i>et al.</i> , 1992; Dodick, 2000; Handler, 2004; Hansson <i>et al.</i> , 2000; Hong <i>et al.</i> , 2003; Kruszewski <i>et al.</i> , 2000; Kumar <i>et al.</i> , 2017; Manandhar <i>et al.</i> , 2021; Mohammadi <i>et al.</i> , 2021; Prudeniano <i>et al.</i> , 2005)
<b>Discomfort in Head</b> Facial flushing Ringing in the ears Tenseness Tinnitus	<b>References:</b> (Alyabyeva <i>et al.</i> , 2022; Courand <i>et al.</i> , 2016; Handler, 2004; Hansson <i>et al.</i> , 2000; Kruszewski <i>et al.</i> , 2000; Kumar <i>et al.</i> , 2017; Manandhar <i>et al.</i> , 2021; Mohammadi <i>et al.</i> , 2021)

"Mrs K, 48 years old, was brought by her family to the emergency room of X Hospital because of a severe headache she felt. The headache has been felt since three days ago. Headaches are felt to increase in the morning when she wakes up. The patient reports ringing in the ears, tension, and redness of the face (**Discomfort in the Head**). Headaches that are felt gradually decrease but persist. The results of the blood pressure examination were 200/118 mm Hg. The patient admitted that her last blood pressure was checked two weeks ago, and the results were 140/90 mmHg (**Elevated Blood Pressure**). The patient describes her headaches as having her forehead tied tightly and tightly by a rope and pain felt throughout the head area so that the neck feels stiff (**Cephalgia**). When she walked, she had to be assisted by her family; she felt about to fall. When the light was bright and his head was moved, it hurt more (**Dizziness**). The patient was diagnosed with hypertension three years ago and does not routinely control blood pressure."

The patient says his whole head hurts, and his neck is stiff (**Cephalgia**). The headache will worsen when getting out of bed or in very bright light (**Dizziness**). This situation feels like the head is spinning, causing nausea and vomiting.

In this case, only two attributes were presented, namely cephalgia and dizziness, whereas there was no increase in blood pressure and discomfort in the head.

*c. Contradictory Case*

Mr D, 38 years old, has just been fired. Mr D is the backbone of the family that supports the needs of all its members. A debt collector visited Mr D to collect a significant debt. He was forced to mortgage his house to pay off the debt. Mr D complained to his close friend that he experienced extraordinary headaches due to his life problems.

**6. Identification of Cases in Different Contexts**

*a. Borderline Case*

The borderline case is the case that contains most but not all of the attributes of this concept, for example:

"Mr N, 40 years old, went to the internal medicine clinic because he had a headache. The patient has suffered from hypertension for five years and routinely controls his blood pressure. The patient admits that the most intense pain is felt in the upper part of the head (**Cephalgia**), causing ringing in the ears and reddening of the face due to the pain (**Discomfort in the Head**). The patient feels stiff in the neck and has dizzy eyes (**Dizziness**). According to the patient, this was supposed to happen after being unable to sleep for the last two days."

Almost all attributes were found in this case, but one attribute, elevated blood pressure, was absent. elevated blood pressure is an indicator of headache in hypertensive patients, especially in crises (Courand *et al.*, 2016; Kruszewski *et al.*, 2000; Mohammadi *et al.*, 2021; Prudeniano *et al.*, 2005).

*b. Related Case*

Related cases are examples of ones like those being analyzed but not containing all of the set attributes, for example:

"Mr K was taken to the emergency room because of a headache.

