Research

Overview of epistaxis cases in emergency installation of Dr. M. Djamil General Hospital Padang

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ABSTRACT

Background: Epistaxis is a common case that occurs in Ear Nose Throat (ENT) Department. Epistaxis can be managed independently, but mortality and morbidity rates will increase if it occurs in children, elderly, and patient with systemic conditions. **Purpose:** To understand epistaxis in terms of patient age, gender, risk factor, bleeding location, treatment, and age distribution based on etiology and risk factors. **Method:** A descriptive retrospective study, using secondary data from medical records of patients with chief complaints of epistaxis at the emergency installation of Dr. M. Djamil General Hospital in Padang, from 2018 to 2022. **Result:** The study found 329 patients who came with chief complaints of epistaxis. Epistaxis mostly found at age above 45 years old. Most cases happen in males (64.1%). The most common etiology and risk factors found were hypertension (21.4%). Most frequent bleeding location found in the anterior part (80.5%). Most epistaxis patients were treated with nasal compression (26.4%). The most common causes of epistaxis in children were mechanical trauma, in young adults fractures of the maxillofacial region, and hypertension in elderly. **Conclusion:** Epistaxis can occur in all age groups and can occur spontaneously or accompanying a disease. The etiology and risk factors of epistaxis vary based on age groups. Epistaxis is treated according to the cause.

Keywords: epistaxis, age, risk factors, treatment

ABSTRAK

Latar belakang: *Epistaksis merupakan kasus yang sering terjadi di bagian THT. Epistaksis dapat ditangani secara mandiri, namun angka mortalitas dan morbiditas akan meningkat jika terjadi pada anak-anak, lansia, dan pasien dengan kondisi sistemik.* ***Tujuan:*** *Untuk mengetahui gambaran epistaksis ditinjau dari usia pasien, jenis kelamin, faktor risiko, lokasi perdarahan, penanganan, dan distribusi usia berdasarkan etiologi dan faktor risiko.* ***Metode:*** *Studi deskriptif retrospektif dengan menggunakan data sekunder dari rekam medis pasien dengan keluhan utama epistaksis di Instalasi Gawat Darurat RSUP Dr. M. Djamil di Padang, dari 2018-2022.* ***Hasil:*** *Penelitian menemukan 329 pasien yang datang dengan keluhan utama epistaksis. Epistaksis paling banyak ditemukan pada usia di atas 45 tahun. Sebagian besar kasus terjadi pada laki-laki (64,1%). Etiologi dan faktor risiko yang paling banyak ditemukan adalah hipertensi (21,4%). Lokasi perdarahan yang paling sering ditemukan di bagian anterior (80,5%). Sebagian besar pasien epistaksis ditangani dengan kompresi hidung (26,4%). Penyebab epistaksis yang paling sering ditemukan pada anak-anak adalah trauma mekanik, pada dewasa muda fraktur pada daerah maksilofasial, dan hipertensi pada lansia.* ***Kesimpulan:*** *Epistaksis dapat terjadi pada semua kelompok usia dan dapat terjadi secara spontan atau menyertai suatu penyakit. Etiologi dan faktor risiko epistaksis bervariasi berdasarkan kelompok usia. Penatalaksanaan epistaksis dilakukan sesuai dengan penyebabnya.*

Kata kunci: *epistaksis, usia, faktor risiko, tatalaksana*

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INTRODUCTION

Epistaxis or nasal bleeding is a common condition in everyday life.[1] The exact incidence of epistaxis in the general population is unknown, as most people can manage epistaxis independently.[2] Most cases are self-limiting, but some cases require intervention. Epistaxis can also be a sign of a disease. Mortality and morbidity in epistaxis may be higher in children, old age, and individual with systemic disease.[3]

About 60% of the world's population has experienced epistaxis, and about 6% of them seek medical help.[3] Indonesia itself still does not have specific data related to epistaxis cases, because no multicenter studies have ever been conducted.[4]

Epistaxis is caused by multi-factors, so an examination is needed to confirm the cause of epistaxis. The etiology of epistaxis can be classified by systemic factors and local factors. Systemic factors are usually caused by hypertension, while local factors can be caused by trauma, infection, neoplasm, abnormalities or anomalies of the nasal blood vessels.[3] Cases of local masses in the nose or nasopharynx such as polyps or benign or malignant tumors can cause recurrent epistaxis. Systemic factors, most often due to hypertension.[3]

