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## Characteristics of patients with acute limb ischemia (ALI) at Hasan Sadikin General Hospital, Bandung, Indonesia in 2019-2020



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### ABSTRACT

**Introduction:** Acute limb ischemia (ALI) is a disease that attacks peripheral arteries and veins causing impaired tissue perfusion. There are 5000 patients with ALI per year with a mortality rate of 20% and a loss of one extremity as much as 40%. ALI is characterized by 6P's signs; pain, pulselessness, pallor, poikilothermia, paresthesia, and paralysis. The purpose of this study was to determine the characteristics of ALI patients in the emergency department at Hasan Sadikin Central General Hospital, Bandung.

**Methods:** The type of this research is descriptive cross-sectional research. The data was from the medical records of ALI patients who came to Hasan Sadikin Hospital from January 1<sup>st</sup>, 2019 to December 31, 2020. The data obtained were then identified according to patient gender, patient age, chief complaint, degree, comorbidities, and onset. The data were analyzed descriptively using SPSS ver.17.

**Results:** Of the 99 patients with ALI, it was found the prevalence of men (58%) was higher rather than women (42%) with the largest age distribution around 49-56 years old (23%). The main complaint of ALI in the emergency ward was pain (32%). Category of ALI based on Rutherford classification was mostly category III (36%). The most common accompanying comorbidities were diabetes in 47 patients (47.47%).

**Conclusion:** Characteristics of ALI in the emergency department of Hasan Sadikin Hospital Bandung mostly occur in men. The degree of ALI according to the Rutherford classification was category III with diabetic comorbidity.

**Keywords:** Acute Limb Ischemia, Rutherford classification, characteristic.

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### INTRODUCTION

One of the diseases that attacks the arteries is acute limb ischemia (ALI). In the kingdoms of England and Wales, there are 5000 patients with ALI per year with a mortality rate of 20% and a loss of one extremity as much as 40%. The risk of amputation is quite high in ALI. This condition could affect their activity in daily living and has the worst clinical outcome.<sup>1</sup>

Acute arm and leg ischemia occurs when a sudden blockage of an artery causes reduced blood flow to the arm and leg area. The metabolic requirements for tissue perfusion become greater, which can compromise the function of the limbs. Other etiology that caused ALI are arterial

embolism about 30%, thrombosis either from the graft (20%) or from popliteal aneurysm (5%). A certain amount of trauma also can cause ALI (5%).<sup>2</sup> The risk factors of ALI are smoking, hypertension, diabetes mellitus, hyperlipidemia, and atrial fibrillation. The Howard *et.al* investigation established that smoking was the most prevalent risk factor for ALI.<sup>3</sup>

The clinical features in patients with acute arm and leg ischemia are associated with the site of arterial obstruction and decreased blood flow. ALI is commonly characterized by 6P's signs such as pain, pulselessness, pallor, poikilothermia, paresthesia, and paralysis. When viewed from the severity of the ischemic, the patient may experience paralysis and may become limping or experience pain when

resting.<sup>4</sup> Pain can occur for a short period and is evident in the extremities distal to the area of obstruction. The pain that arises is not limited to the feet or thumbs, or the hands or fingers, as is usually found in chronic ischemia of the arms and legs. Concomitant ischemia of the peripheral nerves results in loss of sensory stimulation and motor dysfunction. On physical examination, there is often no pulse in the area distal to the blockage area, cold, pale skin, delayed capillary refill and slow venous filling, absence of sensory perception, and muscle weakness leading to paralysis.<sup>5</sup>

By recognizing the signs, symptoms, and characteristics of ALI, the risk of amputation could be decreased. One study showed that the amputation rate was

increasing with the interval time between the onset of ALI and exploration (6% at 12 hours, 12% at 13 to 24 hours, and 20% after 24 hours).<sup>1,5,6</sup> Therefore, knowing the characteristics of ALI is very important so that it can be treated quickly and the opportunity for amputation is decreased. Thus this study aimed to know the characteristic of ALI particularly in Hasan Sadikin General Hospital, Bandung, Indonesia from 2019 to 2020.

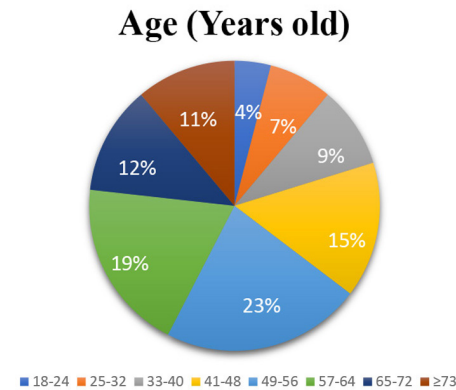
## METHOD

This type of research is a descriptive cross-sectional study that was conducted in 2021 at Hasan Sadikin Hospital. Data were collected by reviewing the medical records of ALI patients who were treated in the Emergency Department at Hasan Sadikin Hospital in Bandung for the period between January 1<sup>st</sup>, 2019 - December 31<sup>st</sup>, 2020. The subjects within this study were all ALI patients admitted to the emergency department of Hasan Sadikin Hospital Bandung. The inclusion criteria of this study were the patient was registered in Hasan Sadikin Hospital Bandung, has been diagnosed with ALI, and was willing to be a research sample. The exclusion criteria of this research were incomplete medical record data. The data obtained were then identified according to patient gender, patient age, chief complaint, degree, comorbidities, and onset. The data were analyzed descriptively using SPSS ver.17.