**7. Antecedent and Consequences**

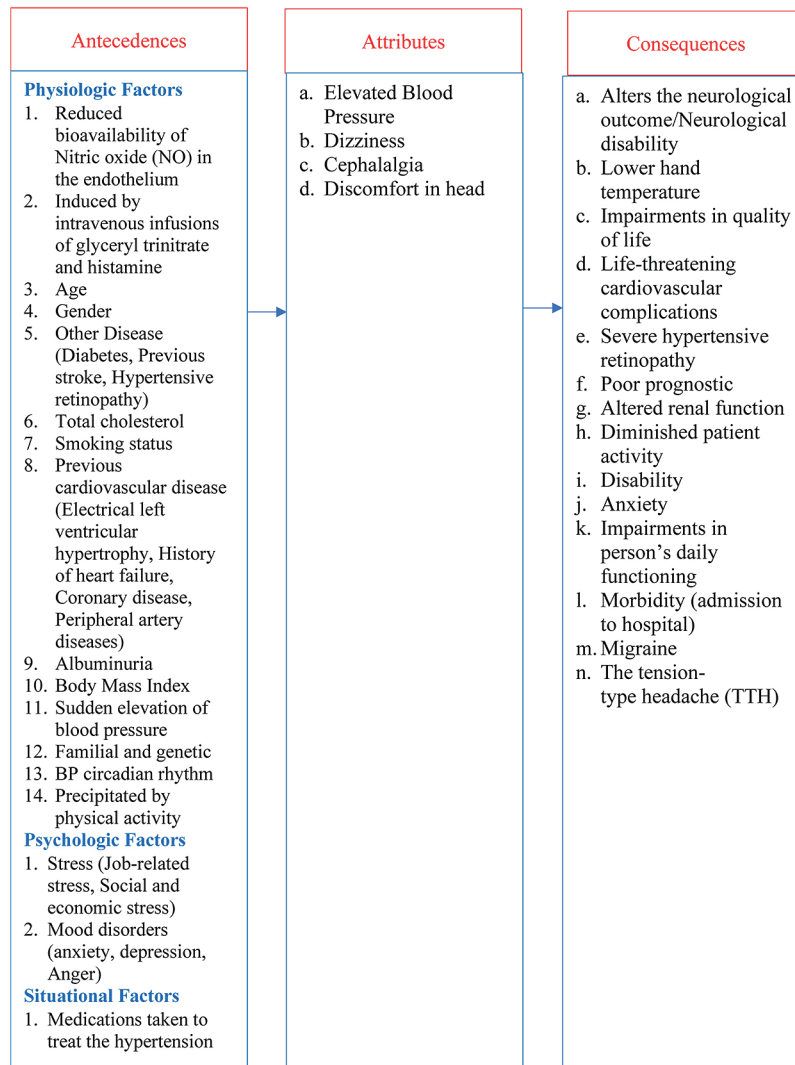
An antecedent is an event or factor that should exist for the occurrence of the concept in question. The antecedents obtained from this concept are:

- a. Reduced bioavailability of Nitric oxide (NO) in the endothelium
- b. Induced by intravenous infusions of glyceryl trinitrate and histamine
- c. Age
- d. Gender
- e. Other Disease (Diabetes, Previous stroke, Hypertensive retinopathy)
- f. Total cholesterol
- g. Smoking status
- h. Previous cardiovascular disease (Electrical left ventricular hypertrophy, History of heart failure, Coronary disease, Peripheral artery diseases)
- i. Albuminuria
- j. Medications taken to treat the hypertension
- k. Body Mass Index
- l. Stress (Job-related stress, Social and economic stress)
- m. Mood disorders (anxiety, depression, Anger)
- n. Sudden elevation of blood pressure
- o. Familial and genetic
- p. BP circadian rhythm
- q. Precipitated by physical activity

**Table 2: Details of the articles used**

No	Year	Title	Design	Samples	Age	Elevated Blood Pressure	Dizziness	Cephalgia	Discomfort in head
1	Alyabyeva <i>et al.</i>	2022	Intracranial pressure directly predicts headache morbidity in idiopathic intracranial hypertension	Experimental study	Group 1 = 30; Group 2 = 30; Group 3 = 31	Middle age adults (male: 45 to 65 years old, female: 40 to 60 years old)	√	√	
2	Blanchard <i>et al.</i>	1989	Hand temperature norms for headache, hypertension, and irritable bowel syndrome	Experimental study	221 headache patients, 105 hypertensive, 45 irritable bowel syndrome patients, and 56 normal	39-42	√	√	√
3	Courand <i>et al.</i>	2016	The Paradoxical Significance of Headache in Hypertension	The Lyon OLD-HTA cohort	1,914 hypertensive patients	45.1 ± 13.4	√	√	√
4	Handler, J.	2004	Headaches and hypertension: primary or secondary?	Case Study	2	48 and 67	√	√	√
5	Hong, Y. H.; Lee, Y. S.; Park, S. H.	2003	Headache as a predictive factor of severe systolic hypertension in acute ischemic stroke	Observational Study	131 ischemic stroke patients	66, SD ± 12 years	√	√	√
6	Kruszewski <i>et al.</i>	2000	Headache in patients with mild to moderate hypertension is generally not associated with simultaneous blood pressure elevation	Observational Study	150	48 SD ± 10 years	√	√	√
7	Manandhar <i>et al.</i>	2021	If headache has any association with hypertension, it is negative. Evidence from a population-based study in Nepal	Cross-sectional	2100	Nepalese adult population (18-65 years)	√	√	√
8	Mohammadi <i>et al.</i>	2021	Relation of hypertension with episodic primary headaches and chronic primary headaches in population of Rafsanjan cohort study	Cohort study, as one of the Prospective Epidemiological Research Studies	10,000 residents of Rafsanjan, 9993 eligible	35 to 70	√	√	√
9	Prudenzano <i>et al.</i>	2005	The comorbidity of migraine and hypertension. A study in a tertiary care headache centre	Observational Study	240 adult	181 females, mean age 39.44 ± 13.02 years, and 59 males, mean age 37.12 ± 13.94	√	√	
10	Hansson <i>et al.</i>	2000	Headache in mild-to-moderate hypertension and its reduction by irbesartan therapy	Clinical Trial	2673 mild to moderate hypertension	> 18 years	√	√	√

