CHAPTER II

LITERATURE REVIEWS

2.1 Definition of Head and Neck Cancer

Generally, cancer is the uncontrolled growth and spread of cells. It caused by the loss of differentiation and apoptotic ability in cells. It can affect almost any part of the body as a primary site of cancer. The growths often invade surrounding tissue and can metastasize to distant sites. The etiology of cancer is multifactorial; sometimes the specific cause is unknown. While, specifically, Head and Neck Cancer may be defined as the number of different malignant tumors that develop in head and neck regions. [6]

2.2. The Types of Head and Neck Cancer

Head and Neck Cancer can be classified based on its anatomic sites, and also can be encoded based on ICD 10 Classification.[7,8]

2.2.1. Based on Its Anatomic Site[7]

This classification is often used for determining the staging of Head and Neck Cancer, especially in determining the stage of primary tumor (T). Below are the anatomical margin of each site of head and neck region:

1) Oral cavity

The anterior border is the junction of the skin and vermilion border of the lip. The posterior border is formed by the junction of the hard and soft palates superiorly, the circumvallate papillae inferiorly, and the anterior tonsillar pillars laterally. The various sites within the oral cavity include the lip, gingival, hard palate, buccal mucosa, floor of mouth, anterior 2/3 of tongue, and retromolar trigonum.

2) Oropharynx

The oropharynx includes the base of the tongue, the inferior surface of the soft palate and uvula, the anterior and posterior tonsillar pillars, the glossotonsillar sulci, the pharyngeal tonsils, and the lateral and posterior pharyngeal walls

3) Hypopharynx

The hypopharynx includes the pyriform sinuses, the lateral and posterior hypopharyngeal walls, and the postcricoid region.

4) Larynx

The larynx includes all laryngeal structures from the tip of the epiglottis to the cricoid cartilage inferiorly and is subdivided into three specific sites: supraglottis, glottis, and subglottis.

5) Nasopharynx

The nasopharynx, extends from the base of the skull to the upper surface of the soft palate. It includes the space between the internal nares and the soft palate and lies above the oral cavity. The adenoids, also known as the pharyngeal tonsils, are lymphoid tissue structures located in the posterior wall of the nasopharynx. Waldeyer's tonsillar ring is an annular arrangement of lymphoid tissue in both the nasopharynx and oropharynx.

6) Nasal Cavity and Paranasal Sinuses Cancer

The paranasal sinuses include the ethmoid, maxillary, sphenoid, and frontal sinuses.

The maxillary sinus is a pyramid-shaped cavity within the maxillary bone. The medial border is the lateral nasal wall. Superiorly, the sinus abuts the orbital floor and contains the infraorbital canal. The posterolateral wall is anterior to the infratemporal fossa and pterygopalatine fossa. The anterior wall is posterior to the facial skin and soft tissue. The floor of the maxillary antrum extends below the nasal cavity floor and is in close proximity to the hard palate and maxillary tooth roots.

The nasal cavity includes the nasal antrum and the olfactory region. The subsites within the nasal cavity include the septum; superior, middle, and inferior turbinates; and olfactory region of the cribriform plate. The ethmoid sinus is made up of several thin-walled air cells. Laterally, the

ethmoid sinus is bound by a thin bone called the lamina papyracea, which separates it from the medial orbit. The posterior border of the ethmoid sinus is close to the optic canal. The anterosuperior border or roof of the ethmoid is formed by the fovea ethmoidalis, which separates it from the anterior cranial fossa. The perpendicular plate of the ethmoid bone separates the ethmoid cavity into left and right sides.

7) Salivary Glands Cancer

The salivary glands include the parotid, submandibular, sublingual, and minor salivary glands.[7]

2.2.2. Based on International Statistical Classification of Diseases and Related Health Problems 10th (ICD 10)

The ICD 10 can be used to classify disease and health problems and is used to translate the disease from words into an alphanumeric code. Malignant neoplasms stated or presumed to be primary, of specified sites. Below are the classification code for neoplasms in head and neck region (for further classification, see the attachment)[8]:

1) Malignant neoplasm of lip, oral cavity and pharynx (C00-C14)
2) Malignant neoplasm of respiratory organs (C30-C32)

2.3. Risk Factor of Head and Neck Cancer

A risk factor is something that increases the chance of developing cancer. But having a risk factor for cancer doesn't mean that people will definitely get it. Some people with risk factors never develop cancer, and other people without any known risk factors can still develop it.