Approximately 65-75% of patients requiring treatment can be managed by primary care physicians with initial measures. In persistent anterior epistaxis, bleeding can be controlled in 78-88% of cases with chemical or electrical cauterization by an ear, nose and throat (ENT) specialist. Nasal tampons may be used when these measures are unsuccessful, or posterior epistaxis is present.[5]

Based on the description above, this study aimed to understand the case desctiption of epistaxis in terms of age, gender, risk factor, bleeding location, treatment, and age distribution based on etiology and risk factors, in patients with epistaxis at the emergency installation of Dr. M. Djamil General Hospital in Padang from 2018 to 2022.

METHOD

This was a descriptive observational study with a retrospective approach, using patient medical record data of Dr. M. Djamil General Hospital Padang, in 2018-2022 period.

The samples of this study were all patients who came with the main complaint of epistaxis to the emergency installation of Dr. M. Djamil General Hospital Padang in 2018-2022, who met the inclusion and exclusion criteria, and had complete medical record data. The sampling technique in this study was total sampling.

This research had passed the ethical test of the Health Research Ethics Commission of Dr. M. Djamil General Hospital Padang, with letter number DP.04.03/D.XVI.XI/65/2024.

RESULT

During the period 2018-2022, there were 329 patients who presented with a chief complaint of epistaxis. All samples met the inclusion criteria and were included in the study data. Incidence of epistaxis was more prevalent in males than females as shown at table 1 below:

Table 1. Frequency distribution of epistaxis patiens based on gender

Gender	f	%
Male	211	64.1
Female	118	35.9
Total	329	100.0

Table 1 showed that the incidence of epistaxis was more prevalent in males than females at 64.1%.

Table 2. Frequency distribution of epistaxis patiens based on age

Age (Year)	f	%
0-11 years old	54	16.4
12-45 years old	136	41.3
>45 years old	139	42.3
Total	329	100.0

Table 2 showed that the age of patients who came with complaints of epistaxis in the 2018-2022 period varied greatly. Most patients were in the age above 45 years old, namely 42.3%.

Table 3. Age frequency distribution of epistaxis patients based on etiology and risk factors

		Age (year)			Total
		0-11 (Children)	12-45 (Youth-adult)	>45 (Elderly)	
Etiology and risk factor	**Mechanical trauma**	21 29.6 %	30 42.3%	20 28.2%	71 100.0%
	Hypertension	0.0%	11 15.3%	61 84.7%	72 100.0%
	Tumor	1 1.8%	27 48.2%	28 50.0%	56 100.0%
	Blood disorders	15 41.7%	15 41.7%	6 16.7%	36 100.0%
	Fracture of maxillofacial	2 4.8%	32 76.2%	8 19.0%	42 100.0%
	Septal deviation	1 5.0%	8 40.0%	11 55.0%	20 100.0%
	Infection	1 20.0%	4 80.0%	0 0%	5 100.0%
	Corpus alienum	**8** 72.2%	**1** 9.1%	**2** 18.2%	**11** 100.0%
	Post-operation	0.0%	4 100.0%	0 0%	4 100.0%
	Idiopathic	4 44.4%	2 22.2%	3 33.3%	9 100.0%
	Others	1 33.3%	2 66.7%	0 0%	3 100.0%
	Total	54 16.4%	136 41.3%	139 42.3%	329 100.0%

Table 3 showed the etiology and risk factors in epistaxis patients were quite varied. Hypertension was the most common etiology and risk factor at 21.9%, followed by mechanical trauma at 21.6%. In the age group of 0-11 years, the most common etiology was mechanical trauma, for 12-45 years the most common etiology was maxillofacial fracture, while ages above 45 years or the elderly were mostly caused by hypertension.

Table 4. Frequency distribution of epistaxis patients based on bleeding location

Bleeding location	f	%
Anterior	265	80.5
Posterior	50	15.3
Unknown	14	4.2
Total	329	100.0

Table 4 showed that the incidence of epistaxis was more prevalent in the anterior part of the nose at 80.5%.

