ORIGINAL ARTICLE

THE MEDIAN SURVIVAL TIME OF PANCREATIC CANCER PATIENTS IN MALAYSIA

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ABSTRACT

Pancreatic cancer is an intractable disease, and its mortality rates are approximately identical to its incidence ones. Getting its early diagnosis is quite challenging and subsequently, it contributes to one of the reasons for poor survival figures. The retrospective record review of radiologically or histo-pathologically confirmed primary pancreatic cancer cases registered at State hospitals in Penang, Kedah, Kelantan and Terengganu from 1st January 2011 to 31st December 2018 were performed. The cumulative survival probabilities were estimated using the Kaplan-Meier method while the log-rank test was applied to determine the differences in overall survival among groups. The overall median survival time was 9.37 (95% CI:8.53, 10.21) months since the diagnosis. The median survival times were significantly shorter in those aged >60 years, in Chinese subjects, those with smoking or alcohol consumption history, patients with some comorbidities, those presented with some signs and symptoms at the time of diagnosis. Moreover, the median survival time was found to be different based on the type of the pancreatic malignancy and staging of the disease. It was also found that the survival time was significantly longer in those who underwent surgery, those who received radiotherapy or chemotherapy whereas it was significantly shorter in those who took best supportive treatment. The disparities of overall survival time were observed depending on their socio-demographic data and clinical features at the time of diagnosis. The results of this study may serve as a solid foundation to develop robust and meaningful prediction modelling for the prognosis of pancreatic cancer.

***Keywords**: Survival time, pancreatic cancer, Kaplan-Meier, Malaysia, retrospective record review*

INTRODUCTION

Pancreatic cancer (PC) is notorious for its poor survival outcomes. It is an intractable disease, and its mortality rates are approximately identical to its incidence ones[1]. According to Global Cancer Statistics 2020, 466,003 people died due to pancreatic cancer while 495,773 newly diagnosed cases were reported around the world in 2020[2]. Consequently, it is ranked as the seventh cause of death among all cancer sites [2]. Without significant new breakthroughs in diagnosis and treatments, it was predicted to become the second leading cause of cancer-related mortality by 2030[3].

Currently, early detection for timely intervention for pancreatic cancer was limited by lack of specific diagnostic tools and standardized screening approaches[4]. Moreover, mostly pancreatic cancer presents non-specific symptoms in its early stage, and these symptoms are collectively hard to recognize as having the disease[5]. Thus, getting early diagnosis is quite challenging and subsequently, it contributes to one of the reasons for poor survival figures. Poor survival outcomes embrace not only mortality rate but also short life expectancy in terms of median survival time after diagnosis. With the currently available multimodal therapy, overall median survival time remained less than 12 months[6], and only less than 10% of the patients survived up to 5 years or more[7,4]. Depending on the socio-demographic factors and clinicopathological presentation, the median survival time of the pancreatic cancer patients may vary. Consequently, the relatively low overall median survival time had magnified the need to capitalize variations attributable to these clinicopathological factors for a more robust and accurate detection and prediction.

Current epidemiological evidence on disease projection indicates comparable survival rates between the developing countries and developed countries despite higher incidence of pancreatic cancer in the latter[4]. In Malaysia being as an upper middle-income country[8], pancreatic cancer is not a commonly diagnosed malignancy. However, it is documented as the 11th cause of cancer mortality, contributing 3.6% of all Malaysian cancer deaths[9].

Despite rising morbidity and mortality cases[10], studies on this oncological disease have not yet been paid much attention. There is a paucity of studies on pancreatic cancer, especially overall survival of pancreatic cancer patients in Malaysia. Only two studies from the health centres in Kuala Lumpur[11,12] and one in Kelantan[13] have been published. Cancer survival analysis is an important prerequisite clinical indicator and may potentially help in developing targeted strategies and activities for early management of pancreatic carcinogenesis. Therefore, this study was conducted by retrospectively reviewing the records of pancreatic cancer patients hospitalised at multi-health centres in Malaysia to evaluate the impact of socio-demographic features and clinicopathological characteristics on survival time.

