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## Risk factors and characteristics of laryngeal carcinoma in the developing region of Indonesia

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# Risk factors and characteristics of laryngeal carcinoma in the developing region of Indonesia

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**Abstract.** In developing regions such as West Nusa Tenggara (WNT), Indonesia, industry, transportation, and lifestyle were also developed synergistically. This development will lead to several consequences such as air pollution, traffic, etc. On the other hand, Laryngeal cancer remains the dominant cancer in the head and neck. It is related to environmental factors such as air pollution as well as a smoking habit. Laryngeal cancer is commonly found in the advanced stage. The study aims to know the factors associated with laryngeal cancer occurrence and the characteristics of the diseases. A retrospective study was conducted through medical records exploration in WNT General Hospital from January 1<sup>st</sup>, 2018 to December 31<sup>st</sup>, 2019. All patients in this period will be included as a subject. All risk factors and characteristics of patients were recorded, then analyzed descriptively. Nineteenth patients fulfilled the criteria in the study period. Most of them were male, low socio-economic status, and has a smoking habit. The symptom when the patients seeking medical advice were mainly hoarseness and hoarseness with dyspnea. Predominantly, the patients came in late-stage. Furthermore, the most treatment given was the combination of surgery, chemotherapy, and radiotherapy. The main histopathology result was undifferentiated squamous cell carcinoma.

## 1. Introduction

Laryngeal carcinoma is a malignancy arising from the larynx epithelium. This carcinoma remains a problem in the otolaryngology head and neck surgery department. This problem occurs due to the treatment should be done integrated by several specialists. According to Bray et al (2018), laryngeal carcinoma is the second most head and neck cancer globally, with an incidence of 1% of all cancer [1]. In Indonesia, although laryngeal cancer was not the highest carcinoma in the head and neck, however, it remains in fourth-place. In Padang, West Sumatera reported 100 new cases or 0,7% among 1,439 head and neck cancer [2].

The incidence of laryngeal carcinoma was correlated with smoking habit and alcohol consumption. An epidemiologic study has drawn this significant relationship between smoking, alcohol consumption, and radioactive exposure with laryngeal carcinoma. The other factors that may also increase the risk of laryngeal carcinoma were gastroesophageal reflux disease, infection by Human Papilloma Virus type 16 and 18, wood dust, polycyclic hydrocarbon, and asbestos exposure. However, the exact etiology has not been established yet [3]. The study by Permitasari et al (2019) found that smokers were susceptible to laryngeal cancer and their family as a secondhand smoker.[4] The male usually was more susceptible to laryngeal carcinoma with the male and female ratio 7:1 [1] Adeel et al (2019) found that 93,5% of the laryngeal carcinoma patients were male [5].

Indonesia is one of the developing countries in the world. Furthermore, this country is included in the G20 organization [6]. West Nusa Tenggara (WNT) is one of the provinces in the middle part of Indonesia which is now growing as a development state. The state's development may be accompanied by several aspects such as industry, transportation, as well as socio-economic status, including smoking habits and alcohol consumption. This development will lead to several consequences such as air pollution, traffic, etc.



In West Nusa Tenggara province, several interesting medical cases were found and have been managed. One of the patient characteristics was difficulties in referring them to the other province due to several reasons, such as economic and culture [7].

According to this province's status, it may be correlated with the occurrence of certain diseases including laryngeal carcinoma. To know the epidemiology of the disease in the developing state, it is important to report this study.

## 2. Materials and methods

A retrospective study was conducted through medical records exploration in West Nusa Tenggara General Hospital for 2 years from January 1<sup>st</sup>, 2018 to December 31<sup>st</sup>, 2019. Ethical clearance was approved by the ethical committee, Faculty of Medicine, Mataram University. Total sampling was used in this study. However, if the data is incomplete, the subject will be excluded.

The general characteristics such as gender, age, socio-economic status, and the risk factor will be documented. The gender will be divided into male and female. The age will be divided into groups less than 40, 40-50, 51-60, 61-70, and more than 70 years old. The socioeconomic state defined as the class type where the subject took care in the hospital, for instance, if the subject stays at class 3 then categorized as poor; if the subject at class 2 then categorized as fair; and if the subject at class 1 or VIP then categorized as good. Risk factors were documented through the medical records note regarding the smoking habit, alcohol consumption, or the other specific risk factor.

