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Appendix

Temporal Trends of Liver Cancer Incidence Rate in Songkhla, Thailand during 1989-2007

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Abstract

Background: Hepatocellular carcinoma (HCC) and cholangiocarcinoma (CCA) are the two major subtypes of liver cancer (LC) in Thailand. HCC is related to hepatitis B infection while CCA in the north and northeastern regions is related to liver fluke, *Opisthorchis viverrini* (OV), infestation. Unlike other regions, southern Thailand has been known to be free of OV parasite and hepatitis B, the major cause of HCC, vaccination has been integrated into the extended program of immunization for all newborns in Songkhla since 1992. The trends in both types of LC in Songkhla would give a very good insight for LC incidences in Thailand.

Objective: The purpose of this study was to investigate the temporal trends for LC in Songkhla during 1989-2007.

Materials and methods: A total of 1,254 LC cases were ascertained by the world accredited population-based cancer registry of Songkhla province from 1989 to 2007. Age standardized incidence rates (ASR) were stratified by gender, age groups, year of diagnosis, area and the two main morphological types of LC.

Results: The ASRs for males were higher than females in all age groups. The rates were higher between 2003 to 2007 than in other periods, and a relatively high rates of LC is also seen in Hat yai and Sadoa district. HCC was more prevalent than CCA in males while the reverse was true in females.

Conclusion: The increasing trends in both types of LC in later years is evident and they are different by gender. The evidences need further clarification by epidemiological studies.

Key words: Liver cancer, Age standardized incidence rate, Hepatocellular carcinoma, Cholangiocarcinoma, topography

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แนวโน้มอัตราการป่วยของโรคมะเร็งตับในจังหวัดสงขลา ระหว่างปี พ.ศ. 2532-2550

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ความสำคัญและที่มา: โรคมะเร็งตับในประเทศไทย มี 2 ชนิด คือ Hepatocellular carcinoma (HCC) และ cholangiocarcinoma (CCA) สาเหตุของการเป็นโรคมะเร็งชนิด HCC มีความสัมพันธ์กับการติดเชื้อไวรัสตับอักเสบบี ขณะที่มะเร็งตับชนิด CCA พบมากในภาคเหนือ และภาค

ตะวันออกเฉียงเหนือ สาเหตุเกิดจากพยาธิใบไม้ตับ ชนิด *Opisthorchis viverrini (OV)* ซึ่งแตกต่างจากภาคอื่น ๆ เช่น ในภาคใต้จะไม่มีพยาธิใบไม้ตับชนิด *OV* และการติดเชื้อไวรัสตับอักเสบบี ซึ่งเป็นสาเหตุของมะเร็งตับชนิด HCC มีการให้วัคซีนภูมิคุ้มกันไวรัสตับอักเสบบีกับเด็กทารกที่เกิดตั้งแต่ปี พ.ศ. 2535 แนวโน้มอุบัติการณ์ของโรคมะเร็งตับทั้งสองชนิดในจังหวัดสงขลา ทำให้ทราบถึงอุบัติการณ์การเกิดโรคมะเร็งตับในประเทศไทยชัดเจนขึ้น

วัตถุประสงค์: เพื่อศึกษาแนวโน้มการป่วยด้วยโรคมะเร็งตับในจังหวัดสงขลา ระหว่างปี พ.ศ. 2532-2550

วิธีการศึกษา: ผู้ป่วยโรคมะเร็งตับทั้งหมด 1,254 คนจากฐานข้อมูลทะเบียนมะเร็งจังหวัดสงขลา ปี พ.ศ. 2532-2550 อัตราการป่วยปรับฐานอายุ จำแนกตามเพศ กลุ่มอายุ ปีที่วินิจฉัย อำเภอ และ ชนิดของโรคมะเร็งตับ

