Colorectal cancer survival in Thailand

Nattayakorn Monkhan[1*], Surachai Phimha[2], Nakarin Prasit[2], Nopparat Senahad[2], Chanaporn Pinsuwan[3]

[1]Public Health Program, Faculty of Public Health Khon Kaen University, Thailand
[2]Department of Public Health Administration, Health Promotion and Nutrition, Faculty of Public Health,
 Khon Kaen University, Thailand
[3]Public Health Program, Faculty of Public Health Khon Kaen University, Thailand

*Corresponding author: Nattayakorn Monkhan, nattayakorn.m@kkumail.com

ABSTRACT

Background: Colorectal cancers are third among the world's most common cancers. Among the top five most common malignancies in Thailand, colorectal cancer primarily affects the elderly but affects persons of all ages as well. In addition, its incidence is rising yearly.

Objectives: This retrospective cohort study aimed to describe the survival rate of Colorectal cancer patients in Thailand.

Methods: The study used secondary data from the Ministry of Public Health between 2013 and 2020, a total of 57,321 cases were enrolled. Descriptive statistical analysis and inferential statistical analysis were performed by Cox regression analysis to observe survival rate estimate, Kaplan-Meier Survival estimate with 95% CI.

Results: Among the total participants, 51.28% were male. Female survival rate was 9% higher than male Colorectal cancer patients (HR = 0.91, 95% CI: 0.86-0.94). The Colorectal cancer patients who were aged 61-70 years were more likely to pass away than patients aged ≤ 60 years (HR= 1.25, 95% CI:1.17- 1.34). Similarly, Colorectal cancer patients aged ≥70 years were more likely to have demise 1.58 times earlier than patients aged ≤ 60 years (HR= 1.58, 95% CI: 1.49-1.68).

Conclusion: The survival rate of patients with colorectal cancer was significantly affected by gender. In addition, age was one of the variables which is also statistically significant that impacted on the colorectal cancer patient survival rate. Therefore, the formulation of screening policies for colorectal cancer in targeted populations, particularly in elderly should be established to support colorectal cancer prevention and reduce the risk to achieve a greater health impact among them.

Keywords: Colorectal cancer, Survival rate, Patients in Thailand

1. Introduction

The third most prevalent malignancies worldwide are Colorectal cancers (CRC) [1]. There are 1,931,590 cases of colorectal cancer worldwide with an incidence of 19.5 per 100,000 population and a prevalence of 271 per 100,000 population, accounting for 1.2 million new cases and up to 609,000 fatalities annually [2]. During the last five years (2012-2016), the colorectal cancer mortality rate was 13.9 per 100,000 population (2013-2017). The incidence rate increased significantly with doubling age between 5 and 50 years, and increasing by approximately 30% in the ≥ 55 age group which signify the age-related risks among the individual [3]. Australia and New Zealand have the highest expected rates of colorectal cancer while west Africa has the lowest [1]. However, it exhibits similar patterns of colorectal cancer among men and women globally [1]. In the next 15 years, the incidence of colorectal cancer is expected to increase by 60% (2.2 million cases). The number of Colorectal cancer patients is projected to increase to 3.2 million by 2040 [4, 5]. The majority of increasing incidence of colorectal cancer is attributable to rise radiation exposure [6].

There is an increase in colorectal cancer in Asia. In many Asian countries, the prevalence is comparable to that of Western nations. Multiple studies have provided information about patients with CRC. In Asia, the overall cure rate for CRC has not increased significantly over the past decade [7]. In Thailand, CRC is among the top five most prevalent cancers, affecting people of all ages, but particularly the elderly, with an increasing incidence [8]. The incidence of the disease was 16.9 per 100,000 people [2], because of economic development transforming the consumption pattern to promote prolonged life. Although Colorectal cancer can be cured with surgery in the early stages, there are typically no symptoms, resulting in more than 60 percent of Colorectal cancer patients being diagnosed at a late stage which has a high cost, including a low survival rate. It is generally believed to be preventable through screening for abnormalities in asymptomatic individuals. These abnormalities are frequently polyps or adenomas which have the potential to develop into cancer. There are risk factors that cause colorectal cancer which includes not consuming vegetables [9]. Over the past four decades, these risk factors have been identified as causes of colorectal cancer. A rapid transformation has occurred in economic, social, and environmental factors. As a consequence, people's lifestyles have changed drastically which will increase the population's

longevity despite an increase in chronic noncommunicable disease-related mortality and morbidity [10].

Therefore, in this study researchers used 43 files from the Ministry of Public Health, 2020 a reliable source of information to examine factors related to colorectal cancer. This is a national representative to monitor the situation and analyze methods to manage diverse health problems in Thailand. In national investigations of colorectal cancer patient survival rates, Thailand's data was also found to be less frequent in previous studies.