11	Kumar <i>et al</i>	2017	Prevalence of primary headache in association with age, sex, obesity and hypertension among patients received at OPD of Liaquat university hospital, Hyderabad/Jamshoro	Cross-sectional study	200 patients	> 18 years	√	√	√
12	Cugini <i>et al</i>	1992	Nocturnal headache-hypertension syndrome: a chronobiologic disorder	Observational Study	Thirty essential hypertensive patients	17-54 years old)	√	√	
13	Dodick, D. W.	2000	Recurrent short-lasting headache associated with paroxysmal hypertension: a clonidine-responsive syndrome	Case Study	2	62 & 68	√	√	
14	Assarzadegan <i>et al</i>	2013	Secondary headaches attributed to arterial hypertension	Review article	Not mention	Not mention	√	√	



**Figure 2: Antecedents, attributes, and consequences of the concept of Headache in Hypertension**

Consequences are events or factors that occur as a result of the concept analysis, which are called outcomes. Consequences in this concept are:

- a. Alters the neurological outcome/Neurological disability
- b. Lower hand temperature
- c. Impairments in quality of life
- d. Life-threatening cardiovascular complications
- e. Severe hypertensive retinopathy
- f. Poor prognostic
- g. Altered renal function
- h. Diminished patient activity
- i. Disability
- j. Anxiety
- k. Impairments in person's daily functioning
- l. Morbidity (admission to hospital)
- m. Migraine
- n. The tension-type headache (TTH)

## 8. Determination of References or Empirical References (Empirical Referents)

This stage is the final stage of the concept analysis by Walker and Avant. Empirical references are categories of actual phenomena whose existence may reveal the concept itself. In some cases, the attributes and empirical references may be identical. Sometimes the concepts being analyzed and their attributes are very abstract; then, this condition is called an empirical reference, which is very important. Empirical references are beneficial for developing instruments because they are closely related to the concepts being discussed.

- a. Questionnaire from the British Association for the Study of Headache management guidelines (MacGregor *et al.*, 2010)

## DISCUSSION

Janeway reported the classic expression that there is a headache in hypertensive patients that appears when patients wake up, throbs in the head area, and gradually subsides more than 90 years ago (Law *et al.*, 2005a). Hypertensive patients complain that the incidence of headaches is higher than the general population, and the role of hypertension as a factor that increases the severity and frequency of migraines is also confirmed (Mathew, 1999). Several major characteristics of cephalgia have rarely been described in certain groups of hypertensive patients, and only attempts to classify the different types of headaches have been proposed. In the general population setting, migraine is found more frequently in subjects with optimal to standard blood pressure. However, elevated blood pressure, stroke, epilepsy and psychiatric disorders have been associated with migraine (Muiesan *et al.*, 2006).

Tension-type headaches and migraine are in hypertensive patients, which are found in all articles used to prepare this concept. Nevertheless, the incidence of tension-type headaches is higher than migraine. The existence of a vascular mechanism can explain this. An increase in blood pressure in hypertensive patients triggers a tension-type headache. In addition, it can be caused by general hypertension therapies such as beta-blockers, calcium antagonists, and others which cause a sudden decrease in blood pressure (Prudenzano *et al.*, 2005).