Below are some risk factors of Head and Neck Cancer.

1) Age

Almost study proved that people over 50 are at higher risk for head and neck cancer. Two main mechanisms have been suggested to explain the increase in cancer incidence with ageing: the first refers to prolonged exposure to carcinogens during life and the second explanation seems to be attributed to the individual vulnerability to cancer with age.[9]

2) Sex

Men are two to three times more likely than women to develop head and neck cancer. However, the rate of head and neck cancer in women has been rising for several decades. This might be caused by the changing of habitual risk factors in daily life.[4]

2.4. Incidence of Head and Neck Cancer

Head and Neck cancer is a serious and growing problem in many parts of the world. Some epidemiological studies were conducted in some certain countries. According to the incidence data, Head and Neck Cancer showed different patterns each year.

The previous study about International Trends in Head and Neck Cancer during 1998- 2002 found the incidence of this cancer as follow. Data displayed is restricted to the incidence of cancer in Asian continent.[4]

Table 2. Head and Neck Cancer Incidence in Asia during 1998-2002

Countries	Males	Females
Eastern Asia		
China	694	383
Hongkong	321	316
Shanghai	1915	1128
Japan	155	71
Southern Asia		
India		
Mumbai	2506	1132
Chennai	1020	585
South East Asia		
Phillipines	246	218
Singapore		
Chinese	207	101
Indian	32	22
Malay	20	11
Thailand	160	104
Western Asia		
Israel		
Jews	256	216
Non- Jews	27	8
Kuwait		
Kuwaitis	15	14
Non-Kuwaitis	40	13

The epidemiological study before have been conducted at Kariadi Hospital Semarang Hospital, by Onggo Wiliyanto, found that there were 448 cases of Head and Neck Cancer during January 1st 2001 – December 31th 2005. The distribution based on sex can be seen as follows.[5]
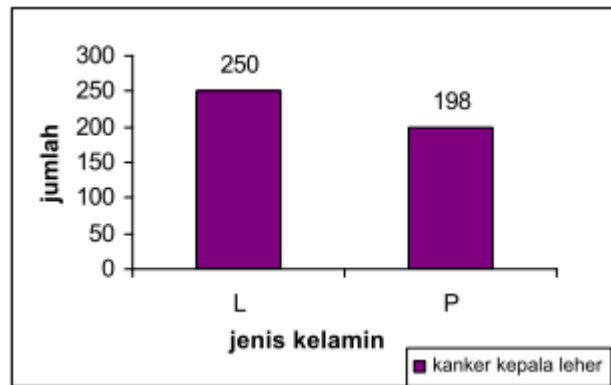

Figure 1. The incidence of Head and Neck Cancer Based on Sex at Kariadi Hospital Semarang Indonesia during January 1st 2001 – December 31th 2005

Cited from: Wiliyanto[5]

Based on the diagram above, men suffering Head and Neck Cancer were more than woman. There were 250 cases in men and 98 cases in women during five years period.

