

HEPATO-CELLULAR CARCINOMA IN CHINA: MORTALITY REVIEW

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ABSTRACT

Background: The aim of this article is to focus on the significance of mortality rates of Hepatocellular carcinoma (HCC) in males versus females between rural and urban areas from age groups 0 to 87 in Peoples Republic of China. **Design:** Mortality Review. **Methods:** HCC patients with mortality rates of males in rural areas and mortality rates of females in rural areas were compared. HCC patients with mortality rates of males in urban areas and mortality rates of females in urban areas were compared. Over all death rates of china were also included in this study. HCC mortality data were obtained originally from the book 全国第三次死因回顾抽样调查报告 (quan guo di san ci siyin huigu chouyang diaocha bagao) which was printed and published in China, and death rates were obtained from index mundi. All the data were statistically and graphically analyzed by microsoft Excel. **Results:** The risk of developing HCC mortality is higher as the age progresses especially in males compared to females and the urban mortality rate is higher than the rural area for both sexes. **Conclusions:** The study revealed that the peak age of HCC mortality rate in males was observed in age range between 57- 62 with rapid increase with slight decline. The peak age of HCC mortality rate in females was observed in age range between 72 -77 with rapid increase. Cancer is the leading cause of death in China. After the age of 75 years old, the mortality rate of females increases where as in males the mortality rate decreases after the age of 85 years.

INTRODUCTION

With the worldwide epidemic of hepatitis C and migration of individuals from endemic countries to North America, the incidence of hepatocellular carcinoma (HCC) is increasing. Hepatocellular carcinoma (HCC) is the third leading cause of cancer mortality worldwide. The pathway leading to HCC generally begins with an acute hepatic insult which progresses over decades. Fibrosis and cirrhosis are typically precursors of HCC. Most HCC is thought to be associated with either chronic hepatitis C

virus (HCV) or hepatitis B virus (HBV) infection. The etiology of HCC is likely to involve interactions between multiple risk factors. In a study which utilized the Surveillance, Epidemiology, and End Results (SEER)-Medicare linked databases, the most commonly reported risk-factor was nonspecific cirrhosis (21%), followed by alcohol-induced liver disease (16%), HCV infection (10%), and HBV infection (5%). Obesity and type II diabetes are also suspected to increase risk. Hepatocellular carcinoma occurring in non-cirrhotic livers is rare. Hepatic resection and liver transplantation are surgical therapeutic options for small-sized hepatocellular carcinoma (HCC). Hepatic resection is performed as an initial treatment, and then salvage transplantation is done when recurrence occurs or liver function deteriorates. Mortality rate is a measure of

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the number of deaths in a population, scaled to the size of that population, per unit of time in terms of Age and sex specific related mortality rates.

MATERIALS AND METHODS

The patients information were not determined and not included in this article as this article is not related with the management, treatment, staging, survival, prognosis and identifying of risk factors. The aim of this study is to compare the mortality rates of males and females with Hepatocellular carcinoma (HCC) in rural and urban areas of China. There is no any personal information regarding the patients who suffered from HCC. The materials required to perform mortality rates comparisons among rural and urban areas of both sexes in age groups from 0 to 87 where obtained from the book 全国第三次死因会顾抽样调查报告 (quan guo di san ci siyin huigu chouyang diaocha baogao), printed and published in China. Data from Index mundi were obtained to study the death rates of China. All the data were statistically and graphically analyzed with the help of Microsoft Excel, version 2007. A total of seven figures with age on X-axis and mortality rates on Y- axis and a two tables were drawn by using the original data. Figure-1, illustrates the comparison of mortality rates between males and females with HCC in rural areas. Figure -2, illustrates the comparison of mortality rates between males and females with HCC in urban areas. Figure-3, illustrates the overall comparison of males versus females mortality rates in urban and rural areas. Figure 4-5, demonstrates the average mortality rates of HCC of both sexes in rural and urban areas. Figure-6, illustrates overall death rate of both sexes from the year 2000 to 2012. Figure -7, illustrates the global variation in HCC incidence rates (low incidence to high incidence) of males and females. The mortality data of HCC are provided in the table (1) and the death rate are provided in table (2).