Headache due to either migraine or tension is described as pulsating or throbbing pain, which causes tightness or a feeling of pressure in the patient. Severe cephalgia can cause persistent vomiting supporting intracranial lesions as a complication of hypertension (Kumar *et al.*, 2017). One of the causes and characteristics of a headache in hypertension is following the attributes of this concept, namely an increase in blood pressure either systolic (Handler, 2004; Hong *et al.*, 2003), diastolic (Dodick, 2000; Hansson *et al.*, 2000), or both (Courand *et al.*, 2016; Kruszewski *et al.*, 2000; Mohammadi *et al.*, 2021; Prudenzano *et al.*, 2005). Several studies have proven the relationship between headaches and hypertension. Treatment and appropriate hypertension therapy reduce headaches' incidence compared to those without treatment. Hansson proved that patients who received irbesartan therapy showed a significant reduction in the incidence of headaches compared to patients who received a placebo (17% vs 22%) (Hansson *et al.*, 2000). Other antihypertensive drugs, such as beta-blockers and calcium antagonists, are known to be effective in treating hypertension and have also been used successfully to treat vascular headaches.

Another explanation for the greater prevalence of cephalgia among hypertensive patients, compared with normotensive subjects, explain that headache is a general predisposition to arterial hypertension. Another opinion says headache is the cause and not a symptom of increased blood pressure. Headaches, especially those that are more severe, can cause activation of the sympathetic nervous system resulting in increased blood pressure (Kruszewski *et al.*, 1992). Headaches may lead to reduced patient activity and, as a result, lower blood pressure levels. Even so, it is undeniable that the presence of a headache affects the patient's activities, productive activities, and quality of life. Appropriate management of headaches in hypertension provides many benefits and is proven to improve patient's quality of life (Alyabyeva *et al.*, 2022; Hansson *et al.*, 2000; Mohammadi *et al.*, 2021). Early blood pressure assessment in hypertensive patients who report headaches is crucial for management. Therapy for hypertension is also necessary to eliminate other risks.

## IMPLICATIONS AND LIMITATION

This concept can be used as a basis for nurses to research headaches in hypertension. By drafting the concept, the authors found a limited instrument for assessing headaches in hypertensive patients. For this reason, it is necessary to have thorough research aimed at preparing the instrument. In addition, research on headache treatment using independent nursing interventions or collaborating with medical professionals can also be carried out. The author realizes there are limitations in the preparation of this manuscript. The author uses the Walker and Avant concept analysis methodology, which is one of the weaknesses in the manuscript. This is due to the limited scope of the analysis. In the Walker and Avant method, there are no strict rules in their methodology, but they only provide guidelines, and all depend on the author's knowledge. The author works in a team, aiming to enrich the discussion process and increase the breadth of knowledge contained in this manuscript. We use these efforts to overcome the shortcomings and weaknesses of our methods.

## CONCLUSION

Headache in hypertensive patients is a complaint of pain in the pericranium caused by increased systolic and diastolic blood. Headache can be an indicator of the severity of hypertension so that it can be used to prevent worsening conditions.

## REFERENCES

- Aggarwal, M., & Khan, I. A. (2006). Hypertensive crisis: hypertensive emergencies and urgencies. *Cardiology clinics*, 24(1), 135-146.
- Ahmed, F. (2012). Headache disorders: differentiating and managing the common subtypes. *Br J Pain*, 6(3), 124-132. <https://doi.org/10.1177/2049463712459691>
- Alyabyeva, P. V., Chastina, O. V., Petrova, M. M., Lareva, N. V., Garganeeva, N. P., Chumakova, G. A., Cherniaeva, M. S., & Shnyder, N. A. (2022). New Genetic Biomarkers of the Overlap Syndrome Tension-Type Headache and Arterial Hypertension. *Genes*, 13(10), 1823.
- Arnold, M. (2018). Headache classification committee of the international headache society (IHS) the international classification of headache disorders. *Cephalalgia*, 38(1), 1-211.
- Assarzadegan, F., Asadollahi, M., Hesami, O., Aryani, O., & Mansouri, B. (2013). Secondary headaches attributed to arterial hypertension. *Iranian Journal of Neurology*, 12(3), 106.
- Blanchard, E. B., Morrill, B., Wittrock, D. A., Scharff, L., & Jaccard, J. (1989). Hand temperature norms for headache, hypertension, and irritable bowel syndrome. *Biofeedback and Self-regulation*, 14(4), 319-331.
- Briggs, I. J. (2015). Joanna Briggs Institute reviewers' manual: 2015 edition/supplement. *Adelaide: The Joanna Briggs Institute.*
- Cabral, G. T. R., Correa, L. B., Silveira, S., & Lopes, R. P. (2009). Interferência da queixa de tontura na qualidade de vida dos idosos cadastrados na UBS do bairro Araçás, Vila Velha/ES. *Acta Orl*, 27(2), 58-63.
- Courand, P.-Y., Serraille, M., Girerd, N., Demarquay, G., Milon, H., Lantelme, P., & Harbaoui, B. (2016). The Paradoxical Significance of Headache in Hypertension. *American Journal of Hypertension*, 29(9), 1109-1116. <https://doi.org/10.1093/ajh/hpw041>
- Cugini, P., Granata, M., Strano, S., Ferrucci, A., Ciavarella, G. M., Palma, L. D., Leone, G., & Giacobazzo, M. (1992). Nocturnal headache-hypertension syndrome: a chronobio-