Meanwhile, based on age, the highest incidence of Head and Neck Cancer went to age range 40-49 as can be seen in the figure below.
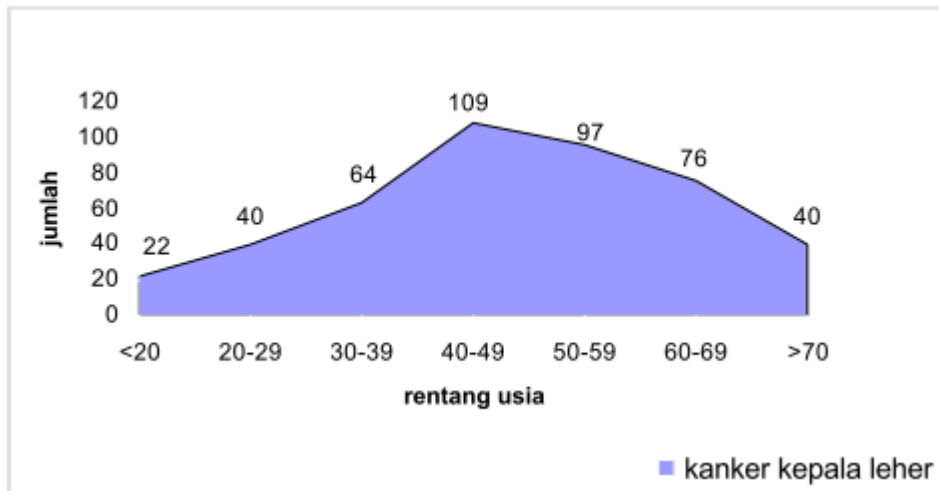
Figure 2. The Incidence of Head and Neck Cancer Based on Age at Kariadi

Hospital Semarang Indonesia during January 1st 2001 – December 31th 2005
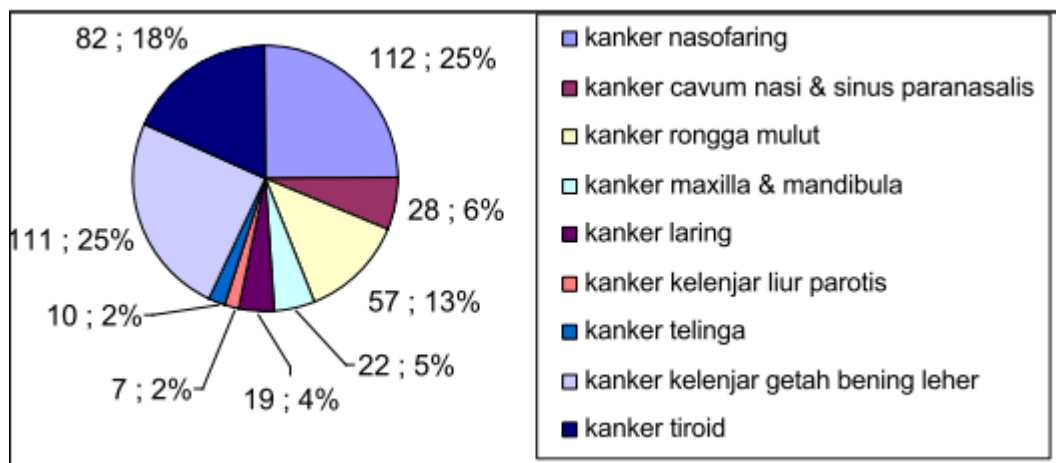
Cited from: Wiliyanto[5]

Figure 3. The Incidence of Head and Neck Cancer Based on Anatomical

Pathology Diagnosis at Kariadi Hospital Semarang Indonesia during

January 1st 2001 – December 31th 2005

Cited from: Wiliyanto[5]

In the same research, based on anatomical pathology diagnosis, nasopharyngeal cancer became the most Head and Neck Cancer incidence, as can be seen in the diagram above.