Table 5. Frequency distribution of epistaxis patients based on therapy

Therapy	f	%
Pharmacotherapy	67	20.4
Nasal compression	87	26.4
Cauterization	42	12.8
Anterior nasal packing	58	17.7
Posterior nasal packing	4	1.2
Ligation	9	2.7
Non-ligation	51	15.5
Extraction	11	3.3
Total	329	100.0

Table 5 stated that majority of epistaxis patients were treated with nasal compression (26.4%), and followed by medical treatment (20.4%).

DISCUSSION

Frequency distribution of epistaxis patients based on gender

This study showed that patients who came with the main complaint of epistaxis to the emergency installation of Dr. M. Djamil General Hospital Padang were more common in men. The results of this study found that 64.1% of patients who came with the main complaint of epistaxis were male.

The results of this study were in line with research conducted by Wulan et al.[6] at Sanglah General Hospital, Denpasar from January 2015-December 2016, occurred mostly in men rather than women with a percentage of 64.1%.

The incidence of epistaxis is more common in men than women, which is associated with the intensity of causative factors that often occur in men compared to women. The habit of doing activities outside the home more often found in men, increases the risk of trauma which is a common cause of epistaxis. In addition to trauma, hypertension problems are also more often found in men, supported by smoking habits in men higher than women.[7]

Frequency distribution of epistaxis patients based on age

Based on the research conducted, it could be seen that epistaxis occurred in all age groups, ranging from children aged 0-11 years to the elderly who were over 45 years old. This study found that the youngest age of epistaxis was a child aged 7 months, while the oldest age was 87 years. The results of this study found that the incidence of epistaxis occurred mostly in the late elderly, namely the age above 45 years as many as 42.3%. Patel[8] stated that epistaxis was more common in the age group of 40 to 80 years old.

In contrast, a study conducted at the Government Hospital in Dhaka, Bangladesh, stated that the highest incidence of epistaxis occurred in young adults. This was related to the etiology and risk factors for epistaxis; in their study they discussed the division of the etiology of epistaxis into traumatic and non-traumatic events, and also influenced by the domicile of epistaxis patients who were

divided into patients from urban and rural areas.[7] Our study obtained different results, from Patel[8], namely epistaxis was more common in young adults.

Frequency distribution of epistaxis patients based on etiology and risk factors

The etiology and risk factors for patients presenting with a chief complaint of epistaxis in this study varied widely. The results of the study found that there were idiopathic etiologies and risk factors in cases of primary epistaxis, where there was spontaneous bleeding in the patient's nose. Secondary epistaxis etiology and risk factors were also found in this study, both systemic and local.

The results of this study found that hypertension was the most common risk factor in patients who came with the main complaint of epistaxis. This was in line with research conducted by Patel, et al.[8] which stated that hypertension was the most common factor that was closely related to epistaxis, followed by idiopathic cases. Another study also obtained the same results, 70% of epistaxis patients had risk factors for hypertension, with majority of patients aged 45-65 years, and followed by patients over 65 years of age.[9] Hypertension does not play a direct role in the incidence of epistaxis. However, hypertension can cause structural lesions in the vascular bed, resulting in changes in the vessels of the nasal mucosa. In cases of prolonged hypertension, it can lead to an increased risk of blood vessel rupture and trigger recurrent cases of epistaxis.[10]

Research conducted at Dr. M. Djamil General Hospital Padang found that epistaxis patients with hypertension were more common in grade 2 hypertension, and followed by grade 1 hypertension. Another study conducted by Zulfiani et al.[11] found hypertension was not associated with the severity of epistaxis. However, hypertension had been shown to cause severe damage to the blood vessels in the nose (degeneration of fibrous tissue changes in the tunica media), which over a long period of time became a risk factor for epistaxis.

Another factor causing epistaxis is mechanical trauma, which is a local factor. Mechanical trauma is related to the incidence of irritation, allergy or infection in the nose experienced by previous epistaxis patients. This was in line with research conducted by Ross, et al.[12] which stated that common risk factors for epistaxis patients were nasal irritation, nasal cannula use, systemic conditions, and the use of anticoagulant drugs.