The clinical characteristics such as complaint when the subject coming to the hospital, histopathology type, stage, and the treatment given to the subject were recorded. The staging was establish based on the AJCC 2018. All data that have been collected are then analyzed descriptively.

## 3. Results and discussion

During the study period, there was 19 patient with laryngeal cancer, most of them were male, and the age between 51-70 years old. The general characteristic of the subject in this study is described in table 1.

**Table 1.** Characteristic of patients with laryngeal cancer.

General characteristics	Male N (%)	Female N (%)	Total N (%)
Gender	17 (89)	2 (11)	19 (100)
Age group (years)			
Less than 40	0 (0)	0 (0)	0 (0)
40-50	3 (16)	0 (0)	3 (16)
51-60	6 (32)	1 (5)	7 (37)
61-70	6 (32)	1 (5)	7 (37)
More than 70	2 (11)	0 (0)	2 (11)
Socioeconomic state			
Good	3 (16)	0 (0)	3 (16)
Fair	6 (32)	1 (5)	7 (37)
Poor	8 (42)	1 (5)	9 (47)
Risk Factor			
Smoking	14 (74)	0 (0)	14 (74)
Alcohol	1 (5)	0 (0)	1 (5)
Furniture worker	2 (11)	0 (0)	2 (11)
Unidentified	0 (0)	2 (11)	2 (11)

Among the 19 subjects, clinically most of them came to the hospital due to hoarseness and dyspnea (47%). The most histopathology type was undifferentiated squamous cell carcinoma and was usually found in the late stage. Due to the subject found in the late stage, the most treatment done was laryngectomy combined with chemotherapy and radiotherapy. The detailed data on clinical characteristics were shown in Table 2.

**Table 2.** Clinical characteristics of patients with laryngeal cancer.

Clinical characteristics		Number	Percentage
Complaint	Hoarseness	4	21
	Dyspnea	3	16
	Hoarseness and dyspnea	9	47
	Mass on the middle part of the neck	2	10
	Dysphagia	1	5
Histopathology	Undifferentiated Squamous cell carcinoma	14	74
	Well-differentiated squamous cell carcinoma	3	16
	Adenoid cystic carcinoma	2	10
	Stage I	0	0
Staging	Stage II	1	5
	Stage III	8	42
	Stage IV	10	53
	Laryngectomy	2	10
Treatment	Laryngectomy + Chemotherapy	6	32
	Laryngectomy + Chemotherapy + Radiotherapy	8	42
	Others	3	16

In West Nusa Tenggara, laryngectomy has been started since 2016, chemotherapy since the end of 2016. Meanwhile, radiotherapy is the last mode of therapy against cancer, has been started in WNT since the end of 2018. [8] Based on those facts, most of the patients with laryngeal cancer who were found at the beginning of 2018 have not been radiated yet. There were some obstacles to referred the patients outside this province, some of them were socio-economic factors, the waiting period for starting the radiotherapy in the other province was quite long, away from the family member, and a limited number of the family member who can accompany them.[7] Finally, most of them were waiting for the operation of the radiotherapy units in the West Nusa Tenggara General Hospital.

According to a nationwide survey in Denmark in 2014, the incidence of laryngeal cancer was 2,3/100,000 population, however, the incidence was lower than in 1980. During the study period, they found 8,748 patients with laryngeal cancer.[9] In Indonesia, the morbidity of laryngeal cancer was 1,619 among 20,555 from the most six prevalence carcinoma. The laryngeal cancer morbidity stands as the 6<sup>th</sup> prevalent cancer in Indonesia.[4] This study found 19 cases of laryngeal cancer, mostly found in cancer age, poor socioeconomic status, and related to smoking history. Meanwhile, the authors found an interesting finding where there were 2 patients exposed to wood dust and 2 female cases who didn't have a history of smoking or wood dust exposure. However, the last 2 cases may be related to secondhand smoking.[4]

The histopathologic pattern in this study was similar to the study by Ciolofan et al (2017) who found mostly poorly differentiated squamous cell carcinoma.[10] In his book, Boyle et al (2020) stated that 95% of the larynx's primary tumor was squamous cell carcinoma.[11]

Hoarseness is the main complaint in the early stage of laryngeal cancer, especially on glottic cancer. The relationship between hoarseness and laryngeal cancer is depending on the site of the tumor. If the mass growth on the true vocal cord, the first symptoms would be hoarseness. On the other hand, if the mass growth in supraglottis or infraglottis, the hoarseness will occur in the advance stage. In this case, dyspnea may occur first; furthermore, it referred to the upper airway obstruction if the symptom occurs. Hoarseness and dyspnea can occur at a similar time when the vocal cord and airway obstruction are involved.[3] In this study, hoarseness with dyspnea was the most complaint, followed by independent hoarseness and dyspnea. This result indicated that the case was mostly in the advanced stage.