As the most cases in Head and Neck Cancer, there was previous study about the incidence of Nasopharyngeal Cancer at Kariadi Hospital Semarang Indonesia, brought by Merry Puspita. This study found the incidence of Nasopharyngeal Carcinoma based on age and sex between 2002 and 2011.[10]
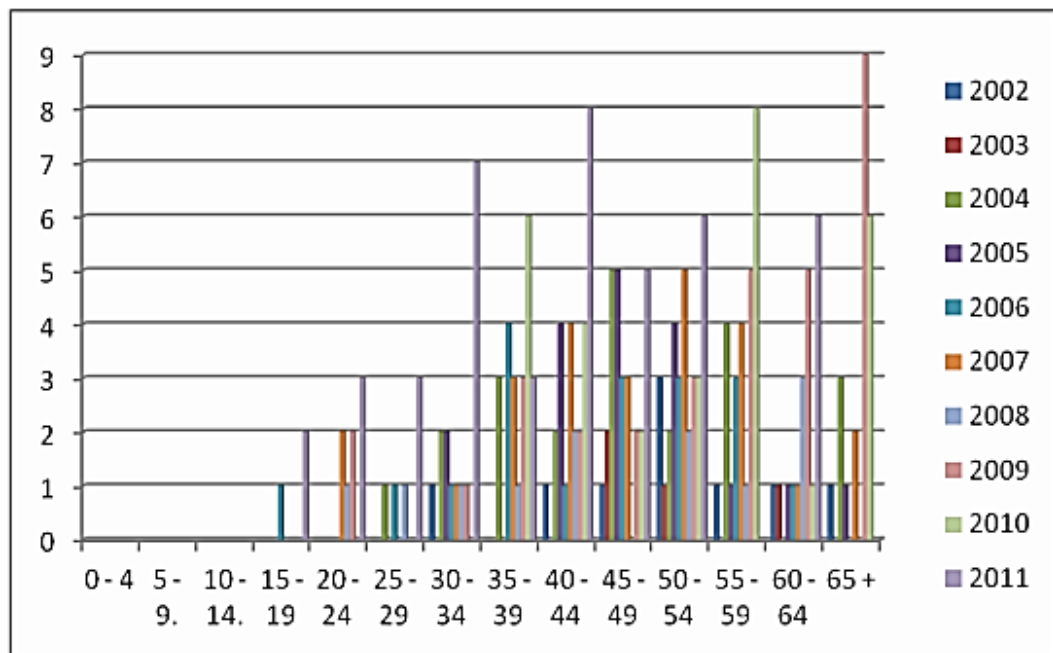

Figure 4. The Incidence of Head and Neck Cancer Based on Age at Kariadi Hospital Semarang Indonesia between 2002 and 2011
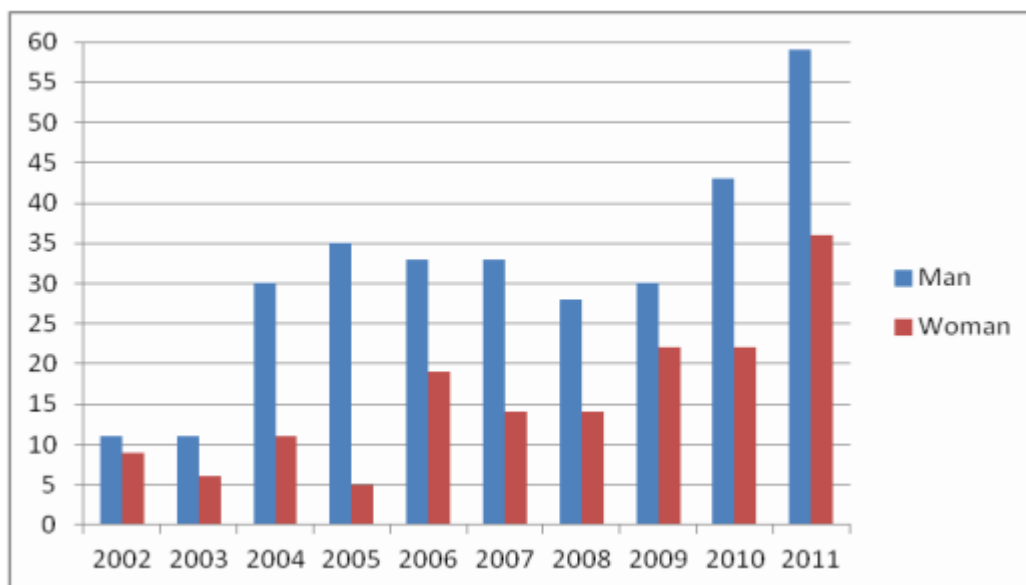
Cited from: Puspita[10]

Figure 5. The Incidence of Head and Neck Cancer Based on Sex at Kariadi

Hospital Semarang Indonesia between 2002 and 2011

Cited from: Puspita[10]

From the diagram above, the equality with another study, the incidence of nasopharyngeal cancer every year in men was more than women.

