

RESEARCH ARTICLE

Numbers of New Cases and Trends of Cancer 1993-2012: Srinagarind Hospital Based Population, Khon Kaen, North-East Thailand

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Abstract

Background: Cancer is the most common cause of death in Thailand, where treatment outcomes and prognosis are poor and mortality rates remain high. This study reports new cancer cases and trends of all cancers registered in Srinagarind Hospital from 1993 to 2012 and also provides a picture of the cancer situation in Northeast Thailand. **Materials and Methods:** All new cases of cancer registered in the hospital-based cancer registry at Faculty of Medicine, Srinagarind Hospital, Khon Kaen University during 1993-2012 were included in the study. **Results and Conclusions:** The number of new cancer cases has gradually increased each year during the last 20 years. The three most common cancers at present in males are liver and bile duct cancer, lung cancer and colorectal cancer, respectively. In females, liver and bile duct, breast and thyroid cancers are now the most frequent. Interestingly, the number of cases of both liver and bile duct cancer and colorectal cancer in males noticeably increased during the second decade of the study. Additionally, breast cancer greatly increased in the same decade and lung cancer in females climbed into the top five most common cancers. Thyroid cancer has also risen steadily in the last decade. Trends of common cancers are similar to those throughout Thailand.

Keywords: Numbers of new cases - cancer - Srinagarind Hospital - hospital based cancer registration

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Introduction

Cancer is a leading cause of death worldwide in both developed and developing countries, including Thailand (Siegel et al., 2012; Ferlay et al., 2010; Sriplung et al., 2005). In Thailand, the incidence of all cancers and the mortality rate resulting from malignant diseases gradually increase each year. In particular, incidences of colorectal cancer and breast cancer significantly increased during 1989-2000 (Sriplung et al., 2006). Lung cancer, in both males and females, is the most common cancer in many countries (Siegel et al., 2012). However, in Thailand, liver cancer is the most common cancer in males and breast cancer in many parts of the country is the commonest cancer in females (Sriplung et al., 2005), (Public Health Statistic, 2010, reported in Thai language). The number of patients diagnosed with cancer has noticeably increased in Srinagarind Hospital during the last 10 years (unpublished data, reported from Cancer Unit of Srinagarind hospital, 2000-2012). We therefore prepared this overview of all new cancer cases recorded in Srinagarind Hospital during 1993-2012, with an emphasis on changing trends in types of cancer in NE Thailand.

Materials and Methods

Population and registration procedure

Case definitions: All new cancer cases registered in Srinagarind Hospital between January 1st, 1993 and December 31st, 2012 were included in this study. This study is officially approved by the Khon Kaen University Ethics Committee for Human Research based on the Declaration of Helsinki and the ICH Good Clinical Practice Guidelines with HE571238 of reference number.

Sources of data: Srinagarind Hospital, Khon Kaen University (a thousand-bed university hospital), Khon Kaen, Thailand, is situated in the center of NE Thailand and accepts all referred cases from other health care centers in the region. Our data were obtained from the Khon Kaen Cancer Registry, which has recorded data of all cancer cases treated in this hospital since 1987. All data were verified, checked for coding duplication and entered into the CANREG software (Version 4, available from <http://www.iacr.com.fr/canreg4.htm>). The data normally collected from each cancer patient included age, sex, date of birth, date of diagnosis, method of diagnosis, primary site of cancer, extension or metastasis, histology of cancer,

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date of last visit, vital status at last follow-up and other necessary information. Deaths were not recorded but these data can be obtained from the civil registration database, if they are required. Only relevant data were presented in this study.

Statistical methods

The data were analysed using Poisson regression to compare the trends in the first decade (1993-2002) and the second decade (2003-2012).

Results

Overall numbers and trends of new cancer cases, 1993-2012

The numbers of new cancer cases recorded between 1993 and 2012 in Srinagarind Hospital are shown in Figure 1. For some analyses, the data were divided into 2 intervals; the first decade (1993-2002) and the second decade (2003-2012). The overall numbers of cancer cases were fairly constant from 1993 to 2005, but has shown an apparently accelerating increase since then. The numbers of male and female patients during the period surveyed were comparable, male patients being slightly more numerous than female. Both genders showed an increase in the last few years, and especially in the period 2010-2012.