- logic disorder. *Chronobiology International*, 9(4), 310-313.
- Dodick, D. (2000). Recurrent short-lasting headache associated with paroxysmal hypertension: a clonidine-responsive syndrome. *Cephalgia*, 20(5), 509-514.
- Donaghy, M., Chang, C., & Poulter, N. (2002). Duration, frequency, recency, and type of migraine and the risk of ischaemic stroke in women of childbearing age. *Journal of Neurology, Neurosurgery & Psychiatry*, 73(6), 747-750.
- Friedman, B. W., Mistry, B., West, J. R., & Wollowitz, A. (2014). The association between headache and elevated blood pressure among patients presenting to an ED. *The American Journal of Emergency Medicine*, 32(9), 976-981.
- Handler, J. (2004). Headaches and hypertension: primary or secondary? *The Journal of Clinical Hypertension*, 6(1), 42.
- Hansson, L., Smith, D. H., Reeves, R., & Lapuerta, P. (2000). Headache in mild-to-moderate hypertension and its reduction by irbesartan therapy. *Archives of internal medicine*, 160(11), 1654-1658.
- Hong, Y.-H., Lee, Y.-S., & Park, S.-H. (2003). Headache as a predictive factor of severe systolic hypertension in acute ischemic stroke. *Canadian journal of neurological sciences*, 30(3), 210-214.
- Hu, X. H., Markson, L. E., Lipton, R. B., Stewart, W. F., & Berger, M. L. (1999). Burden of migraine in the United States: disability and economic costs. *Archives of internal medicine*, 159(8), 813-818.
- Kruszewski, P., Bieniaszewski, L., Neubauer, J., & Krupa-Wojciechowska, B. (2000). Headache in patients with mild to moderate hypertension is generally not associated with simultaneous blood pressure elevation. *Journal of hypertension*, 18(4), 437-444.
- Kruszewski, P., Bordini, C., Brubakk, A. O., & Sjaastad, O. (1992). Cluster headache: alterations in heart rate, blood pressure and orthostatic responses during spontaneous attacks. *Cephalgia*, 12(3), 172-177.
- Kryst, S., & Scherl, E. (1994). A population?based survey of the social and personal impact of headache. *Headache: The Journal of Head and Face Pain*, 34(6), 344-350.
- Kumar, S., Nazia, S., Almani, S. A., Lakhair, M., Shah, M. I., & Suhail, Z. (2017). Prevalence of primary headache in association with age, sex, obesity and hypertension among patients received at OPD of Liaquat University Hospital, Hyderabad/Jamshoro. *JLUMHS-Journal of the Liaquat University of Medical Health Sciences*, 16(2), 103-107.
- Law, M., Morris, J. K., Jordan, R., & Wald, N. (2005a). Headaches and the Treatment of Blood Pressure. *Circulation*, 112(15), 2301-2306. <https://doi.org/doi:10.1161/CIRCULATIONAHA.104.529628>
- Law, M., Morris, J. K., Jordan, R., & Wald, N. (2005b). Headaches and the treatment of blood pressure: results from a meta-analysis of 94 randomized placebo-controlled trials with 24 000 participants. *Circulation*, 112(15), 2301-2306.
- MacGregor, E., Steiner, T., & Davies, P. (2010). British Association for the Study of Headache guidelines for all healthcare professionals in the diagnosis and management of migraine, tension-type, cluster and medication-overuse headache. 3rd. *BASH*, 1-53.
- Manandhar, K., Risal, A., Koju, R., Linde, M., & Steiner, T. J. (2021). If headache has any association with hypertension, it is negative. Evidence from a population-based study in Nepal. *Cephalgia*, 41(13), 1310-1317.