## RESULT

After screening the sample according to the inclusion and exclusion criteria was found 99 patients were. It was found that the most prevalent ALI was among men (58%) rather than women (42%) (Figure 2) with the largest age distribution among 49-56 years old (23%) (Figure 1).

The three main complaints were pain (32%), followed by pallor (27%), and paralysis (20%). Classification of ALI was based on Rutherford, and there was 36% in category III, followed by category IIB (29%). Diabetes was the most common comorbidity, with 47 patients (47.47%), followed by hypertension in 29 patients (29.29 %) and hyperlipidemia in 13 patients (13.13%). There were 57 patients



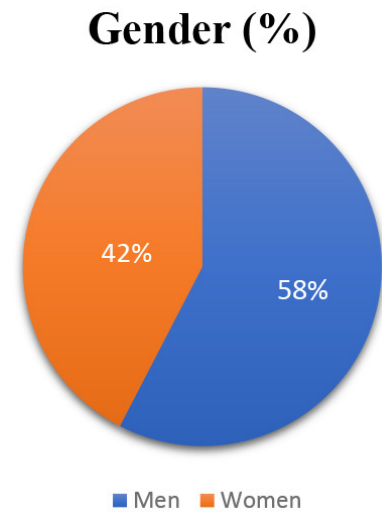
**Figure 1.** The age distribution of ALI patients.

(57.6%) with an ischemic onset of 8-14 days. Meanwhile, 42 patients (42.4%) had an ischemic onset of 1-7 days (Table 1).

## DISCUSSION

In this study, 99 patients with acute limb ischemia were found in the emergency room of Hasan Sadikin Hospital for the period January 2019-December 2020. The results showed that the most common patient who got ALI according to gender was men (58%) rather than women (42%). These results are consistent with a study conducted by the TransAtlantic Intersociety Consensus for the Management of Peripheral Arterial Disease (TASC II). It was found that the prevalence of ALI cases was higher in males than in females by a ratio of 3:1. This condition is also influenced by smoking habits that are mostly practiced by men. Smoking is a dominant risk factor in the development and worsening of ALI, besides smoking also increases the risk of amputation at the age of 49-56 with a total of 22 people (22.2%). In this age distribution, the average is an active smoker.<sup>7</sup>

The main complaint of acute limb ischemia patients was pain (32 %).<sup>8</sup> This study is in line with many kinds of literature that's describing ALI's presenting symptoms are 6P such as pain, pulselessness, pallor, poikilothermia, paresthesia, and the late symptom, paralysis. A patient complained of pain and pallor caused by inadequate tissue perfusion, then continued with the weakness of the limb muscles (paralysis). According to the degree of



**Figure 2.** The gender distribution of ALI patients.

**Table 1.** The characteristic of ALI

Variables	Total (n=99) Prevalence (%)
<b>The main complaint</b>	
Pain	32
Pallor	27
Paralysis	20
Numbness	14
Pulseless	7
<b>Rutherford classification</b>	
I	8
IIA	27
IIB	29
III	36
<b>Comorbid</b>	
Hypertension	29.29
Hyperlipidemia	13.13
Diabetes mellitus	47.47
Others	10.11
<b>Ischemic onset</b>	
1-7 days	42.4
8-14 days	57.6

acute limb ischemia based on Rutherford classification about 36% was grade III, followed by 29% grade II B. In grade II B it mostly found inadequate tissue perfusion, muscle weakness of the extremities, and loss of sensation in the extremities. Meanwhile, in grade III there has been severe ischemia resulting in necrosis, permanent, irreversible nerve damage, limb weakness, loss of sensory sensation, skin disorders, or impaired healing of skin lesions.<sup>9</sup>

Based on the comorbidity, diabetes mellitus was the most common in this research. It is in line with other literature. Diabetes mellitus increases the risk of acute limb ischemia by 3 to 4 times. It also increases the risk of worst outcomes in patients with acute limb ischemia. This condition is also related to the patient's prognosis. Diabetes mellitus is a risk factor for atherosclerotic plaque formation because of diabetic macroangiopathy. Diabetic macroangiopathy cause alterations in vascular homeostasis due to endothelial and vascular smooth muscle cell dysfunction. Long-standing hyperglycemia can induce polyol pathway activation that can lead to endothelial injury that has a role in making atherosclerotic formation.<sup>10</sup> Acute limb ischemia can occur in the event of thrombosis. Thrombosis occurs when chronic stenotic lesions in occlusive atherosclerosis cause acute obstruction resulting from plaque breakdown, circulatory failure, or a hypercoagulable state. The embolus can be trapped in stenotic lesions of arteriosclerosis. It explains diabetes mellitus have an indirect risk factor for acute limb ischemic.<sup>11-13</sup>

The limitation of this study was we did not explore the risk factors of the patient, medication adherence of their comorbidity, and the last condition after receiving the treatment thus we can predict the prognosis of the patient.

## CONCLUSION

Characteristics of Acute Limb Ischemic in the emergency department of Hasan Sadikin Hospital Bandung for the period January 2019 - December 2020 mostly occur in the male, with the largest age distribution was around 49-56. Knowing the risk factors and early diagnosis can help prevent the amputation of extremities

due to ALL. In our research, most patients were diagnosed 8-14 days after signs and symptoms appeared.

## DISCLOSURE

## FUNDING

The author stated that the proposal preparation until publication is using personal expense.

## CONFLICT OF INTEREST

None.

## ETHICAL CLEARANCE

This research has been approved by the ethic commission.

## AUTHOR CONTRIBUTION

All of the author has been contribute in making this article

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