Statistical analysis

The mortality data of HCC (i.e MMRR, FMRR, MMRUA, FMRUA) were carefully put into the table drawn on Excel office, and this is represented as Table (1). Now the graphs where generated in the following manner, a graph was drawn by using MMRR and FMRR data (Fig-1), then a graph was drawn by using MMRUA and FMRUA (Fig-2), then a graph was drawn by using MMRR, FMRR, MMRUA, FMRUA (Fig-3). Then the average mortality rate graph of males and females in rural and urban areas were drawn (Fig 4-5). Overall death rate data of both sexes from the year 2000 to 2012 is drawn to obtain figure 6. The global variation in HCC incidence rates data (low incidence to high incidence) of males and females were used to obtain figure 7. Explanation and interpretation of each figure were carried out to derive the final outcome and conclusion of mortality

rates of HCC in rural and urban areas and also and death rates for past 12 years.

RESULTS

In fig.1, (Comparison Of Male Versus Female Mortality Rates For HCC In Rural Areas), it is observed that, the incidence of mortality rate of HCC was not reported until the age groups between 22-27 due to early diagnosis and intervention. The incidence slowly began to rise from the age 32 and 40 in males and females respectively. The significant rise of mortality rate was seen from the age range between 32 -37 in males and age range between 42- 47 in females. The risk of developing HCC mortality is higher as the age progresses especially in males compared to females. The peak age of HCC mortality rate in males was observed in age range between 77 - 82 due to multiple morbidity issues and complications of the disease itself and then later declines from the age 85. In females, the peak age of HCC mortality was detected from age range between 82 - 87 and then maintains the a steady age (plateau).

In Fig.2(Comparison Of Male Versus Female Mortality Rates For HCC In Urban Areas), It is observed that the incidence of HCC mortality rate was not recognized until the age 30 in males and 45 in females due to lifestyle changes and better livelihood compared to rural area. The significant rise in mortality rate was seen from the age range between 32 – 37 in males and 42 -47 in females. The risk of developing HCC is 2 times higher in males compared to females. The peak age of HCC mortality rate in males was observed in age range between 57-62 and the rapid increase without declining. The peak age of HCC mortality rate in females was observed in age range between 72-77 with rapid increase but not to the extent compared to males. The female HCC mortality rate maintains steady increase after the age of 77.