Overview of the most common cancers in male and female, 1993-2012

The most common cancers in patients, both male and female, registered in Srinagarind Hospital for the period 1993 to 2012, are shown in Tables 1 and 2, respectively. The order of presentation in the tables is based on the numbers of cases of each type of cancer in the final year of the study. Additionally, data on the five or six most common cancers during 1993-2012 are presented graphically in Figures 2 and 3 for male and female, respectively.

Cancer of the liver and bile ducts was the most common cancer in both males and females (Tables 1 and 2; Figures 2 and 3). In males, this made up over 50% of all cancer cases (Table 1) and has shown a marked increase over the last few years. In females, the number of liver and bile duct cancer cases was approximately half of that in males, despite similar numbers of cancer patients of each gender. In females, cervical cancer was the most common cancer during the first decade of the study (Figure 3) but was subsequently surpassed by cancer of the liver and bile ducts and by breast cancer in the second decade (Table 2 and Figure 3). Nevertheless, in females numbers of cases of cervical cancer almost matched liver and bile duct cancer cases overall, despite very substantial reductions in numbers of cases of the former in recent years.

The second most common cancer in males was lung cancer (Table 1) while it was the sixth most common cancer overall in females (Table 2). The number of new lung cancer cases in males was reasonably constant at approximately 250 cases/year through the 20 year period reviewed (Figure 2) whereas it has gradually increased in females only in the last 10 years and markedly risen

especially in the last few years (Figure 3). In 1993, the number of lung cancer cases in females was roughly 50 per year compared to 200/year in 2012. Consequently, lung cancer climbed up into the top five most common cancer in females during the recent 10 years observed. Breast cancer was the second most common cancer in females. Interestingly, the number of breast cancer cases was stable at approximately 200 cases/year during the first 10 years (Figure 3) then increased dramatically up to about 450 cases/year by the end of the second decade (Figure 3).

Colorectal cancer was the third and sixth most common cancer occurring in males and females, respectively (Tables 1 and 2), higher numbers of cases being reported from males (2,275 vs 1,846). The number of cases of colorectal cancer in males was stable at or below 100

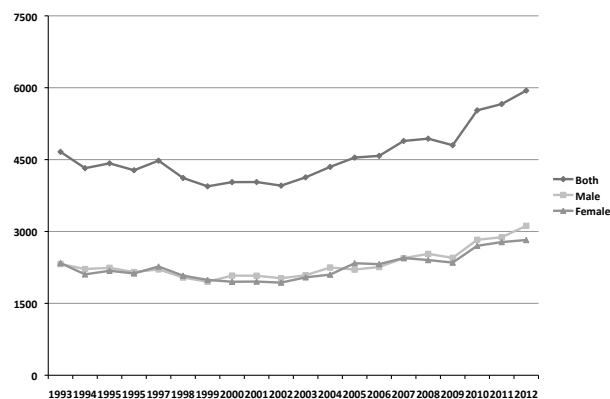


Figure 1. Overall Numbers of New Cancer Cases Recorded Annually during 1993-2012 in Srinagarind Hospital

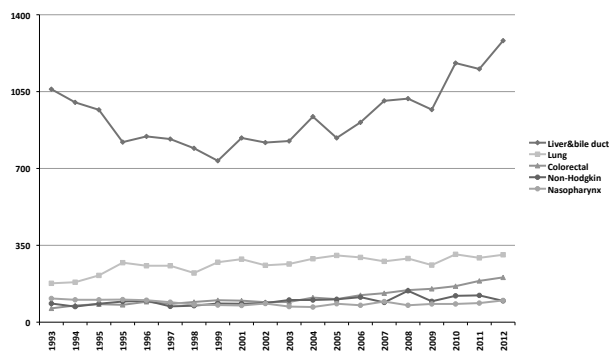


Figure 2. Numbers of Cases of The Five Most Common Cancers in Males, 1993-2012

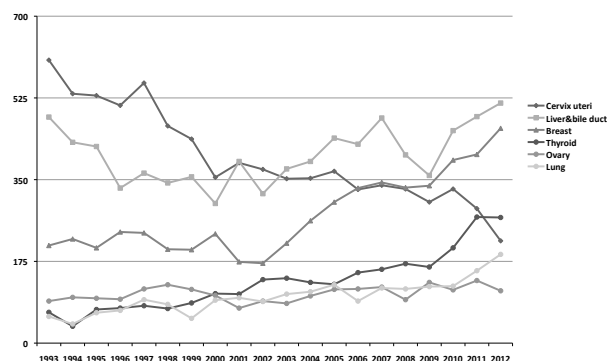


Figure 3. Numbers of Cases of The Six Most Common Cancers in Females during 1993-2012