METHOD

Following the ethics approval from Universiti Sultan Zainal Abidin (UHREC) and registration at the National Medical Research Registry (NMRR), the clinical data of all primary pancreatic cancer patients registered at State hospitals in Penang, Kedah, Kelantan and Terengganu during the period from 1st January 2011 to 31st December 2018 were retrieved from archive files and information system of each hospital. Using the proforma, details of the patients' demographic characteristics, lifestyle factors, family cancer history, comorbidities, signs and symptoms at first presentation, laboratory profiles, methods of diagnosis, pathological parameters of the tumours, and treatment modalities were collected from the patients' records. The tumour staging was identified according to the criteria of the American Joint Committee on Cancer (AJCC) adopted 7th edition of TNM staging[14].

No sampling method was applied, and data were collected from all available and eligible pancreatic cancer patients from the selected State hospitals. Patients aged 18 years or older with radiologically or histo-pathologically confirmed diagnosis of having pancreatic cancer tumours originally formed in their pancreatic tissues were included in this study. Those whose medical records with more than 30% missing information, and those having secondary pancreatic cancer were excluded.

The primary outcome of this study was the overall survival (OS) of the patients. The information about patients' survival status whether the patients were still alive or died due to pancreatic cancer at any place were also obtained from the hospital records. Those who were still alive until the end of the study period, those whose diagnosis was changed from pancreatic carcinoma to other diseases, those died due to other causes, those who were lost to follow-up and those who were transferred out to other hospitals were acknowledged as censored observations. The survival time was recorded in months from the date of diagnosis to the date of mortality for the deceased cases or until the last-seen date for the censored observations during the study period.

The required sample size for this study was calculated using Power and Sample Size Calculation programme[15]. As for the calculation, it applied the concept of survival analysis in which the event was identified as death after the diagnosis of pancreatic malignancy. The power of the study was set at 90% and the level of significance was specified at 0.05 for two-tailed analysis. The accrual time for patient recruitment was 96 months. After considering the 10% expected missing values, the final total required sample size was 335 patients for this study.

The retrospective analysis of the data was performed using the SPSS version 25.0 for Windows[16]. Patients' information was expressed as mean (standard deviation) for numerical variables and as frequency (percentage) for categorical variables. The distribution of survival times was presented with survival function, S(t) which is an individual's probability of surviving longer than or equal to time t. The cumulative survival probabilities for overall and survival at 3-, 6-, 12-, 18-month intervals were estimated using the Kaplan-Meier method. The differences in overall survival among groups were compared using the log-rank test. The level of significance was set at 0.05 for this study.

RESULTS

Total complete records of 376 hospitalized patients with pancreas cancer were retrospectively reviewed. They were registered cases from State Hospitals in Kedah (123 cases), Kelantan (81 cases), Penang (69 cases) and Terengganu (103 cases) during the study's accrual period. Their mean age (SD) at diagnosis was 61.27 (11.24) years and nearly 60% of the patients were more than 60 years old. Majority of the patients were married (75.8%) and belonged to Malay ethnic group (59.6%) followed by Chinese descent (33.2%) and Indians (7.2%). The male patients constituted 57.4% of the total entries, and the male to female ratio was 1.35:1. Out of the total patients, 23.7% of them had smoking habit and 6.9% had alcohol intake history.

Regarding the family history, 9.8% and 15.7% of the patients reported having pancreatic cancer and diabetes in their family. As co-morbidities,

having type II diabetes and hypertension were mostly reported in the patients' medical records. At admission, most of the patients stated that they had weight loss (63.6%), abdominal pain (49.7%), loss of appetite (47.6%) and suffered nausea and vomiting (35.9%). Among the total patients, 26.1% and 10.6% of them had hepatomegaly and ascites respectively.

Concerning the types of malignancy, most of them (94.9%) had pancreatic adenocarcinoma while 5.1% had neuroendocrine pancreatic cancer. The frequently recorded sites of tumours were head of the pancreas (77.9%) followed by the body (13.0%) and tail (9.0%). The patients were diagnosed as having pancreatic cancer mostly by CT scan (81.6%), ultrasound (63.8%), ERCP (55.1%) and biopsies (47.6%). At diagnosis, 146 patients (38.8%) and 114 patients (30.3%) were in stage 4 and 3 whereas 92 patients (24.5%) and 24 patients (6.4%) had the disease of stage 2 and 1 respectively. With regards to the treatment, most of the patients took chemotherapy (54.0%) or best supportive treatment (41.2%). Only 14.6% of the cases underwent surgery either for radical cure or palliative purpose while 19.4% of the cases received radiotherapy treatment.