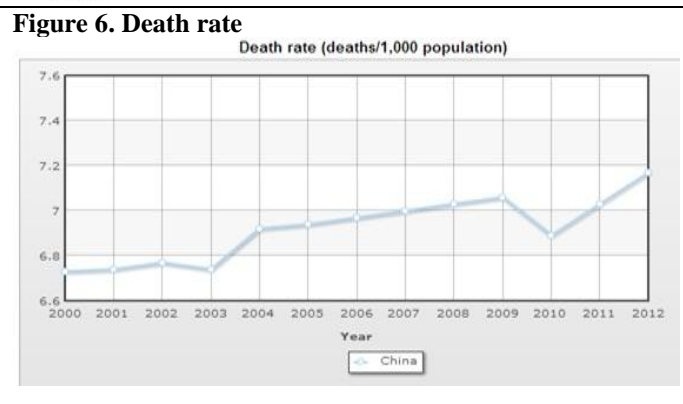
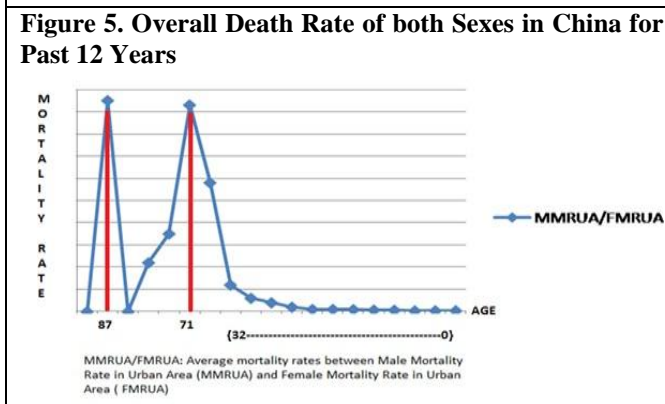
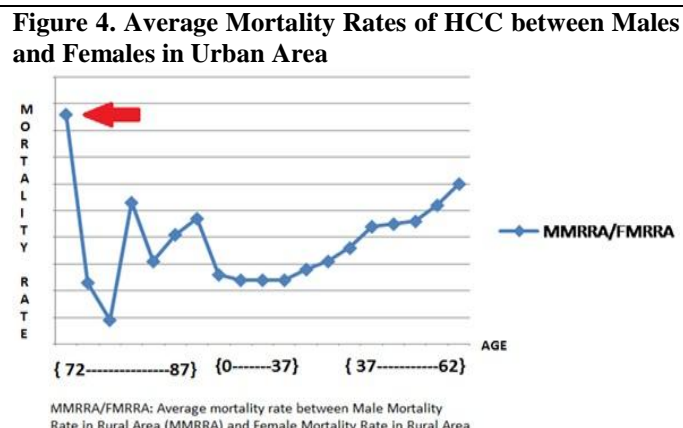
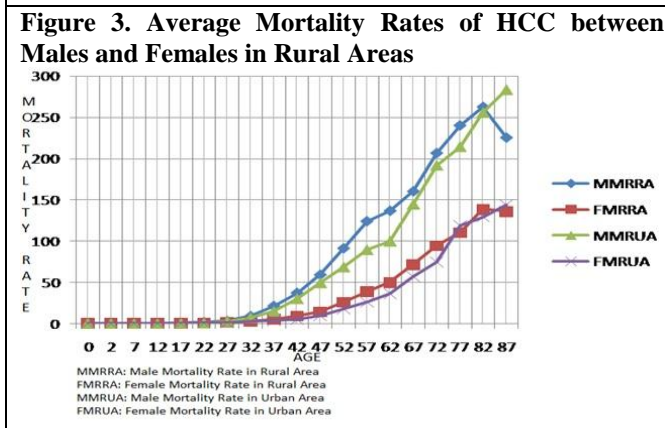
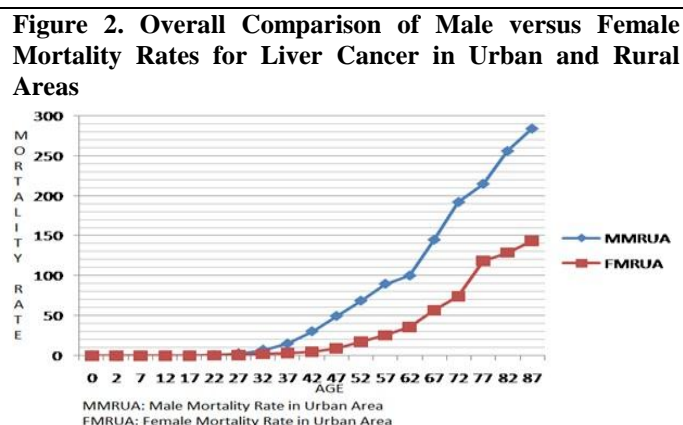
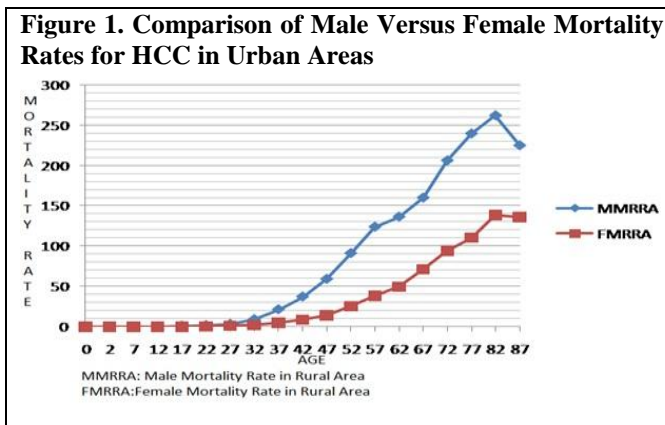
In Fig.3,(Overall Comparison Of Male Versus Female Mortality Rates For Liver Cancer In Urban And Rural Areas) it is noticed that the mortality rate of HCC in males is almost parallel increase in urban and rural areas. After the age range of 77-82, the incidence falls in rural areas, but in the urban area the incidence of mortality rate increases further. It is observed, the incidence of HCC in female increases equally in both rural and urban areas, but after the age range between 82-87, where there is a slight increase in rural area compared to urban areas. As overall comparison, urban mortality rate is higher than the rural area for both sexes.