ผลการศึกษา: อัตราการป่วยปรับฐานอายุของเพศชายสูงกว่าเพศหญิงทุกกลุ่มอายุ อัตราการป่วยในปี พ.ศ. 2546-2550 จะเพิ่มสูงกว่าช่วงปีอื่น ๆ และอัตราการป่วยสูงที่สุด คือ อำเภอหาดใหญ่ รองลงมาคืออำเภอสะเดา โรคมะเร็งตับชนิด HCC มีความชุกมากในเพศชาย ส่วนความชุกของโรคมะเร็งตับชนิด CCA มากในเพศหญิง

สรุปผล: โรคมะเร็งตับชนิด HCC และ ชนิด CCA ในปีที่ผ่านมา มีแนวโน้มเพิ่มขึ้นอย่างชัดเจน และมีความแตกต่างระหว่างเพศชายและเพศหญิง จากข้อมูลดังกล่าว จึงต้องมีการศึกษาข้อมูลทางระบาดวิทยา ให้มีความชัดเจนมากยิ่งขึ้น

คำสำคัญ: มะเร็งตับ อัตราการป่วยปรับฐานอายุ มะเร็งตับชนิด HCC มะเร็งตับชนิด CCA ชนิดของมะเร็งตับ

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Introduction

Cancer is a class of diseases in which a group of cells display uncontrolled growth beyond the normal limits, invasion and destruction of adjacent tissues and organs, and sometimes metastasis which is the spread to other locations in the body. (Kumar et al., 2007) Cancer is an important public health problem that causes social and economic loss worldwide and also in Thailand. In 2008, cancer was reported as a leading cause of death worldwide. The disease accounted for 7.9 million deaths or around 13% of all deaths. The main types of cancer leading to overall cancer mortality each year are lung, stomach, colorectal, and liver cancers (WHO, 2008).

In Thailand, the reported of Public Health Statistics A.D.2004 found liver cancer is the top leading cause of death. The mortality rate of cancer in 2004 was approximately 83.1 per 100,000 population, and men are affected than women. Liver cancer in Thailand can be divided into four groups. The most two common types are hepatocellular carcinoma (HCC) and cholangiocarcinoma. HCC is originated from liver cells and the most common cause in Thailand is exposure to hepatitis B virus. Other causes can be hepatitis C virus infection, aflatoxin exposure, alcohol, and other hepatotoxic agents. CCA is the cancer of bile ducts. In Thailand, an important cause of CCA is exposure to a species of liver fluke, *Opisthorchis viverrini*, together with nitrosamines. OV is prevalent in the Northeastern region of Thailand followed by the North and Central regions. It has never been found in the Southern region (Shivatanakul et al., 2004; Shanmugaratnam, 1985). Angiosarcoma is a cancer of blood vessels and usually caused by exposure to vinyl chloride and hepatoblastoma occurs in children. Both are very rare types of liver cancer.

The incidence rate of liver cancer was reported to be 29.9 per 100,000 people in 2002 and increases to 58.8 per 100,000 people in 2007 (Ministry of Science and Technology, 2006). The incidence starts to rise from 30 year of age and reaches a peak at age group of 60-69 year old (Khuhaprema et al., 2007). The Incidence rates in different regions of Thailand estimated by Bureau of Health Policy and Planning (2007) are shown in Table 1. The incidence rates of liver cancer in southern provinces are lower than provinces in other regions and the increase is evident.

Provincial	Incidence per 100,000 population			
	2002	2003	2006	2007
North	33.74	30.91	37.64	42.03
Northeastern	51.55	47.46	50.07	51.68
Central	22.85	26.11	20.43	30.67
South	11.08	11.39	14.67	15.05

Table 1: The incidence rate of liver cancer in different regions, estimated for the years 2002-2007

In this thesis, the objectives are to investigate the incidence rates of liver cancer, HCC and CCA, in Songkhla and construct a statistical model for incidence rates. The data aforementioned will be useful in planning cancer prevention and patient care policy in the future.