Table 1a: Median survival time of the pancreatic cancer patients (n =376)

Socio-demographic characteristics		Frequency (%)	Median time (months) 95% CI	*P* value*
Age group	≤60 years old	151 (40.2)	10.63 (8.83, 12.43)	<0.001
	>60 years old	225 (59.8)	7.93 (6.69, 9.17)	
Gender	Male	216 (57.4)	9.27 (8.07, 10.47)	0.107
	Female	160 (42.6)	9.77 (8.5, 11.04)	
Ethnicity	Malay	224 (59.6)	10.10 (9.08, 11.12)	
	Chinese	125 (33.2)	7.67 (5.89, 9.45)	0.041
	Indian	27 (7.2)	9.37 (8.06, 10.68)	0.673
Marital status	Single	17 (4.5)	13.60 (12.63, 14.57)	
	Married	285 (75.8)	9.67 (8.85, 10.49)	0.087
	Widow/Divorced	74 (19.7)	6.83 (6.12, 7.54)	0.069
Smoking	No	287 (76.3)	10.03 (9.23, 10.83)	0.013
	Yes	89 (23.7)	7.30 (5.48, 9.12)	
Alcohol drinking	No	350 (93.1)	9.53 (8.68, 10.38)	0.010
	Yes	26 (6.9)	6.47 (2.71, 10.23)	
Clinical Profiles				
Family history of pancreatic cancer	No	339 (90.2)	9.47 (8.45, 10.49)	0.151
	Yes	37 (9.8)	9.33 (5.35, 13.31)	
Family history of diabetes	No	317 (84.3)	9.37 (8.36, 10.39)	0.605
	Yes	59 (15.7)	9.67 (7.42, 11.92)	
Having type II diabetes	No	291 (77.4)	10.20 (9.15, 11.25)	<0.001
	Yes	85 (22.6)	6.63 (4.38, 8.88)	
Having Hepatitis B	No	365 (97.1)	9.37 (8.43, 10.31)	0.255
	Yes	11 (2.9)	7.77 (4.27, 11.27)	
Having Hepatitis C	No	368 (97.9)	9.53 (8.60, 10.46)	0.041
	Yes	8 (2.1)	4.73 (0.93, 8.53)	
Having cirrhosis	No	371 (98.7)	9.37 (8.53, 10.21)	0.010
	Yes	5 (1.3)	2.93 (1.49, 4.37)	
Having gastritis	No	343 (91.2)	9.47 (8.54, 10.40)	0.346
	Yes	33 (8.8)	7.93 (7.06, 8.80)	
Hypertension	No	259 (68.9)	9.77 (8.96, 10.59)	0.053
	Yes	117 (31.1)	8.20 (6.63, 9.77)	
Ischaemic Heart Disease	No	351 (93.4)	9.57 (8.76, 10.38)	0.028
	Yes	25 (6.6)	6.70 (4.14, 9.26)	
Abdominal pain	No	189 (50.3)	10.60 (9.93, 11.27)	0.002
	Yes	187 (49.7)	7.40 (6.03, 8.77)	
Back pain	No	307 (81.6)	9.57 (8.83, 10.31)	0.003
	Yes	69 (18.4)	7.40 (3.68, 11.12)	
Loss of appetite	No	197 (52.4)	11.17 (9.87, 12.47)	<0.001
	Yes	179 (47.6)	6.80 (4.91, 8.69)	
Weight loss	No	137 (36.4)	10.10 (8.53, 11.67)	0.287
	Yes	239 (63.6)	9.27 (8.02, 10.52)	

**Log-rank test*

Table 1b: Median survival time of the pancreatic cancer patients (n =376)