Table 1. Numbers of Cases of the Most Common Cancers in Males in Srinagarind Hospital, 1993-2012

Male Site	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	All
Liver & bile duct	1061	1001	967	820	846	834	792	735	839	818	825	936	839	910	1008	1018	968	1180	1153	1282	18832
Lungs	177	182	213	271	257	257	224	273	287	259	265	289	304	295	277	290	260	309	293	307	5289
Colorectal	63	76	82	79	93	83	92	100	98	91	92	112	105	123	132	146	152	164	188	204	2275
Nasopharynx	108	102	102	103	100	91	80	78	76	85	71	69	84	77	94	77	83	83	87	99	1749
Non-Hodgkin lymphoma	85	71	84	94	98	72	75	85	84	87	101	101	104	114	90	143	95	120	122	97	1922
Skin	42	41	45	43	33	37	41	42	43	44	33	43	46	34	53	49	50	66	63	80	928
Prostate	13	28	13	23	15	25	19	28	28	47	34	33	39	50	44	51	50	71	87	67	765
Stomach	36	36	27	43	40	31	28	36	36	29	34	38	22	31	31	48	49	31	43	61	730
Thyroid	15	11	19	15	23	20	22	31	21	26	29	23	33	43	37	36	32	54	48	60	598
Bladder	35	31	34	25	28	25	19	26	31	23	19	24	34	27	31	35	43	45	36	54	625
Leukemia	83	83	88	106	114	98	108	109	103	74	82	88	94	55	82	65	82	73	47	52	1768
Brain	77	48	54	56	63	52	35	51	42	39	44	33	39	37	51	39	35	53	33	43	1082
Larynx	38	39	30	44	44	31	43	30	27	35	33	38	30	35	45	31	44	37	57	50	761
All sites	2321	2216	2242	2153	2209	2039	1952	2076	2077	2023	2087	2248	2205	2259	2443	2533	2449	2827	2880	3118	37324

Table 2. Numbers of Cases of The Most Common Cancers in Females in Srinagarind Hospital, 1993-2012

Male Site	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	All
Liver and bile duct	484	430	421	332	364	343	356	299	389	320	373	389	439	426	482	403	359	455	485	514	8063
Breast	209	223	204	238	236	201	200	234	174	171	214	262	302	332	344	333	337	392	404	460	5470
Thyroid	66	36	72	75	80	74	86	106	105	136	139	130	126	151	158	170	163	204	270	269	2616
Cervix uteri	606	534	530	509	557	465	437	355	386	372	352	353	368	329	338	330	302	330	288	219	7960
Lung	57	41	65	70	93	83	53	92	97	89	105	110	125	90	118	116	121	122	155	190	1992
Colorectal	57	53	50	60	82	62	79	71	75	70	81	77	98	96	117	126	136	140	156	160	1846
Corpus uteri	55	29	32	51	49	57	51	49	53	60	69	79	99	82	100	113	111	142	94	123	1498
Ovary	90	98	96	94	116	125	115	102	75	90	85	101	115	116	120	93	130	114	134	112	2121
Skin	38	27	42	53	44	31	26	31	44	40	41	34	46	58	56	42	41	50	66	80	890
Mouth	82	59	86	57	68	62	67	56	39	51	51	43	62	60	58	59	44	74	64	59	1201
Non-Hodgkin lymphoma	43	66	52	69	55	53	58	52	54	72	76	73	75	95	62	91	73	107	97	59	1382
Brain	69	33	60	53	51	59	40	58	38	53	55	41	36	23	31	34	18	36	34	33	855
All sites	2341	2105	2179	2125	2269	2078	1990	1951	1955	1932	2043	2100	2336	2319	2446	2404	2350	2700	2779	2822	35894

*The order of the most common cancers is based on the last year of study (2012)

cases/year during the first decade studied but increased considerably during the second decade (Figure 2). Similarly, the number of female patients with colorectal cancer has increased steadily during the last 20 years (Table 2). The fourth most common cancer in females was thyroid cancer with steadily increasing numbers of cases over the period surveyed. Approximately 70 cases/year were diagnosed in the early 1990s, rising to 300 cases/year at the end of the period, with much of the increase occurring in the last three years (Figure 3).