Method

A total of 1,254 liver cancer cases diagnosed from 1989 to 2007 in 16 districts of Songkhla in Southern Thailand were obtained from the population-based cancer registry of Songkhla. The population-based cancer registry of Songkhla collects data from patients who are Songkhla residences diagnosed and/or treated in any hospitals in Songkhla vicinity. The data collected for each cancer patient consists of name, residential address, date of birth, age, sex, religion, date and method of diagnosis, topographic site, histology and extent of cancer, and vital status of cancer patients (Kuhaprema, et al., 2007). Copies of death certificates are also collected and cases died of cancer without trace of cancer diagnosis in any hospital are also registered. Topography (primary site of cancer) and histology (pathological diagnosis) of cancer are coded according to the International Classification of Disease for Oncology (ICD-O) version 3 and then automatically converted to ICD, the 10th revision codes (ICD-10). After extensive cleaning to correct or impute data entry errors the records for 16 districts for the nineteen years were stored in the Songkhla Cancer Registry database. To the request of the authors, the Songkhla Cancer Registry kindly supplied individual records of those with liver cancer without any identification items in

Microsoft Excel format and gave permission to analyze the data with its recognition (Songkhla Cancer Registry, 2009).

Population denominators were estimated from two censuses in 1990 and 2000 by the National Statistical Office. The estimated populations of Songkhla from 1989-2007 stratified by gender, 5-year age group, and district are supplied by Associated Professor Hutchia Sriplung, the Chairman of the Thai Network of Cancer Registries.

Age standardized incidence rates were computed as the number of cases per 100,000 residents in the province.

$$a_i = \frac{r_i}{n_i} \times 100,000 \quad (1)$$

a_i is age specific rate for age class i , Which we denote as a_i , can also be simply calculated as a rate per 100,000 by dividing the number of cases in the age-class (r_i) by the corresponding person-years of observation (n_i) and multiplying by 100,000 population

$$ASR = \frac{\sum_{i=1}^A a_i w_i}{\sum_{i=1}^A w_i} \quad (2)$$

ASR is Age standardized incidence rates were compute from denoting w_i as the population present in the i^{th} age-class of the standard population, were as above $i = 1, 2, \dots, A$ and letting a_i again represent the age specific rate in the i^{th} age-class (Jensen et al., 1991).

Results

There were 1,254 cases of Liver cancer for Age standardized incidence rate per 100,000 populations were classified as gender, topography, year, area and age group during 1989-2007.

Liver Cancer in Songkhla

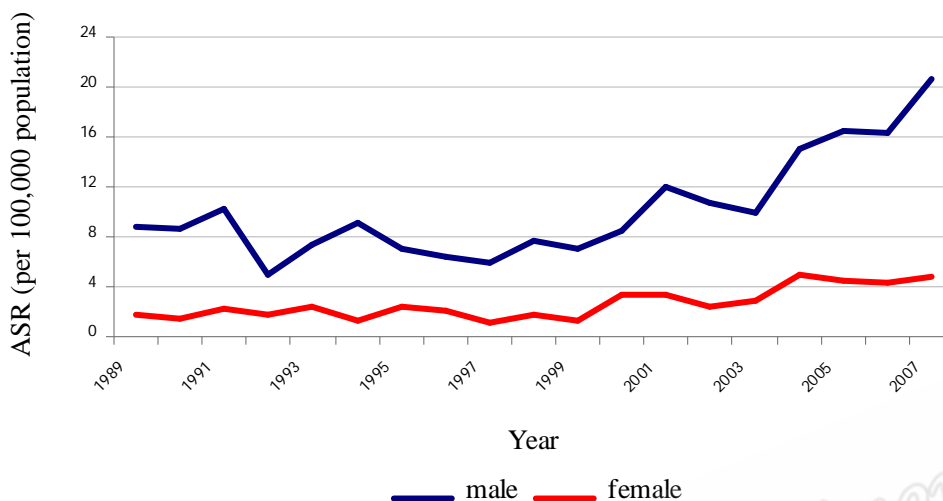


Figure 1: Overall annual Liver cancer of Age standardized incidence rate for each gender

Figure 1 shows trend of Liver cancer of Age standardized incidence rate by gender. The rates for both male and female have similar trend. The annual percent change (APC) of male is 4.88 percent and female is 6.25 per year. The rate increase from 2004-2007 in male and increase from 2003-2007 in female.