Socio-demographic characteristics		Frequency (%)	Median time (months) 95% CI	*P* value*
Fatigue	No	273 (72.6)	9.77 (9.06, 10.48)	0.002
	Yes	103 (27.4)	6.70 (3.10, 10.30)	
Nausea and vomiting	No	241 (64.1)	9.57 (8.49, 10.65)	0.054
	Yes	135 (35.9)	9.03 (6.47, 11.59)	
Jaundice	No	274 (72.9)	10.17 (9.32, 11.02)	<0.001
	Yes	102 (27.1)	2.93 (2.26, 3.60)	
Lack of colour in faeces	No	324 (86.2)	9.57 (8.74, 10.40)	<0.001
	Yes	52 (13.8)	2.10 (1.17, 3.04)	
Dark colour urine	No	341 (90.7)	9.53 (8.68, 10.38)	<0.001
	Yes	35 (9.3)	3.17 (0.94, 5.40)	
Fever	No	319 (84.8)	10.03 (9.37, 10.69)	<0.001
	Yes	57 (15.2)	4.53 (1.96, 7.10)	
Abdominal distension	No	328 (87.2)	9.53 (8.66, 10.40)	<0.001
	Yes	48 (12.8)	7.10 (2.16, 12.04)	
Dyspepsia	No	319 (84.8)	9.77 (9.03, 10.51)	<0.001
	Yes	57 (15.2)	4.43 (2.63, 6.23)	
Mass in abdomen	No	349 (92.8)	9.67 (9.01, 10.33)	<0.001
	Yes	27 (7.2)	2.33 (0.05, 4.61)	
Having hepatomegaly	No	278 (73.9)	10.03 (9.19, 10.87)	<0.001
	Yes	98 (26.1)	4.77 (1.98, 7.56)	
Having ascites	No	336 (89.4)	9.57 (8.73, 10.41)	<0.001
	Yes	40 (10.6)	2.03 (1.04, 3.02)	
Pathological features				
Type of carcinoma	Exocrine tumour	357 (94.9)	9.17 (8.14, 10.20)	0.007
	Neuroendocrine tumour	19 (5.1)	17.50 (15.84, 19.16)	
Location of tumour	Head	293 (78.0)	9.37 (8.55, 10.19)	
	Body	49 (13.0)	7.30 (4.52, 10.08)	0.240
	Tail	34 (9.0)	11.17 (7.20, 15.14)	0.406
Staging of tumour	Stage 1	24 (6.4)	18.93 (16.97, 20.89)	
	Stage 2	92 (24.5)	14.50 (12.15, 16.85)	<0.001
	Stage 3	114 (30.3)	9.03 (8.27, 9.79)	<0.001
	Stage 4	146 (38.8)	3.93 (3.68, 4.19)	
Surgery	No	321 (85.4)	7.30 (6.40, 8.20)	<0.001
	Yes	55 (14.6)	15.53 (12.59, 18.47)	
Radiotherapy	No	303 (80.6)	7.77 (6.48, 9.06)	<0.001
	Yes	73 (19.4)	14.23 (11.28, 17.18)	
Chemotherapy	No	173 (46.0)	4.57 (4.29, 4.86)	<0.001
	Yes	203 (54.0)	12.80 (10.18, 15.42)	
Palliative	No	221 (58.8)	11.67 (8.98, 14.36)	<0.001
	Yes	155 (41.2)	4.37 (3.96, 4.78)	

**Log-rank test*

Survival time

Regarding the overall median survival time, it was 9.37 (95% CI:8.53, 10.21) months since the diagnosis of the disease with the mean follow-up time of 10.23 (95% CI: 9.22, 11.24) months. The survival rates for 3-, 6-, 12 and 18-month were 64.15% (260/376), 36.70% (138/376), 11.17% (42/376) and 4.52% (17/376) respectively. Figure 1 displays the overall survival probability curve of pancreatic cancer patients in this study.

Based on demographic data, the log-rank test results showed that the median survival times were significantly shorter in those aged >60 years at diagnosis and in Chinese subjects compared to their counterparts. However, it was found that the median OS was not significantly difference between gender and among different marital status. Moreover, those with smoking or alcohol consumption history had significantly shorter survival time than those without these histories.

Concerning the clinical history, the survival time was not significantly different based on the family history of pancreatic cancer and of diabetes. However, the log-test results reported that shorter survival time was observed in the patients with the following comorbidities namely; having type II diabetes, hepatitis C, cirrhosis, ischaemic heart

disease. Moreover, it was also stated that the median survival time was significantly shorter in those who complained about abdominal pain, back pain, loss of appetite, fatigue and those presented with jaundice, lack of colour in faeces, dark colour urine, fever, abdominal distension, dyspepsia, mass in abdomen, hepatomegaly and ascites (Table 1).