The figure 4 (Average Mortality Rates Of HCC between Males And Females In Rural Areas) is the summarization of the figure 1 and 2, which shows the average mortality rate between males and females in rural area. It is observed that, the mortality



rate between the age 0-37 is very low (rare cases of HCC) but after the age of 37, there is decreased mortality rate. From the age of 37 to 62, there is slow increase in the mortality rate and then the mortality rate peaks from the age 72 to 87. In figure 5, (Average Mortality Rates Of HCC Between Males And Females In Urban Area). In urban area, the mortality rate of HCC has two peaks, the first one is observed at age range between 67 to 71 and the second one is seen between the age range 82 to 87. The mortality rate declines between the age range 71 to 82 (significant decrease) and the mortality is very low from the age 0 to 32 in urban area.

In figure 6, (Overall Death Rate of Both Sexes In China For Past 12 Years). Demonstrates the overall death rate in China for past 12 years. The X-axis shows the number of deaths per 1000 population and Y-axis shows the years. The death rate is between 6.7-6.8 until the year 2003 and then the death rate rose to almost 7/1000 until the year 2007 and then from the year 2007 the death rate increased slowly until 7.05 till the year 2009 which declined after that which is the same as that of death rate in 2004. The death rate in China rapidly increased to 7.2/1000 until 2012.



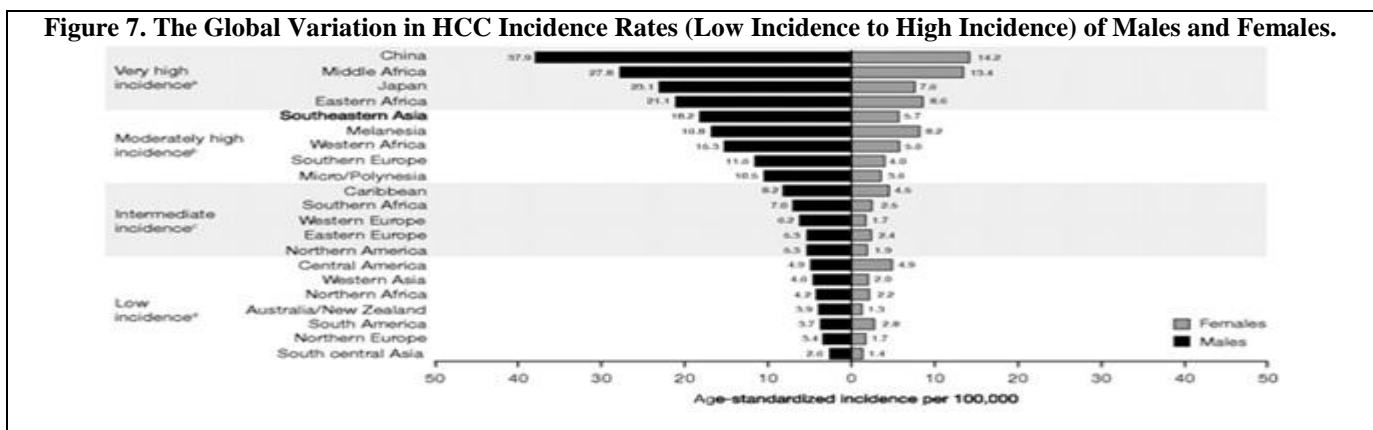


Table 1. Comparison of Male versus Female Mortality Rates for HCC in Rural Areas

Age	MMRRA	FMRR	MMRUA	FMRUA	B/C	D/E
0	0.37	0.43	0.47	0	0.86	0
2	0.21	0.05	0.22	0.24	0.23	0.95
7	0.31	0.03	0.15	0	0.09	0
12	0.28	0.15	0.11	0.12	0.53	0.22
17	1.13	0.36	0.37	0.11	0.31	0.35
22	1.81	0.76	0.63	0.44	0.41	0.93
27	3.26	1.54	2.71	0.81	0.47	0.58
32	9.1	2.38	7.11	2.1	0.26	0.12
37	21.48	5.22	14.84	3.68	0.24	0.06
42	37.29	9.05	30.16	5.25	0.24	0.04
47	59.22	14.24	49.37	9.57	0.24	0.02
52	91.27	25.76	68.49	17.86	0.28	0.01
57	124.03	38.64	89.59	25.57	0.31	0.01
62	136.68	49.8	99.87	36.02	0.36	0.009
67	160.23	71.48	144.68	57.02	0.44	0.007
72	206.51	94.41	191.86	74.51	0.45	0.006
77	239.99	110.52	214.58	118.66	0.46	0.003
82	262.42	138.71	255.76	129	0.52	0.004
87	225.28	135.98	283.64	143.8	0.6	0.004