Liver Cancer in Songkhla, Male

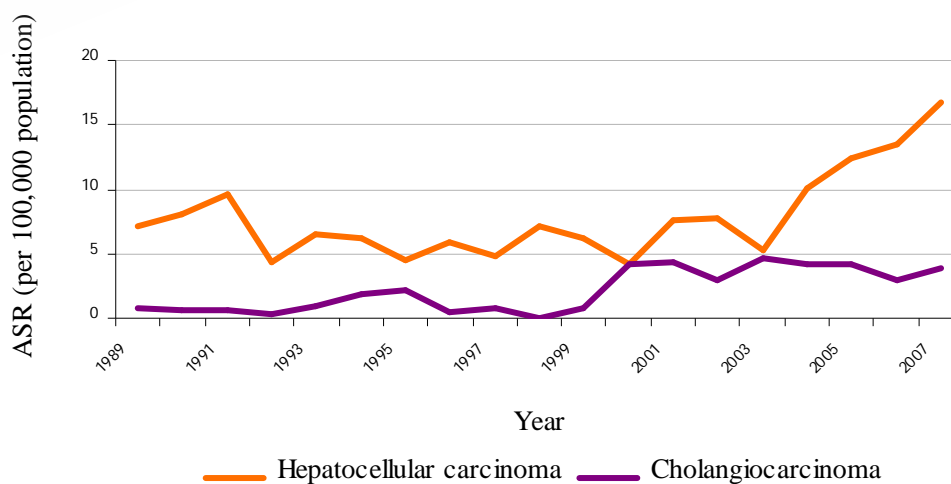


Figure2: Overall annual male of Age standardized incidence rate for each topography

Figure 2 shows trend of Liver cancer for Age standardized incidence rate in male by topography. The separate are Hepatocellular carcinoma (HCC) and Cholangiocarcinoma (CCA). The rates for HCC and CCA have increased in male. The annual percent change (APC) of HCC is 3.8 percent and CCA is 13.1 per year. The incidence rate increase from 2004-2007 in HCC and increase from 2000-2007 in CCA.