Regarding the tumour features, the median survival time was significantly different based on the type of the pancreatic malignancy and staging of the disease, but not based on tumour location. Furthermore, it was also found that the survival time was significantly longer in those who underwent surgery, those who received radiotherapy or chemotherapy whereas it was significantly shorter in those who took best supportive treatment (Table 1).

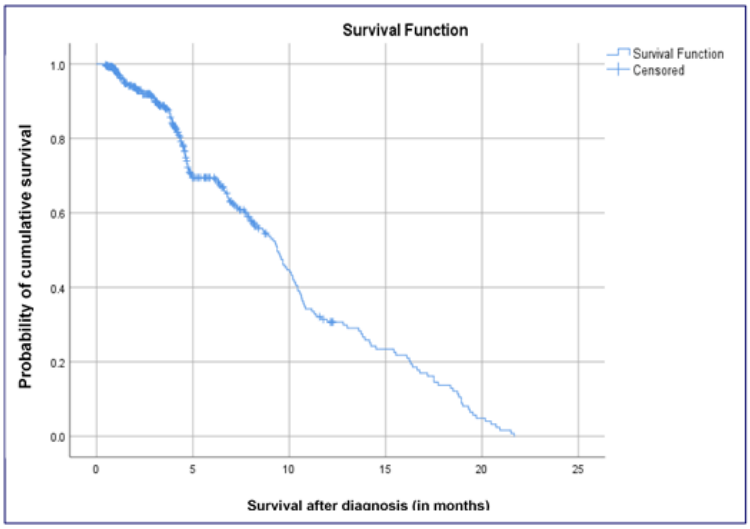

Figure 1: Kaplan-Meier curve for survival of pancreatic cancer patients (n =376)

DISCUSSION

Globally, the burden of pancreatic cancer is escalating, and now it was ranked as 12th frequently diagnosed cancer around the world[2]. Due to mostly getting late diagnosis of the disease, most of the patients had poor clinical outcomes. This study analysed the survival time of 376 pancreatic cancer patients who were diagnosed and treated at State Hospitals in Malaysia. To the best of our knowledge, this is the first multi-centres Malaysian study which studies the sociodemographic and survival analyses of patients with pancreatic cancer in different states.

The overall median survival time of the patients varied with their socio-demographic data and clinical presentation at the time of diagnosis. This study found the discrepancy of survival times between the elderly patients and young ones. The older patients had significantly shorter survival periods than those diagnosed below the age of 60. This finding is consistent with the previous studies which also proved that patients of advanced age had poorer median survival time[17]. Generally, the elderly patients have underlying comorbidities or debilitating illness, and thus age poses a significant challenge to the management of the disease[18]. Some studies have reported that patients of increasing age have higher complication rates compared to the young patients[19]. Furthermore, older patients may have contraindications to receive aggressive treatment and therefore, they may get different treatment modalities[20]. The current data reveal most of the older patients are not recommended to undergo surgery or to take long-term chemotherapy[18]. These above factors may partly contribute to the age-related differences in survival outcomes.

Throughout the world, pancreatic cancer is more frequently diagnosed among men[21]. In Malaysia, according to the National Cancer Registry Report 2012-2016, the estimated age-standardised rates of pancreatic cancer are 2.0 per 100,000 males and 1.5 per 1000,000 females respectively[10]. In this study, males constituted 60% of the total diagnosed pancreatic cancer cases, and this male predominance is in accordance with the two previous studies done in Malaysia[11,13]. Concerning the survival outcomes by gender, some authors reported males had poorer survival than the female patients[17] whereas other studies discovered there was no significant difference of survival times between male and female cases[22]. The results of this study also showed that the female survival time was not significantly different from that of the male patients. Although the effect of

sex on survival time remains controversial, higher incidence of pancreatic cancer and shorter survival time in male patients might be attributed to the genetic or environmental factors such as higher prevalence of smoking and alcohol consumption among males[21].