1.5. Statistical Methods for Cancer Registries

In order to present trends in Head and Neck Cancer, some statistical methods are used. The concern of cancer registries will be the calculation of cancer incidence rates and their use to study the risk of individual cancers in the registry area. Populations of individuals on whom information has been collected about the presence or absence of risk factors are assessed.[11]

But, if the population from which the cases registered are drawn is unknown, it is not possible to calculate incidence rates. In these circumstances, different case series must be compared in terms of the proportionate distribution of different types of cancer. The usual procedure is to calculate the relative frequency of each cancer relative to the total. It can be formulated by:[11,12]

$$\text{Relative frequency} = \frac{R}{T}$$

Where R= number of cases of the cancer of interest in the study group

T= number of cases of cancer (all sites) in the study group

One of the most frequently occurring problems in cancer epidemiology involves comparison of incidence rates for a particular cancer between two different populations, or for the same population over time. When comparing pattern of cancer over time for the same area, it is important to allow for the changing or differing population age-structure.

Age-structure varies tremendously across populations of the world at different levels of the demographic transition. There is no clearly conceptual justification for choosing one standard over another; hence the choice will eventually be arbitrary. However, comparisons of crude age-specific rates over time and between populations may be very misleading if the underlying age composition differs in the populations being compared. Hence, for a variety of purposes, a single age-independent index, representing a set of age-specific rates, may be more appropriate. This is achieved by a process of age standardization or age adjustment.[11,12]

There are several techniques for adjusting age-specific rates. Among them are direct and indirect standardization. The direct method has considerable interpretative advantages over the indirect method. An age-standardized rate is the theoretical rate which would have occurred if the observed age-specific rates applied in a reference population: this population is commonly referred to as the Standard Population. The populations in each age class of the Standard Population are known as the weights to be used in the standardization process. The most frequently used is the World Standard Population

Table 3. WHO World Standard Population Distribution (%), based on world average population between 2000-2025[11]

Age Group	World Average 2000- 2025
0- 4	8.86
5- 9	8.69
10- 14	8.60
15- 19	8.47
20- 24	8.22
25- 29	7.93
30- 34	7.61
35- 39	7.15
40- 44	6.59
45- 49	6.04
50- 54	5.37
55- 59	4.55
60- 64	3.72
65- 69	2.96
70- 74	2.21
75- 79	1.52
80- 84	0.91
85- 89	0.44
90- 94	0.15
95- 99	0.04
100+	0.005

Age Standardized Rate (ASR) can be formulated by:[10,13]

ASR = Total (nx/y.px) Wx for 100.000 population

Where   nx : number of new certain head and neck cancer at age x

          y   : number of year on which rates are based

          Px : number of person in population at age x in the same sex

          Wx: World standard population at age x

As in the case of comparisons of incidence rates, comparison of proportions is complicated by differences in the age structure of the populations being compared. The relative frequency of different cancer types varies considerably with age Thus the proportion of different cancers in a case series is strongly influenced by its age composition, and some form of standardization for age is necessary when making comparisons between them.

The methods have been used for age-standardization, the age-standardized cancer ratio (ASCAR), which is analogous to direct age standardization. The ASCAR is a direct standardization, which requires the selection of a set of standard age-specific proportions to which the series to be compared will be standardized. The choice is quite arbitrary, but a standard which is somewhat similar to the age-distribution of all cancers in the case series being compared will lead to the ASCAR being relatively close to the crude relative frequency. The proportions used for comparing frequencies of cancers in different developing countries.[11]

Age Standardized Cancer Ratio (ASCAR) can be formulated by:[10,13]

ASCR = Total (nx/Nx) Wx

Where nx: Number of new head and neck cancer cases at certain age group

Nx: Number of new head and neck cancer cases at all age group

Wx: World standard population at certain age group