- Mancia, G. (2007). Blood pressure reduction and cardiovascular outcomes: past, present, and future. *The American journal of cardiology*, 100(3), S3-S9.
- Mathew, N. (1999). Migraine and hypertension. *Cephalgia*, 19(25\_suppl), 17-19.
- Mohammadi, M., Ayoobi, F., Khalili, P., Soltani, N., La Vecchia, C., & Vakilian, A. (2021). Relation of hypertension with episodic primary headaches and chronic primary headaches in population of Rafsanjan cohort study. *Scientific Reports*, 11(1), 1-10.
- Muiesan, M. L., Padovani, A., Salvetti, M., Monteduro, C., Poisa, P., Bonzi, B., Pains, A., Cottini, E., Agosti, C., Castellano, M., Rizzoni, D., Vignolo, A., & Agabiti-Rosei, E. (2006). Headache: Prevalence and relationship with office or ambulatory blood pressure in a general population sample (the Vobarno Study). *Blood Pressure*, 15(1), 14-19. <https://doi.org/10.1080/08037050500436089>
- Olesen, J., & Steiner, T. (2004). The International classification of headache disorders, 2nd edn (ICDH-II). In (Vol. 75, pp. 808-811): BMJ Publishing Group Ltd.
- Prudenzano, M. P., Monetti, C., Merico, L., Cardinali, V., Genco, S., Lamberti, P., & Livrea, P. (2005). The comorbidity of migraine and hypertension. A study in a tertiary care headache centre. *The journal of headache and pain*, 6(4), 220-222.
- Rasmussen, B. K., & Olesen, J. (1992). Symptomatic and nonsymptomatic headaches in a general population. *Neurology*, 42(6), 1225-1225.
- Rizzoli, P., & Mullally, W. J. (2018). Headache. *Am J Med*, 131(1), 17-24. <https://doi.org/10.1016/j.amjmed.2017.09.005>
- Stanaway, J. D., Afshin, A., Gakidou, E., Lim, S. S., Abate, D., Abate, K. H., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F. (2018). Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, 392(10159), 1923-1994.
- Steiner, T. J., & Fontebasso, M. (2002). Headache. *Bmj*, 325(7369), 881-886.
- Stovner, L., Hagen, K., Jensen, R., Katsarava, Z., Lipton, R., Scher, A., Steiner, T., & Zwart, J. (2007). The global burden of headache: a documentation of headache prevalence and disability worldwide. *Cephalgia*, 27(3), 193-210.
- Treede, R. D. (2018). The International Association for the Study of Pain definition of pain: as valid in 2018 as in 1979, but in need of regularly updated footnotes. *Pain Rep*, 3(2), e643. <https://doi.org/10.1097/pr9.0000000000000643>
- Vos, T., Abajobir, A. A., Abate, K. H., Abbafati, C., Abbas, K. M., Abd-Allah, F., Abdulkader, R. S., Abdulle, A. M., Abebo, T. A., & Abera, S. F. (2017). Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*, 390(10100), 1211-1259.
- Vos, T., Lim, S. S., Abbafati, C., Abbas, K. M., Abbasi, M., Abbasifard, M., Abbasi-Kangevari, M., Abbastabar, H., Abd-Allah, F., & Abdelalim, A. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, 396(10258), 1204-1222.
- Walker, L. O., & Avant, K. C. (2005). *Strategies for theory construction in nursing* (Vol. 4). Pearson/Prentice Hall Upper Saddle River, NJ.
- Wang, Y.-F., & Wang, S.-J. (2021). Hypertension and migraine: Time to revisit the evidence. *Current Pain and Headache Reports*, 25(9), 1-9.
- Waters, W. (1971). Headache and blood pressure in the community. *Br Med J*, 1(5741), 142-143.
- Wiles, C., & Lindsay, M. (1996). General practice referrals to a department of neurology. *Journal of the Royal College of Physicians of London*, 30(5), 426.