According to this study, 95% of patient with laryngeal cancer was coming in stage III and IV. This result was higher than the previous report by Cahyadi et al (2016) and Adeel et al (2018) who found

66% and 61% consecutively.[2], [5] There were several possibilities why the patient in WNT was late to seek medical advice. One of them was the lack of knowledge of the disease symptom. These handicaps affect the low awareness of laryngeal cancer treatment. The other possibility was the low economic status which is reflected by the high number of patients with low economic status in this study.

The treatment choices would be a combination of surgery, chemotherapy, and radiotherapy in advanced stages.[3] Since the majority of the case in this study was the advanced stage, it is logical that the most therapy given was the combination of laryngectomy, chemotherapy, and radiotherapy. However, the authors found 3 cases that did not follow the standard therapy. One patient refused to follow the medical treatment and the others only followed chemotherapy on the treatment. There were several reasons for the rejection of medical advice such as they were afraid of the effect of laryngectomy, chemotherapy, or radiotherapy. The other reason, according to the family view, for instance, the patient was too old for receiving any surgery, chemotherapy, and/or radiotherapy.

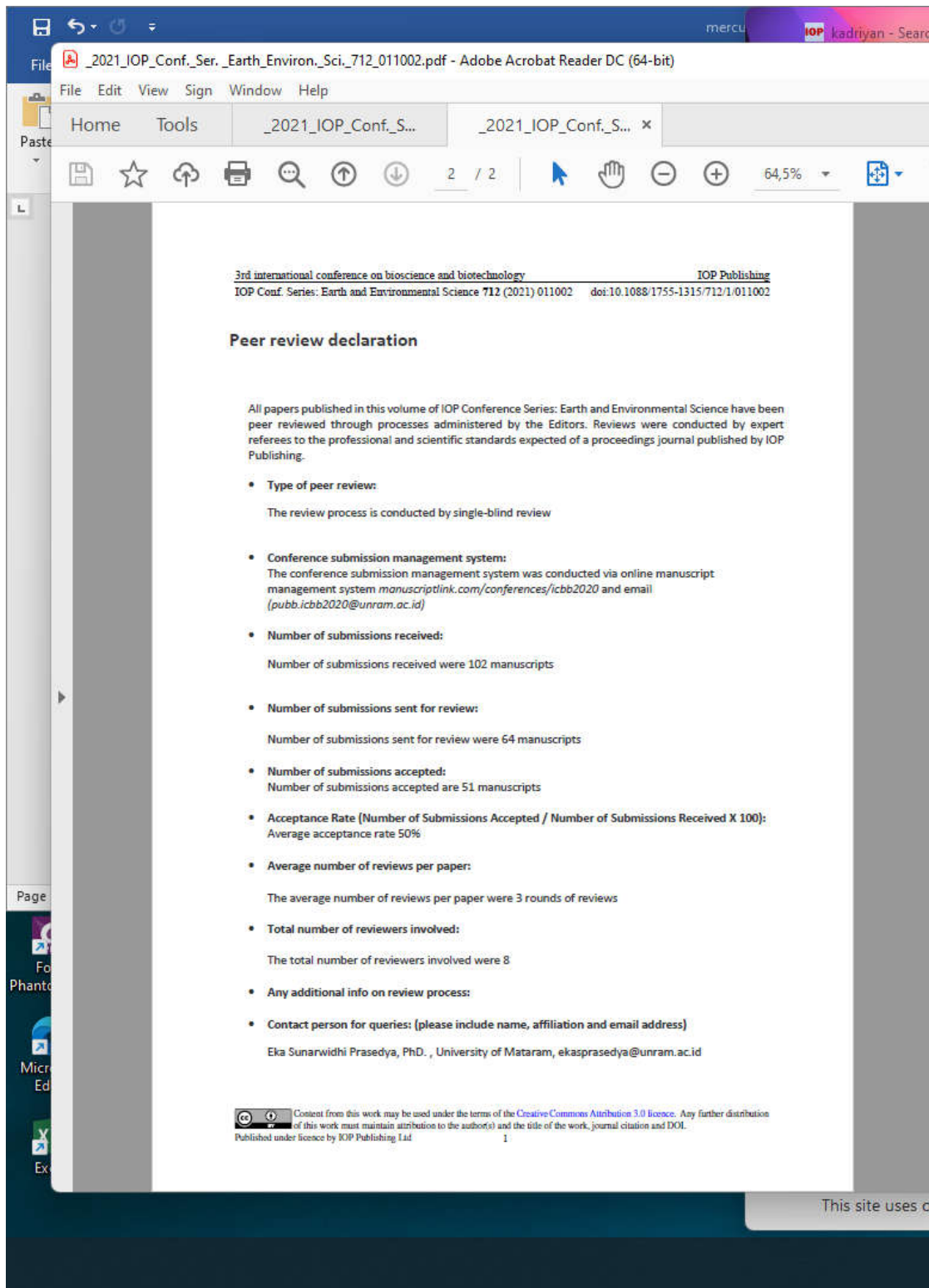
This research has several limitations such as the design with a cross-sectional, limited number of patients, and relatively new radiotherapy utilization in our hospital. Furthermore, prospective and advanced research should be addressed to draw the epidemiology of laryngeal cancer in detail.