There are a lot of evidence showing the significant difference of pancreatic cancer incidences among races[23]. In Malaysia, Chinese people experienced higher pancreatic cancer rates compared to other ethnic groups[10]. However, in this study, about two thirds of the diagnosed patients were found to be Malays while Chinese patients contributed only 33.2% of the total patients. This ethnic distribution was closely similar to the previous study done at Universiti Sains Malaysia Hospital in Kelantan[13] but totally different from the study carried out at Universiti Malaya Medical Centre in Kuala Lumpur[11] in which Chinese patients were predominantly diagnosed. The observed ethnic-distribution discrepancy may be because the collected data for this study are mostly from State Hospitals where there are more Malay residents compared to other ethnic populations. On the other hand, relating to the survival outcomes due to racial disparities, this study discovered that Chinese patients had significantly shorter survival time compared to Malay cases. Difference in median survival time between races is probably related to different lifestyle practices such as diet, physical activity or genetic factors[4]. Unfortunately, information on lifestyle practices was not available in this study. Thus, investigating their lifestyles may be useful to deepen our understanding on the pathophysiology of this disease.

In the context of pancreatic cancer, smoking is one of the identified risks factors[4], and the risk escalates with the long-term duration and amount of tobacco usage[24]. Additionally, smoking behaviour is usually accompanied with consuming alcoholic beverages and thus, they may act synergistically and there is effect modification on risk and survival of pancreatic cancer cases[25]. In this study, 23.7% and 6.9% of the total patients reported having a history of smoking and alcohol consumption respectively, and both of them had shorter survival time than their counterparts. Although smoking and alcohol drinking are implicated as risk factors, their influence on survival from pancreatic cancer is contradictory. Based on the previous studies, the influence of smoking and alcohol drinking on survival from pancreatic cancer is contradictory albeit they are implicated as risk factors. A retrospective study in China[26] concluded that both smokers and drinkers had reduced survival whereas a study done by Pelucchi et al., 2014[24] stated that reduced survival was observed with increased amount and duration of smoking but not related with drinking alcohol. A prospective study in the US[27] pointed out that drinking alcohol, especially liquor consumption of 3 or more drinks per day was associated with reduced survival regardless of smoking status. As opposed to all previous studies, Wang et al., 2012[28] found out that alcohol drinking and smoking had no effect on overall survival. These inconsistent results may probably be due to lack of capturing the detailed information about duration, amount and type of the tobacco usage and alcohol beverage consumption in these studies.

Having history of pancreatic cancer in two or more first-degree family members was documented as a significant causal factor for developing pancreatic malignancy. Individuals with familial pancreatic cancer had 9 times increased risk of getting pancreatic cancer compared to those with no such family history[29]. It is estimated that familial pancreatic cancer accounts for 5-10% of diagnosed cases[30]. In this study, 9.8% of the patients provided family history of pancreatic cancer and they had no survival time difference from those without family history. The effect of family history on survival of pancreatic cancer is still unclear and yet to be elucidated. Nevertheless, identifying high-risk people and conducting pancreatic cancer screening in those individuals are paramount for early detection and treatment of the malignancy which may result in longer survival time. A systematic review by Lu et al., 2015[31] recognised that pancreatic cancer screening in familial high-risk kindreds detected early stages of the disease and prolonged survival. Therefore, these days, most health professionals suggest the high-risk individuals to undergo screening for pancreatic cancer[32].

Diabetes is reported in 25% of pancreatic cancer patients at the time of diagnosis[33] and many researchers confirmed their positive association and bidirectional[34]. Many studies found out that metabolic abnormalities in diabetes affect tumour growth and metastasis at different stages[35]. Impaired glucose tolerance also ostensibly gives rise to an adverse response to cancer treatment[36]. Thus, increasing evidence came out that diabetes is associated with higher mortality in pancreatic cancer patients[37] while some studies demonstrate diabetes has no effect on survival duration[38]. A systematic review by Mao et al., 2015[39] stated that diabetes effect on pancreatic cancer patients' overall survival depends on tumour staging and duration of diabetes. The review indicated that poor survival was observed only in diabetes patients with resectable tumour or pancreatic cancer cases with new onsets of diabetes compared to those without such conditions. In this current study, 22.6% of the patients had diabetes

and they had shorter survival time compared to non-diabetes cases. Our study result and previous research findings are unanimous and support that diabetes causes reduced survival of pancreatic cancer patients.