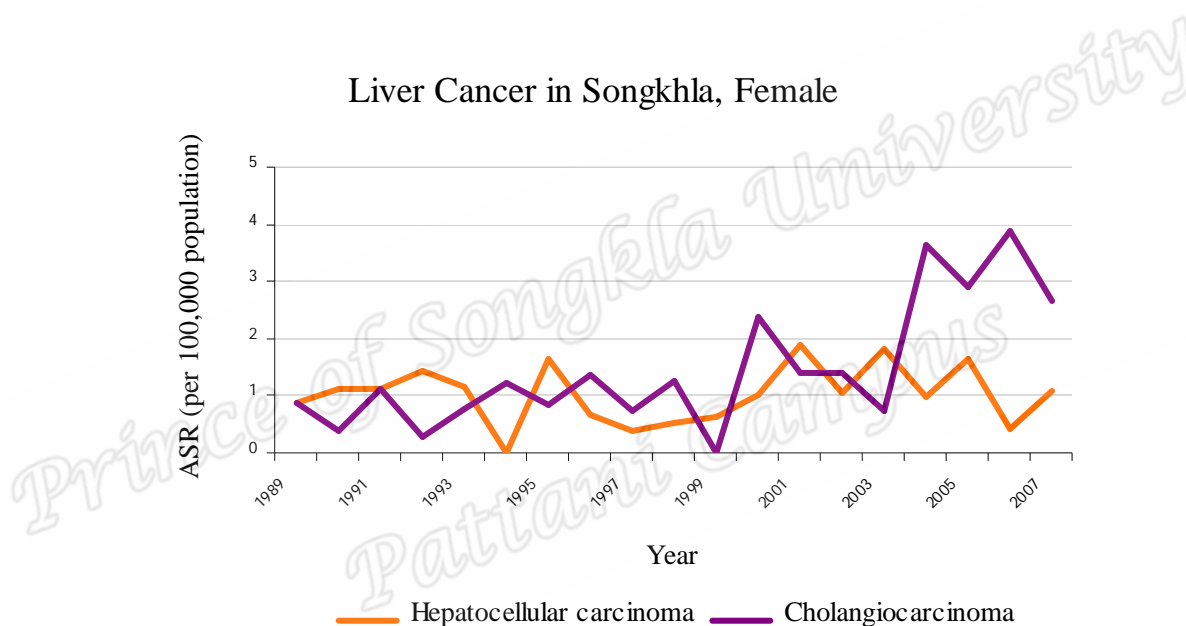


Figure3: Overall annual female of Age standardized incidence rate for each topography

Figure 3 shows trend of Liver cancer for Age standardized incidence rate in female by topography. The rates for CCA have increased and HCC be stable in female. The annual percent change (APC) of CCA is 8.3 percent and HCC is 3.4 per year. The rate increase from 2004-2007 in CCA and was highest in 2006.

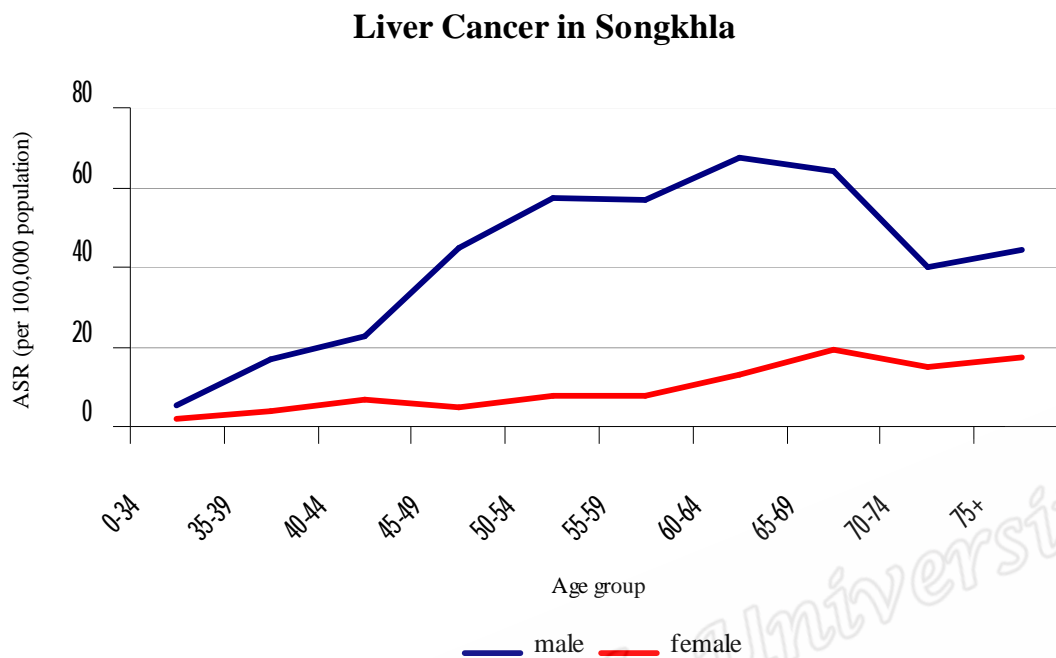


Figure4: Overall age group of Age standardized incidence rate for each gender

Figure 4 shows trend of age group for Age standardized incidence rate each gender. The rates for every age group have increased in male more than female. The maximum age group is 60-64 years old in male and maximum is 65-69 years old in female.

Summary

This study tends to identify temporal trends for liver cancer in Songkhla during 1989-2007 we found that male have more risk than that of female. The topography HCC is majority type found in male, CCA is found in most of female. In addition male ages during 60-64 years old and female age during 65-69 years old are more likely to be ill from liver cancer. Hat yai and Sadao were districts having a high incidence rates of LC, ASR were 154.76 and 136.17 respectively

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