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Mortality due to malignant neoplasms of the liver and intrahepatic biliary tract in the state of Mato Grosso in 2020

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Abstract. Malignant neoplasms of the liver and intrahepatic biliary tract occupy the third place of cancer deaths in the world and the second most deadly in men and the sixth in women. Eating habits characterized by the consumption of food with high caloric and glycemic indexes, associated with a sedentary lifestyle, provide a greater risk of developing hepatic steatosis, as well as obesity, which, together with the increased incidence of chronic viral hepatitis, excessive alcoholism, and age over 50 years, constitute the main risk factors for the development of these types of cancer. In addition, due to the chronicity of liver pathologies, the diagnosis is usually late, a factor that contributes to increase the mortality rate. Thus, the objective of this work is to analyze the epidemiological profile of deaths due to liver cancer and intrahepatic biliary tract that occurred in the state of Mato Grosso in 2020. This is a cross-sectional study based on data from the Mortality Information System (SIM), made available by the Department of Informatics of the Unified Health System (DATASUS), and in the population estimate of the Brazilian Institute of Geography and Statistics (IBGE) for 2020. A study was carried out of the epidemiological profile of deaths related to liver and intrahepatic biliary ducts neoplasms (CID 10 C-22) of the state of Mato Grosso for the year 2020 regarding age group, sex (gender), and race. A total of 120 deaths due to malignant neoplasms of the liver and intrahepatic biliary tract were reported, corresponding to a mortality rate of approximately 3.4 deaths/100,000 inhabitants, with the proportion of deaths between men and women approximately 4:3. For both sexes, there is an abrupt increase in the incidence of deaths after the sixth decade of life, corresponding to 90% of deaths due to this pathology. Regarding the racial evaluation, deaths are more incident in the yellow race, with about 4.97 deaths/100,000 inhabitants, followed by the black race with 4.87 deaths/100,000 inhabitants. Thus, it is evident that deaths from liver and intrahepatic biliary tract malignant neoplasms in the state of Mato Grosso, in 2020, were concentrated from the sixth decade of life, especially in men, with emphasis on the yellow race. It should be noted that the analysis of epidemiological

characteristics is essential for the development of screening policies and early diagnosis in patients with modifiable and non-modifiable risk factors.
Keywords. Hepatic neoplasia, Mortality, Descriptive epidemiology.

Introduction

Cancer of liver and intrahepatic bile ducts occupies the third place of cancer deaths worldwide, being the second most deadly in men and the sixth in women, confirming an important presence in the global health scenario (Sung et al., 2020).

It is known that neoplasms arise from an inadequate proliferation of mutated cells, and the fact that cell renewal is constantly necessary for the proper functioning of the body contributes to the increased risk of failures in this process (Kumar et al., 2018). Thus, when looking particularly at the liver, which is an organ with intense cellular metabolism and with great demand for recovery, it is evident that numerous factors can contribute to the development of this pathology.

Chronic viral hepatitis is one of the main risk factors for the emergence of liver cancer due to the extensive tissue damage caused by the virus to the organ (Petrick et al., 2020; Ministry of Health, 2018). Thus, the high incidence of these diseases in developing countries is an important fact that serves as a warning for treatment to be done thoroughly, given the risks to the health of the population. Advanced age, especially after 50 years old, is another aggravating factor for mortality, since it is also associated with reduced cellular recovery capacity, a characteristic of the aging process (Freitas; Py, 2016).

According to Vilar et al. (2021) the modern lifestyle favors inadequate eating habits, which include consumption of foods with high caloric and glycemic indexes and the low practice of physical activities. Thus, the chance of developing chronic diseases and their complications is increased, as well as the risks of death. Among them, obesity stands out, since it is usually associated with other diseases, such as hypertension, diabetes, dyslipidemia, hepatic steatosis and liver cancer (Vilar, 2021). Many times, because they are insidious diseases, the individual discovers its involvement when there has already been considerable damage and the limits of homeostasis of the body have been exceeded. This can be easily observed in liver diseases, which require a very large degree of impairment to be clinically significant, making it difficult to diagnose and contributing to mortality due to its advanced stage.

Moreover, another risk factor for liver cancer present in the society nowadays is the excessive consumption of alcohol, a substance that corroborates to increase the demands of hepatic activity to perform its elimination. During this process, substances with great toxicity are produced, such as acetaldehyde, which need to be excreted and, while they are present internally, can damage the hepatocytes and the organ (Wang et al., 2020; Ren et al., 2020).