2. Methods

2.1 Study area and study design

This retrospective cohort study assessed all the new cases of CRC registered in the population-based cancer registry in Ministry of Public Health as per the International Classification of Diseases for Oncology (ICD-O, third edition) from C18.0 cecum to C20.9 for the rectum (C18.0 cecum, C19.9 rectosigmoid junction and C20.9 rectum). The data was retrieved for those CRC patients diagnosed between January 1, 2013 till December 31, 2016. Those who only had death certificate without medical records and who had multiple primary tumor origins were excluded from this study.

2.2 Follow-up

The last vital status of participants was updated by linkage with Ministry of Public Health, Thailand. The medical date was obtained from individual medical records and the time of observation was until death or the end of study period in December 31, 2020.
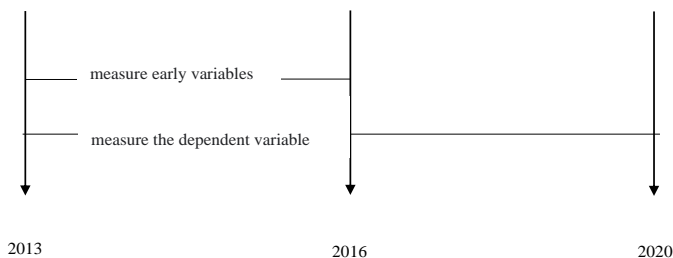

Figure 1. A research model on survival rates of colorectal cancer patients in Thailand

2.3 Statistical analysis

Descriptive statistics were analyzed and presented the demographic characteristics with numbers and percentages for categorical data. The continuous data was analyzed and presented by mean, standard deviation (SD). Observed survival rates were calculated by the actuarial life table.

Survival analysis of the relationship between factors and survival rates of patients with colorectal cancer aged 45 years and older in Thailand between 2013-2020, were observed. Survival rate of colorectal cancer patients was followed until the patient was admitted or until the end of the study. It was calculated from the time when the patient was first diagnosed with cancer in the public health system until the time the patient died or end of tracking. Survival rates at various time intervals such as 1, 3, or 5 years (1-, 3-, or 5-year survival rate) was calculated. Kaplan-Meier Survival estimate with 95% CI and Cox regression analysis at the 0.05 level of statistical significance were performed.

2.4 Ethical considerations

This study was approved by Khon Kaen University Ethics Committee for Human Research based on the Declaration of Helsinki and the ICH Good Clinical Practice Guidelines (HE 652144).

3. Results

From an analysis of 57,321 colorectal cancer patients in Thailand, it was determined that the majority of patients were males (51.17%) and 48.83 % females. 46.65 % of respondents were aged $\geq$70 years old. The median age of the population was 70 years with a minimum of 45 years and a maximum of 104 years.

Male survival rates were 93.09% (95% CI: 92.80-93.37), 87.96% (95% CI: 87.59-88.33), 84.77% (95% CI: 84.33 -85.20) and 82.54% (95% CI: 81.98-83.08) at 1,3, 5 and 7 years, respectively. Female survival rates at 1, 3, 5, and 7 years were 94.05% (95% CI: 93.76-94.32), 89.48% (95% CI: 89.11-89.83), and 86.15% (95% CI: 85.71-86.58), as shown in table 1 and figure 2.

In our setting, we observed that the patients in provinces with cancer hospitals were 1.26 times more likely to die (95% CI: 1.19-1.32) than that of provinces without cancer hospitals. The survival rate of female patients was 9% greater than that of male patients (HR=0.90, 95% CI: 0.86-0.94). Patients aged 61-70 were 1.25 times more likely to perish than those aged patients aged 60 years (HR = 1.25, 95% CI: 1.17 - 1.34). In comparison to the patients aged 60 years, the risk of mortality was 1.58 times greater among the patients aged $\geq$70 (HR = 1.58, 95% CI:1.49-1.68).
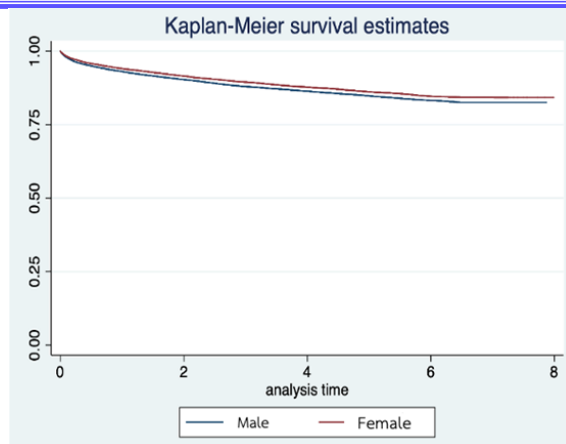
Figure 2. The survival time by sex group