The commonest types of head and neck cancers in males and females differ: nasopharynx cancer was more common in males whereas females more commonly had mouth cancer (Tables 1 and 2). In males, nasopharynx cancer was the fifth most common cancer, with cases remaining stable in number during the last 20 years at approximately 100 cases/year (Figure 2). Cases of mouth cancer in females were likewise relatively stable in number, at between 50 and 75 in each year (Table 2).

Non-Hodgkin lymphoma, was approximately 4-fold more common in males than females. Additionally, it was the fifth most common cancer found in males with numbers of cases remaining stable during the period of study, at approximately 100 cases/year (Figure 2).

Discussion

Srinagarind Hospital is a major tertiary health care center for Northeast Thailand, receiving referrals from all over the region and thereby serving a population of around 22 million people. The hospital is served by many subspecialty physicians with expertise on malignancy, hence, most cancer cases in the NE are referred here to receive the proper management. The data reported here therefore likely reflect actual cancer trends within the broad region.

This study reveals that the overall numbers of cancer cases has increased, especially in the second decade of the study and the results are consistent with the incidence of cancer elsewhere in Thailand (Sriplung et al., 2005 and Public Health Statistic, 2010, reported in Thai language). The three most common cancers in males in Thailand during 2004-2006 were colorectal cancer, lung cancer and liver and bile duct cancer, respectively (Khuhaprema et al., 2012). Additionally, breast cancer, cervix and uterus cancer and colorectal cancers are the three most common cancers occurring in females in Thailand (Sriplung, et al., 2003; Khuhaprema et al., 2007; 2010; 2012). Thus the results from Srinagarind Hospital during the past 20

years are quite similar to those of Thailand as a whole. A major point to note is that liver and bile duct cancer was the most commonly seen cancer in female patients studied in Srinagarind Hospital, whereas it occupies sixth position in the country as a whole. The proportion of liver and bile duct cancer recorded in Srinagarind hospital is noticeably higher than that of the other part of Thailand. The Northeast region has a high incidence of *Opisthorchis viverrini* (liver fluke) infection because members of the local population frequently consume uncooked cyprinoid fish, which are the intermediate hosts of this parasite (Sripa and Pairojkul, 2008). Opisthorchiasis is a significant risk factor for bile duct cancer (Sripa et al., 2011). The apparent increase in numbers of liver and bile duct cancers in the last 10 years is probably due to the increasing numbers of referred cases from primary health care centers, extensive health promotion about causes of cholangiocarcinoma (CCA) leading to increased patient awareness, and improved diagnostic technology. In addition, Srinagarind Hospital is famous for expertise on treatment of CCA and some other cancers, hence attracting patients from all over Thailand.

Since we only report numbers of recorded hospital-based cases, we cannot say whether community incidences of these cancers have changed in the population at large in the period 1993-2012. As mentioned above, numbers of cases reaching Srinagarind Hospital will change according to changes in diagnostic methods and referral patterns, especially if increasing numbers of cases from outside NE Thailand are being referred to Khon Kaen. Changes in screening and early intervention methods might also have influenced the data, as is likely the case for cervical cancer. An effective campaign to promote cervical cancer scanning by Pap smear has been in place in Thailand since 2002 (Kasinpila et al., 2011). In addition, HPV vaccine has been promoted during the last few years in Thailand. These two interventions are expected to reduce the incidence of cervical cancer (Praditsitthikorn et al., 2011) and that is likely reflected in our data.

The increased overall number of cancer cases might be due to demographic factors, such as increasing population size and greater longevity of individuals. It may also reflect an increase in high risk behavior such as unsafe sex leading to HIV or HPV infection, and metabolic syndromes such as diabetes mellitus and obesity (Rattanamongkolgul et al., 2004; Phanuphak et al., 2013; Suthipintawong et al., 2011; Aekplakorn et al., 2004).

The increased numbers of lung cancer cases in females, which is similar to worldwide trends (Mathers et al., 2001; Greenlee et al., 2000), might be because of changing life styles leading, for example, to an increase in passive smoking in bars, pubs and night clubs (Kamsa-Ard et al., 2013). Anti-smoking campaigns are strongly promoted in Thailand; however, fewer females than males seem to be responding (Sagerup et al., 2011) and the numbers of new lung cancer cases in females is still gradually rising. In the last 10 years, the number of breast cancer cases in females has noticeably increased. This might result from the increase in obesity, and the adoption of fat-rich Western diets by the Thai population during recent decades (Sangrajrang et al., 2013). Other factors that may play

a part include late child bearing, having fewer children and physical inactivity, all associated with increased westernization (Jemal et al., 2010).

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