This study found that tumor was the third most common etiology and risk factor followed by maxillofacial fracture, thrombocytopenia, septal deviation, corpus alienum, idiopathic, postoperative patients, and others, such as patients with cellulitis or Systemic Lupus Erythematosus (SLE). The most common tumor that causes epistaxis was nasopharyngeal tumor. This was in line with research conducted by Keerty, et al.[13] which stated that one of the causes of epistaxis was nasopharyngeal tumors. Tumors could cause epistaxis by eroding the structure of the blood vessels at the tumor attachment site, thus increasing the risk of blood vessel rupture and epistaxis.

Another cause found in this study was blood disorders. It was found that thrombocytopenia was the most common blood disorder that caused epistaxis. Studies stated that there was a relationship between average platelet volume and bleeding tendency in epistaxis.[14]

Age frequency distribution of epistaxis patients based on etiology and risk factors

This study found that pediatric patients with an age range of 0-11 years had an etiology and risk factors, namely mechanical trauma, as many as 21 out of 56 pediatric

patients who came with the main complaint of epistaxis to the emergency installation of Dr. M. Djamil General Hospital Padang for the period 2018-2022. Patients with an age group range of 12-45 years or adolescent-adults had etiologies and risk factors for maxillofacial fractures, namely 32 out of 136 epistaxis patients, and patients over 45 years of age had etiologies and risk factors for hypertension as a cause of epistaxis, namely 61 out of 139 epistaxis patients.

Various studies that had been previously conducted, stated that epistaxis could be caused by various risk factors. This was in line with a study by Güneysu et al.[15], which stated that the risk factor for epistaxis at the age of under 10 years was trauma. In the age range of 10-25 years, the most common causes of epistaxis were angiofibroma, chronic kidney disease, and deranged coagulogram.[9] Research by Sigdel et al.[16] mentioned in a previous study that the most common causes in the younger age group were from trauma, such as nose picking, fights, traffic accidents, fall injury and physical assault. While in the age group of 40-80 years, the most common risk factors were hypertension, tumor, and trauma.[8]

Frequency distribution of epistaxis patients based on bleeding location

This study found that patients who came with the main complaint of epistaxis to the emergency installation of Dr. M. Djamil General Hospital Padang for the period 2018-2022 mostly experienced epistaxis located in the anterior part of the nose (Kiesselbach plexus) as many as 80.5%. These results were in line with research conducted by Al Momani et al.[17] which reported that 70% of epistaxis cases that occurred came from the anterior part of the nose.

Several other studies also revealed that the most common location for epistaxis is the anterior part of the nose, precisely at the Kiesselbach plexus. This is because the inside of the nasal cavity has a thin mucosal layer and there are many blood vessels (Kiesselbach plexus). These blood vessels function to warm and moisturize the air entering the nasal cavity, and they are very sensitive to external influences due to their location on the surface and the nose, which is the most prominent part of the face. As a result, all external influences such as trauma to the nose, friction, scratching, nasal irritation, use of antiplatelet drugs, irritating stimulating substances, or foreign body entry can cause epistaxis.[18,19]

Epistaxis originating from the posterior part is very rare, usually occurring in patients with older age, hypertensive patients, and patients with vascular disorders. The results of this study were in line with research conducted by Fauzia et al.[20] which stated that epistaxis originating from the posterior was less common than anterior.

Various other studies had also found similar results, that posterior epistaxis was more common in patients with older age. This is influenced by the condition of the blood vessel wall which has begun to change into sclerotic tissue, so that posterior epistaxis is usually not caused by trauma but due to spontaneous rupture of sclerotic blood vessels.[21]

Frequency distribution of epistaxis patients based on therapy

The main principles in the management of epistaxis are stopping the bleeding, preventing complications, and preventing recurrent bleeding. This study found that most patients who came with the main complaint of epistaxis were treated with pressure on the distal third of the nasal lobe (nasal compression), as many as 26.4%. The results of this study were also in line with various studies which stated that the most common therapy for epistaxis was compression

therapy, which involved applying pressure to control bleeding.[22]

Another therapy in epistaxis patients is the administration of medication. A total of 20.4% of patients who came with the main complaint of epistaxis received medical management, because the bleeding had stopped when the patient arrived at the emergency installation. Epistaxis is often a symptom of a disease, so that the therapy given is definitive therapy according to the cause of epistaxis. Medicamentosa given was all pharmacological therapy given to overcome the conditions that cause epistaxis. Medication in the form of topical tranexamic acid to stop bleeding was found to be superior to conservative therapy, or tampon insertion as therapy for epistaxis patients to prevent recurrent bleeding. Topical tranexamic acid applied for 2 days was found to be effective in preventing recurrent bleeding in patients with epistaxis.[23,24]

The next most common treatments were anterior tampons, or nasal cautery therapy. The results of this study are similar to a study conducted by Bhandary and Shriyan[25] in India, which stated that the majority of epistaxis patients were treated with nasal compression, tampons, and cautery.