Table 1. Survival Period of Patients with Colorectal Cancer

Survival (Time)	Male (95% CI)	Female (95% CI)	All (95 %CI)
1	93.09 (92.80-93.37)	94.05 (93.76-94.32)	93.56 (93.35-93.75)
3	87.96 (87.59-88.33)	89.48 (89.11-89.83)	88.70 (88.44-88.95)
5	84.77 (84.33-85.20)	86.15 (85.71-86.58)	85.44 (85.13-85.74)
7	82.54 (81.98-83.08)	84.31 (83.77-84.82)	83.40 (83.02-83.78)

Table 2. Effect of various factors on the survival of colorectal cancer patients

Variable	Quantity (%)	IR/100	HR (95% CI)	P-value
Provincial hospitals				<0.001
Without cancer center hospitals	836 (99.05)	2.71	1	
With cancer center hospitals	8 (0.95)	4.01	1.26 (1.19-1.32)	
Sex				<0.001
Male	29,331 (51.17)	3.43	1	
Female	27,990 (48.83)	3.02	0.91 (0.86-0.94)	
Age				<0.001
≤ 60 years	14,284 (24.92)	2.40	1	
61-70 years	16,298 (28.43)	3.02	1.25 (1.17-1.34)	
≥70 years	26,739 (46.65)	3.80	1.58 (1.49-1.68)	

P-value, cox regression analysis

4. Discussion

The results of the study were similar to the National Cancer Institute in 2561 which observed the survival rate at one year was 99.5% [11]. However, the five-year survival

rate approached 77%. Our study observed that patients has received a second cancer diagnosis in addition to the colorectal cancer diagnosis. The findings of this study are not consistent with research carried out in Thailand [12]. The five-year survival rate approached 77%.

Based on an examination of numerous factors Provinces with cancer center facilities have a positive impact on the survival of colorectal cancer patients, according to a Cox regression analysis. Compared to provinces without cancer hospitals, patients in provinces with cancer hospitals were 1.26 times more likely to die (95% confidence interval: 1.19-1.32). Since the majority of patients are in the advanced phases of the illness who must receive comprehensive specialized cancer care in accordance with the findings of the study, the 5-year survival rate for colorectal cancer was found to have varied in the past. Because there is no cancer center hospital, the survival rate in each cancer registry, such as the Chiang Mai Cancer Registry, tends to be above 70 percent. In contrast, the survival rate was only forty percent in Division of Lampang Cancer Registry [13]. The survival rate of patients with colorectal cancer was significantly affected by gender (p-value <0.001). The result has been consistent with the previous study conducted in the USA which revealed that males were 1.71

times more likely to perish than females [14]. Simillarly, a study in Malaysia found that males were 1.41 times more likely to die than females [15-17]. However, few studies revealed that the risk of death is undistinguishable for men and women as well [18-21]. Age was one of variables which has impact on the colorectal cancer patient survival rate. It was discovered that being age over 60 years was substantially associated with mortality which is similar to previous study that reported that colorectal cancer patients had an increased risk of death with increasing age [22]. In line with our findings, a study revealed that the patients aged 60 to 64 years and older than 65 years had a mortality risk 1.66 and 1.20 times that of patients under 50 years of age [12, 23].

The results of this study are plausible when compared to the colorectal cancer screening criteria that have been standardized for individuals over the age of 50 years or more because colorectal cancer is frequently diagnosed and rectum among those who were aged 45 [24]. However, the finding did not consistent with the National Cancer Institute, Department of Medical Services where it has been discovered that individuals over the age of 55 had a higher colorectal cancer risk than other age groups [11]. There hasn't been a study

done yet assessing the accuracy of cancer patient data from 43 Ministry of Public Health data files. As a result, when interpreting study results, it is important to take into account the conclusions of earlier research.

5. Conclusion

The survival rate of patients with colorectal cancer was significantly affected by gender. In addition, age was one of the variables which is also statistically significant that impacted on the colorectal cancer patient survival rate.

Incorporating data at the district and subdistrict levels is crucial for improving the prevention and management of colorectal cancer issues. A behavior change effort aimed at preventing colorectal cancer at the population level will lower the disease's incidence rate.

Each province will see improved illness prevention and control as a consequence of the efficient and successful execution of health initiatives customized to the local population's needs. It is necessary to establish a policy for colorectal cancer screening in the targeted population, especially the elderly, in order to assist colorectal cancer prevention.