Also, it is known that the state of Mato Grosso has its economy based on agricultural activities (Silva et al., 2022), therefore, there are more chances of aflatoxin contamination, especially in grain storage, which is another risk factor for this neoplasm (Rushing; Selim, 2019; Yang et al., 2019). Thus, the article aims to analyze the epidemiological profile of mortality from liver and intrahepatic biliary tract cancer that occurred in the state of Mato Grosso in 2020, since there are numerous risk factors to which the population is exposed and that had their incidence increased due to the modern lifestyle, as well as the local risk factors of the study region. Thus, the work can contribute to the generation of data and information that will help in the application of public policies to change this scenario.

Methodology

A cross-sectional study was conducted based on data from the Mortality Information System (SIM) available at the Department of Informatics of the Unified Health System (DATASUS) and the estimated population of the Brazilian Institute of Geography and Statistics (IBGE) for 2020.

In the SIM, data corresponding to the state of Mato Grosso in the year of 2020 were collected using the International Code of diseases, specifically CID 10 C-22 which corresponds to Malignant Neoplasm of the Liver and intrahepatic biliary tracts and include the following malignancies:

- ✓ CID 10 C22.0 - Carcinoma of hepatic cells;
- ✓ CID 10 C22.1 - Carcinoma of intrahepatic bile ducts;
- ✓ CID 10 C22.2 - Hepatoblastoma;
- ✓ CID 10 C22.3 - Angiosarcoma of the liver;
- ✓ CID 10 C22.4 - Other sarcomas of the liver;
- ✓ CID 10 C22.7 - Other specified carcinomas of the liver;
- ✓ CID 10 C22.9 - Malignant neoplasm of the liver, unspecified.

It is important to note that all of the above cancers have primary origin in the liver and intrahepatic bile ducts and are not secondary to metastasis. The data collected in the System were:

- ✓ Total number of deaths;
- ✓ Number of deaths of individuals with a distinction between male and female sexes;
- ✓ Number of deaths of individuals with distinction between white, brown, black, yellow and indigenous races;
- ✓ Number of deaths of individuals with the relation to age with closed 5-year intervals, the initial one being from 0 to 4 years and the last one from 75 to 79 years. Deaths occurring 80 years and older were all allocated to the same interval;

- ✓ Number of deaths of individuals with the combined evaluation of the factors sex and race;
- ✓ Number of deaths of individuals with the combined evaluation of the factors age and sex;
- ✓ Number of deaths of individuals with the combined evaluation of the factors race and age;
- ✓ Number of deaths of individuals with the combined evaluation of the factors sex, race, and age.

Subsequently, data were collected from the 2010 population census of the IBGE, since the new census that was scheduled to be carried out in 2020 was not performed due to the SARS-CoV-2 pandemic. The data collected from the state of Mato Grosso were the total number of inhabitants, the number of inhabitants according to sex, the total number of individuals according to race (white, black, brown, yellow, or indigenous), and the total number of individuals following the age groups present in table 1.

Subsequently, the total population estimate for 2020 was collected for the calculation of a correction factor to determine the corresponding values more accurately to each population group assessed. The correction factor was found by dividing the total estimated population value for 2020 and the total found for 2010, finding the value of 1.162, as shown in Figure 1.

Table 1. Age groups for which mortality data were extracted.

0 - 4 years	20 - 24 years	40 - 44 years	60 - 64 years	80 years and older
5 - 9 years	25 - 29 years	45 - 49 years	65 - 69 years	
10 - 14 years	30 - 34 years	50 - 54 years	70 - 74 years	
15 - 19 years	35 - 39 years	55 - 59 years	75 - 79 years	

$$\frac{\text{Population estimate for 2020}}{\text{Total population for 2010}} = \frac{3{,}526{,}220}{3{,}035{,}122} \cong 1.162$$

Figure 1. Calculation of the population correction factor, considering the 2010 census and estimated population for 2020.

The correction factor was multiplied by all the values found for sex, race, and age individually to maintain the proportion found among the variables for the values estimated for 2020.

Subsequently, the data found in the SIM and IBGE were combined to estimate the mortality rates according to sex, age, and race, following the standard: number of deaths/100,000 inhabitants. All these data were processed using Microsoft Excel Expert software (Office 2019) and using the statistical measure: Standard Deviation.