Table 2. Global variation in liver cancer incidence rates

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
China	6.73	6.74	6.77	6.74	6.92	6.94	6.97	7	7.03	7.06	6.89	7.03	7.17

DISCUSSION

Hepatocellular carcinoma (HCC) is the third leading cause of cancer-related death worldwide. The incidence of this disease is increasing and it is one of the key indications for liver transplantation. Chronic infection with hepatitis B virus is the leading cause of HCC, closely followed by infection with hepatitis C virus. Other factors contributing to the development of HCC include alcoholism and obesity. HCC malignancy occurs more often occurring in men than women, with the highest incidence rates reported in East Asia (the pathway leading to HCC generally begins with an acute hepatic insult which progresses over decades), fibrosis and cirrhosis are

precursors of HCC. The principle finding in this article is that the incidence of mortality rate of HCC was not reported until the age groups between 22-27 due to early diagnosis and intervention and then incidence slowly began to rise from the age 32 and 40 in males and females respectively. The risk of developing HCC mortality is higher as the age progresses especially in males compared to females. After the age range of 77-82, the incidence falls in rural areas, but in the urban area the incidence of mortality rate increases further. In urban area, the mortality rate of HCC has two age peaks, the first one is observed at the age range between 67 to 71 and the second one is seen



between the age range 82 to 87. As overall comparison, urban mortality rate is higher than the rural mortality rate for both sexes. In China, the death rate has increasing points, the first one is slow increase (2004-2009) and the second one is rapid increase (2010-2012)

According to the article "Cancer Trends in China" Ping et al, the cancer is the leading cause in urban China and second one in rural China. Cancer control programs in China focus on prevention, early diagnosis and treatment. The prevention program includes an anti-smoking campaign and immunization against hepatitis B for infants and children under age of 15. Public education and the promotion of healthy lifestyle have been actively carried out. Cancer now becomes the major killer in today's China representing 25% of all deaths in urban areas and 21% in rural area. In particular, HCC kept on increasing trend in the past 30 years and it is estimated that about 280,000 men and 110,000 women are diagnosed with primary liver cancer each year and about 325,000 patients die each year from HCC. China accounts for almost 50% of the world's HCC cases. Cancer varies widely in China between urban and rural area. Mortality is higher in urban than in rural areas according to this study, HCC is the leading cause in rural area. Cancer is the leading cause of death in China. Different cancer spectrum was found in urban and rural area according to cancer incidence and mortality rate. Rural area had relatively lower cancer incidence rates but higher mortality rate in urban areas. The worse prognosis in rural area is likely due to inefficient medical resources, much more causes at late stage of cancer, and poor cancer diagnosis and treatment condition. According to "Liver Cancer Incidence and mortality in China, 2009" which was published in Chinese journal of cancer, the crude mortality rate of HCC was 26.04/100,000 making it the second leading cause of cancer death in China and urban areas and

the third leading cause in rural areas. Incidence and mortality were higher in males than in females and were higher in rural areas than in urban areas. The age specific incidence and mortality were relatively low among age groups under 30 years but dramatically increased and peaked in the 80-84 years old group.

CONCLUSION

The incidence of mortality were not reported from the age group 20 – 27. The significant mortality rates from HCC began to rise in males was between age range of 32 – 37 and 42 – 47 in females for both in rural and urban areas. The risk of developing HCC is fold higher in males compared to females. It is concluded that, urban mortality rate is higher than rural areas for both sexes. The death rate increased in China in the year 2012. Overall mortality rate of peoples with respect in sex and age of China for all diseases is shown that 2.4% among age group 0-4, 0.77% among age group 5-14, 9.47% among age group 15-44, 22.95% among age group 45-64 and 64.76% among age group 64 and above. After the age of 75 years old, the mortality rate of females increases where as in males the mortality rate decreases after the age of 85 years old but remains same as that of females that is age of 75. In urban area, the male death rate is 678.67/100,000 population and female death rate is 519.67/100,000 population. In rural areas, the male death rate is 693.76/100,000 population and female death rate is 528.11/100,000 population. The liver diseases is classified as C22 under ICD-104.

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CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

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