#### 4. Conclusion

The environmental risk factors should be considered for laryngeal cancer besides classic factors such as gender, low socioeconomic status, and smoking history. The patient was usually found in a late-stage; furthermore, the symptom was a combination of hoarseness and dyspnea. The most treatment done was the combination of laryngectomy, chemotherapy, and radiotherapy.

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**Preface: Proceedings of the 3<sup>rd</sup> International conference on bioscience and biotechnology (3<sup>rd</sup> ICBB 2020), 12<sup>th</sup> – 14<sup>th</sup> October 2020**



**Prof. Ir. H. Sunarpi, PhD**  
*Chairman of ICBB2020 Organizing Committee*

This issue of IOP conference proceedings contains papers presented at the 3rd International Conference on Bioscience, Biotechnology and Biometrics (ICBB) 2020 conducted on 12<sup>th</sup> and 14<sup>th</sup> October 2020. It covers a broad range of research in the field of agriculture, bioscience, health and food science which relates to environmental sustainability. The COVID-19 pandemic situation made the organizers conduct the conference through online. The conference was hosted by Lab of Bioscience and Biotechnology, University of Mataram, Indonesia.

Interactive online presentations were arranged through Zoom Video Communications for the participants to present their ideas. The conference was divided into two main sessions: Main session for Keynote speakers and Panel Sessions for participants. A time of 30 minutes was given for Keynote speakers to present their fabulous work. For panel session, 10 minutes were given for participants to share their research and findings. A total of 102 participants from Universities, Research Institutes and also Government Departments joined the conference. All the selected papers were peer reviewed by expert reviewers in a single blind review system as per the review policy given by IOP Conference Series.

On the first day of the conference (12<sup>th</sup> October) invited talks were presented by Prof Lim Phaik Eem from Malaya University on "*Assessing the genetic diversity of Eucheumatoids in Indonesia: Exploration and Conversation for a sustainable seaweed cultivation industry*" and Prof Julian Heyes from Massey University New Zealand on "*The food safety risks associated with fresh products: perception vs reality*". The second day of the conference presented talks by Prof Akihiro Hazama from Fukushima Medical University Japan on "*Electrophysiological technique for the evaluation of mammalian oocytes used for the artificial fertilization*", Prof Jong-Min Lee from Nanyang Technological University Singapore on "*Recovery of feedstock chemicals and fuels from contaminated electronic and electrical waste plastics*" and Eka Sunarwidhi Prasedya, PhD from University of Mataram on "*Elaborating macroalgae potentials to combat COVID-19*". The final day of the conference included talks by Prof Deo Florence Onda from University of Philippines on "*Plastisphere: Understanding the implications of microbial colonization of plastics in the marine environment*" and Prof Ir H Sunarpi PhD from University of Mataram Indonesia on "*Diversity and Potency of Indonesian seaweed as source of hydrocolloid, UV-protector, and biofertilizer*".

Our special gratitude also goes to the Rector of Mataram University for the support given to this conference. Also, we are thankful for the enormous support of IOP conference proceedings for supporting us in every step.

*Editor-in-Chief, ICBB2020*  
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