This study found that as many as 17.6% of epistaxis patients were treated with anterior tampon insertion. Then, as many as 12.8% of epistaxis patients were treated with nasal cauterization, followed by non-ligation therapy (surgery) as many as 15.5%. Management with nasal cautery usually uses silver nitrate, which is effective for controlling continued bleeding, or when the blood vessel as the source of bleeding can be identified.[19] The choice of epistaxis patient management is determined based on the etiology and condition of the patient when arriving at the hospital, the location of bleeding, and depends on whether the blood vessel as the source of bleeding can be identified or not.

Another therapy given in this study was extraction in patients with epistaxis caused by foreign body (corpus alienum) entry, with a percentage of 3.3%. Based on a study by Sajilal et al. it could be concluded that epistaxis could be managed with conservative therapy as the first line, then continued with cauterization therapy as the second line if the conservative therapy given fails to stop bleeding in epistaxis patients, as well as therapy according to the etiology of the cause of epistaxis for secondary epistaxis cases.[24,26]

This study also showed that epistaxis patients presenting with maxillofacial fractures were managed with surgical measures. The selection of effective therapy to treat epistaxis cases is tailored to the etiology and condition of the patient. Another study stated that surgical treatment was more effective in overcoming the incidence of epistaxis in cases of severe or recurrent epistaxis.[5] A study by Sharma et al.[27] stated that, 250 patients (82.23%) had a good recovery after observation with medical management or spontaneous discontinuation; whereas in 22 patients had to be managed with cauterization which was found to be very effective and efficient, and these patients required less hospitalization. Another study stated differently, arterial ligation treatment had minimal complications and satisfactory results in cases of epistaxis with hypertension and recurrent epistaxis.[28]

So, it could be concluded that the selection of therapy in patients who come with the main complaint of epistaxis to the emergency installation of Dr. M. Djamil General Hospital Padang depended on the etiology, or cause of epistaxis, and the patient's condition when they arrived at the hospital.