Acknowledgments

References

[1] Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. 2015;136(5):E359-E86.

[2] Organization WH. Colorectal 2021 2021 [Available from: https://gco.iarc.fr/overtime/en.

[3] Siegel RL, Miller KD, Fedewa SA, Ahnen DJ, Meester RG, Barzi A, et al. Colorectal cancer statistics, 2017. 2017;67(3):177-93.

[4] Analysing research on cancer prevention and survival [Internet]. World Cancer Research Fund. 2018. Available from: https://www.wcrf.org/wp-content/uploads/2021/02/Colorectal-cancer-report.pdf.

[5] Murphy N, Moreno V, Hughes DJ, Vodicka L, Vodicka P, Aglago EK, et al. Lifestyle and dietary environmental factors in colorectal cancer susceptibility. 2019;69:2-9.

[6] Keum N, Giovannucci EJNrG, hepatology. Global burden of colorectal cancer: emerging trends, risk factors and prevention strategies. 2019;16(12):713-32.

[7] Moghimi-Dehkordi B, Safaee A, Zali MRJSJoGOJotSGA. Comparison of colorectal and gastric cancer: survival and prognostic factors. 2009;15(1):18.

[8] Institute NC. Colorectal 2021: National Cancer Institute; 2021 [Available from: https://gco.iarc.fr/overtime/en.%5bAccess.

[9] Cancer Epidemiology and Prevention. Thun M, Linet MS, Cerhan JR, Haiman CA, Schottenfeld D, editors: Oxford University Press; 2017 21 Dec 2017.

[10] National Economic and Social Development Plan [Internet]. 2020. Available from: https://www.nesdc.go.th/ewt_w3c/ewt_dl_link.php?nid=3784.

[11] Institute NC. Cancer registry at hospital level 2018. Bangkok: New Normal Printing (Thailand), Institute NC; 2019.

[12] Koo JH, Jalaludin B, Wong SK, Kneebone A, Connor SJ, Leong RWJOjotACoG, et al. Improved survival in young women with colorectal cancer. 2008;103(6):1488-95.

[13] Sriplung H. Analysis of cancer data quality and cancer situation study and relationship relation to trends and distribution of risk factors from various sources. Health Systems Research Institute. 2010;7(1):1-118.

[14] Watanabe T, Wu TT, Catalano PJ, Ueki T, Satriano R, Haller DG, et al. Molecular predictors of survival after adjuvant chemotherapy for colon cancer. The New England journal of medicine. 2001;344(16):1196-206.

[15] Magaji BA, Moy FM, Roslani AC, Law CWJBc. Survival rates and predictors of survival among colorectal cancer patients in a Malaysian tertiary hospital. 2017;17(1):1-8.

[16] Sharp L, McDevitt J, Brown C, Comber HJAp, therapeutics. Smoking at diagnosis significantly decreases 5-year cancer-specific survival in a population-based cohort of 18 166 colon cancer patients. 2017;45(6):788-800.

[17] Yameela M, Punyaphat C, Somkiat W. Factors associated with mortality in Colorectal Cancer Patient: A literature review. Journal of Community Public Health. 2020;6(3):1-21.

[18] Boyle T, Fritschi L, Platell C, Heyworth JJBjoc. Lifestyle factors associated with survival after colorectal cancer diagnosis. 2013;109(3):814-22.

[19] Joachim C, Godaert L, Dramé M, Véronique-Baudin J, Macni J, Smith-Ravin J, et al. Overall survival in elderly patients with colorectal cancer: A population-based study in the Caribbean. 2017;48:85-91.

[20] Moamer S, Baghestani A, Pourhoseingholi MA, Hajizadeh N, Ahmadi F, Norouzinia MJG, et al. Evaluation of prognostic factors effect on survival time in patients with colorectal cancer, based on Weibull Competing-Risks Model. 2017;10(1):54.

[21] Sharkas GF, Arqoub KH, Khader YS, Tarawneh MR, Nimri OF, Al-Zaghal MJ, et al. Colorectal cancer in Jordan: survival rate and its related factors. 2017;2017.

[22] Dignam JJ, Ye Y, Colangelo L, Smith R, Mamounas EP, Wieand HS, et al. Prognosis after rectal cancer in blacks and whites participating in adjuvant therapy randomized trials. 2003;21(3):413-20.

[23] Sudsawat Laohavinij M, Maneechavakajorn JJJMAT. Prognostic factors for survival in colorectal cancer patients. 2010;93(10):1156-66.

[24] Society AC. American Cancer Society guideline for colorectal cancer screening. American Cancer Society Atlanta; 2018.