Concurrently, having liver cirrhosis in non-hepatic cancer patients causes a dilemma to the usual management of the disease[40]. Hepatitis C virus (HCV) infection is the one of major aetiology of cirrhosis[41], and increased risk of pancreatic cancer was observed in cirrhotic cases[42] as well as in HCV-infected subjects[43] compared to the general population. About 2.1% and 1.3% of the pancreatic cancer patients in this study had HCV infection and liver cirrhosis respectively. Both showed reduced survival and had shorter survival duration. Although pancreaticoduodenectomy is the mainstay treatment for patients with pancreatic malignancy, many previous studies have already indicated that cirrhotic pancreatic patients have increased chance of postoperative morbidity and mortality and they have poor survival outcomes[44]. Additionally, regarding anti-cancer treatment for extra-hepatic cancers, many clinical trials usually excluded patients with liver cirrhosis and thus, only little is known about clinical outcomes of these patients[40]. Thus, further studies evaluating the impact of these risk factors on survival of the patients need to be carried out.

The umbrella of pancreatic cancer embraces several malignancies. The two major histological types of pancreatic carcinoma are exocrine origins and neuroendocrine tumours. The literature data suggest exocrine tumours are the more common type of carcinoma and constitute more than 95% of the pancreatic neoplasm[45] and mostly originate from the head of the pancreas[46]. In consistence with the literature, majority of the patients in this study were diagnosed as having the former type of neoplasm (94.9%), and the frequently reported tumour locations were head of the pancreas (78.0%) followed by body (13.0%) and tail (9.0%). Importantly, our study findings suggest that the patients with neuroendocrine carcinoma have better survival than exocrine carcinoma patients, which are in agreement with the previously published data[13]. Neuroendocrine tumours are less aggressive because of its molecular behaviour[47] and they occur more often in young adults[48]. Consequently, these factors may probably contribute to long-term survival for neuroendocrine carcinoma patients.

Pancreatic cancer is silent and rarely demonstrates signs and symptoms at an early stage when the disease is curable. By the time of presentation of signs and symptoms, the disease has been typically at late stages, and the tumour has already spread to other organs[49]. Nearly 80-90% of patients have unresectable tumours at the moment of diagnosis[50] and therefore, the disease is linked with extremely poor survival[51]. More than 60% of the patients in this study were diagnosed at disease stages 3 or 4 and their clinical manifestations were nearly comparable to the other studies[13]. They mostly presented with weight loss, abdominal pain and loss of appetite. Moreover, on examination, 26.1% and 10.6% of the patients were found to have hepatomegaly and ascites respectively. Based on this study results, it was found that presenting signs and symptoms at diagnosis affect the survival of the patients, and the shorter survival duration was observed with increasing stages of the disease. Additionally, as for the treatment modalities, patients who underwent the surgery (14.6%) or took radiotherapy (19.4%) or chemotherapy (54.0%) had longer median survival time while those accepting palliative treatment or best supportive care only (41.2%) had poor survival duration. All these current study results are consistent with the previous studies[22,11] but unfortunately, the information about type of chemotherapy was not available in this study and could not be analysed.

LIMITATION OF THE STUDY

This was the hospital-record based retrospective study and thus, some information could not be retrieved. There was lack of detailed information on the patients' lifestyle including the frequency and duration of alcohol intake and smoking history. Moreover, there was absence of available data about history of hereditary diseases and complete information about chemotherapy treatment.

CONCLUSION

The disparities of overall survival time were observed depending on their socio-demographic data and clinical features at the time of diagnosis. Older people, Chinese patients, those with smoking or alcohol consumption history had shorter survival duration. Furthermore, those having comorbidities and having some signs and symptoms had poor survival compared to their counterparts. On the other hand, the patients with neuroendocrine neoplasm, diagnosed at early stages of the disease, undergoing surgery, receiving chemotherapy or radiotherapy had longer survival duration. The results of this study may serve as a solid foundation to develop robust and meaningful prediction modelling for both the diagnosis and the prognosis of pancreatic cancer.

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