REFERENCE

1. Punagi AQ. Epistaksis, Diagnosis dan Penatalaksanaan Terkini. Zakiah AM, Perkasa MuhF, editors. Makassar: Digi Pustaka; 2017. p. 1–2.
2. Hamlett KEL, Yaneza MMC, Grimmond N. Epistaxis. Vol. 39, Surgery (United Kingdom). Elsevier Ltd; 2021. p. 577–90.
3. Marbun EM. Etiologi, Gejala dan Penatalaksanaan Epistaksis. J Kedokt Meditek. 2017; 23(62):71–3.
4. Yunita R. Gambaran Pengetahuan Pertolongan Pertama Epistaksis pada Guru Sekolah Dasar di SD Islam Az-Zahrah Palembang. Universitas Muhammadiyah Palembang; 2023.
5. Beck R, Sorge M, Schneider A, Dietz A. Current approaches to epistaxis treatment in primary and secondary care. Dtsch Arztebl Int. 2018; 115(1–2):12–22.
6. Wulan DSS, Ratnawati LM, Susantini IGAD. Characteristics of epistaxis patients at Sanglah General Hospital, Denpasar from January 2015-December 2016. Biomed Pharmacol J. 2018; 11(1):305–10.
7. Islam R, Islam MA, Rashid-E-Mahbub AHM, Chowdhury AK, Islam Md N, Mohiuddin Khan AF. A Clinical Study on Etiological Factors and Management of Epistaxis at a Tertiary Level Hospital. Bangladesh J Otorhinolaryngol. 2020; 26(1):45-54
8. Patel J, Sharma Y, Govindarajalu P, Vadiya S. Clinico-Aetiological Profile of Adult Epistaxis -Three Years' Experience at a Tertiary Care Centre. Bengal J Otolaryngol Head Neck Surg. (BJOHNS). 2022. 29(3):301-5.
9. Maqbool T, Qadri S, Showkat SA, Ahmed R, Mehta KS. Analysis of risk factors in patients admitted with epistaxis. Int J Otolaryngol Head Neck Surg. 2021. 26; 7(6):975.
10. Boiko NV. Epistaxis and arterial hypertension: A pathogenic link. Vestn Otorinolaringol. 2021; 86(1):72 –7.
11. Zulfiani V, Imanto M, Atina R. A 66 years old man with posterior epistaxis et causa hypertension grade II. Medula. 2017; 7(4):55-7
12. Ross A, Engebretsen S, Mahoney R, Bathula S. Risk Factors and Management for Epistaxis in a Hospitalized Adult Sample. Spartan Med Res J. 2022 Sep 6; 7(2).
13. Keerty D, Eaton KC, Trejo K, Strosberg C, Haynes EJ. Malignant epistaxis: A case wandering prostate cancer metastasis. Postgrad Med J. 2022; 98(1):E45-6.
14. Ekber Karabulut A, Çevik Y, Emektar E, Kerem Çorbacioğlu Ş, Dağar S, Yardim O. Analysis of mean platelet volume and red blood cell distribution width in recurrent epistaxis. Turk J Emerg Med. 2018; 18(2):67–70.
15. Güneysu ST, Güleryüz OD, Ceylan E, Çağlar AA, Çolak Ö. Are laboratory evaluations required in every case admitted to the pediatric emergency department with epistaxis? Int J Clin Pract. 2021; 75(11). e14749. doi: 10.1111/ijcp.14749.
16. Sigdel B, Nepali R, Neeraj KC, Dubey T, Neupane B, Sigdel D. Etiological Profile and Management of Epistaxis in Tertiary Care Hospital. J Gandaki Med Coll Nepal. 2019; 12(1):13–6.
17. Al Momani S, Al Khtoum N, Khair H, Albtoush A, Shamayleh B. Epistaxis: Clinical Review of 176 Patients. Int J Adv Res (Indore). 2022; 10(02):51–4.
18. Nazirah J, Putri BI, Maulina N, Herlina N, Fauzan A. Manajemen Epistaksis. Journal Unimal 2024; 3(1).
19. Womack JP, Kropa J, Jimenez Stabile M. Epistaxis: Outpatient Management. Am Fam Physician. 2018; 98(4):240-5.
20. Fauzia TY, Salsabilla A, Cahyadi I. Laporan kasus epistaksis cavum nasi dextra et causa hipertensi emergensi. Tunas Med J Ked & Kes. 2022; 2–3.
21. Masoodi MUI, Naikoo J, Abbas SW. Epistaxis: A Study to Determine Etiologies and Management in a Tertiary Health Care Unit in Kashmir, India. Paripex Indian Journal of Research (PIPR). 2022; 11(09):155–6.
22. Husni T, Hadi Z. Pendekatan diagnosis dan tatalaksana epistaksis. J Ked N Med. 2019; 2(2):28–31.

23. Ghahnavieh AA, Tashayoie A, Esfahani MN, Golshani K. Comparative study of the efficacy of topical tranexamic acid with nasal tampon in management of epistaxis: A randomized clinical trial. Sci J Kurdistan Uni Med Sci (SJKU). 2020; 25(4):140–9.

24. Sereda R, Hall W. Cost Effective Trend in Epistaxis Management. Int J Otolaryngol Head Neck Surg. 2023; 12(3):85–91.

25. Bhandary R, Shriyan AJ. Angioembolism for the Management of Refractory Epistaxis. Austin J Otolaryngol. 2023; 9(1): 1126.

26. Bordino L, Cruz WD, Fernández LV, Macchi EG, Martins A, Medel MJ, et al. Consensus on pediatrics epistaxis: Causes, clinic and treatment. Arch Argent Pediatr. 2021; 119(1):S48–53.

27. Sharma S, Qureshi S, Jadia S, Ukawat L. Epistaxis: Revisited. Indian J Otolaryngol Head Neck Surg. 2020; 72(4):480–3.

28. Zhann A, Irfandy D, Budiman BJ, Viotra D. Ligasi Arteri Sfenopalatina Perendoskopi pada Epistaksis Berulang dengan Hipertensi. Majalah Kedokteran Andalas (MKA). 2023; 46 (4):736–44.