The results found were compared to those available in the literature to explain the possible causes of this epidemiological profile. The literature consulted included peer-reviewed scientific articles available in *PubMed, Web of Science, Lilacs* and *Embase* databases, published between 2015 and 2022, as well as complementary search in grey literature via *Google Scholar*.

Results and discussion

Table 2 represents the mortality rates for every 100,000 inhabitants in the state of Mato Grosso in 2020 when only the variables age and race were considered.

A total of 120 deaths occurred in the state of Mato Grosso in 2020, which corresponds to a general mortality rate of 3.4 deaths/100,000 inhabitants. If only the racial criteri is evaluated, there is the following descending order of mortality: the yellow race (4.97 deaths/100,000 inhabitants), the black race (4.87 deaths/100,000 inhabitants), the brown race (3.41 deaths/100,000 inhabitants), the white race (3.1 deaths/100,000 inhabitants), and the indigenous race (2.02 deaths/100,000 inhabitants).

Furthermore, in relation to the age group, there is a sharp rise in mortality after the beginning of the sixth decade of life, with values that are almost triple the previous interval (7.59 deaths/100,000 inhabitants at the end of the fifth decade of life and 20.63 deaths/100,000 inhabitants at the beginning of the sixth decade of life). The sum of the general deaths from the sixth decade of life onwards corresponds to more than 90% of total deaths.

Moreover, disregarding the sex variable, for the yellow race – that shows the highest mortality – deaths are restricted to individuals in the late sixth and early seventh decades of life. Just like the black population, this race has a mortality rate that exceeds that found for the general population by more than 40%.

Table 2. Mortality rate for malignant neoplasms of the liver and intrahepatic bile ducts in Mato Grosso in 2020, according to age and race/ethnicity, per 100,000 population.

Race/ethinicity	Total	White	Black	Yellow	Brown	Indigenous
Age	3.40	3.10	4.87	4.97	3.41	2.02
0 - 4 years	0.00	0.00	0.00	0.00	0.00	0.00
5 - 9 years	0.00	0.00	0.00	0.00	0.00	0.00
10 - 14 years	0.00	0.00	0.00	0.00	0.00	0.00
15 - 19 years	0.30	0.00	0.00	0.00	0.55	0.00
20 - 24 years	0.30	0.00	0.00	0.00	0.56	0.00
25 - 29 years	0.00	0.00	0.00	0.00	0.00	0.00
30 - 34 years	0.65	0.00	3.66	0.00	0.61	0.00
35 - 39 years	1.10	0.00	4.20	0.00	1.40	0.00
40 - 44 years	1.21	0.00	0.00	0.00	2.40	0.00
45 - 49 years	3.26	2.29	10.81	0.00	2.86	0.00
50 - 54 years	5.21	7.00	6.63	0.00	3.59	0.00
55 - 59 years	7.59	7.27	8.77	0.00	7.93	0.00
60 - 64 years	20.63	19.75	23.48	0.00	21.72	0.00
65 - 69 years	21.35	10.30	15.58	121.57	27.00	181.59
70 - 74 years	37.89	32.98	0.00	145.39	47.24	0.00
75 - 79 years	51.29	44.02	71.31	0.00	57.45	0.00
80 years and older	46.85	48.00	70.84	0.00	44.81	0.00

In addition, the indigenous mortality rate is generated only by individuals at the end of the sixth decade of life, characterizing the most expressive isolated mortality value among all age groups: 181.59 deaths/100,000 inhabitants.

Likewise, the white, black, and brown races present their most expressive values also in the older age groups.

When we evaluate the distribution of deaths according to the age group for each race individually, we have a significant irregularity in the values found. However, although the rates found for 100,000 inhabitants are extremely unequal in the total analysis, this mortality unit shows homogeneity from the sixth decade of life on, especially in the white and brown races.

Despite this abrupt increase in mortality from age 60 onwards occurring for all races, the number of deaths per 100,000 inhabitants from the sixth decade onward remains more stable for the white and brown races than for the black and especially for the yellow and indigenous rates. While the latter two have a considerably higher mortality rate than the total population between 65 and 69 years old (for both) and 70 to 74 years old for the yellow race, the white and brown population maintains relatively homogeneous levels, with a tendency to increase with advanced age. Otherwise, the black race, after a significant increase in the mortality rate at the beginning of the sixth decade of life, has a second abrupt rise for individuals over 75 years old.

In this sense, the homogeneity of the mortality distribution according to the age group for race was evaluated by calculating the standard deviation - indicative of heterogeneity of the sample - as demonstrated in Figure 2.

Therefore, the order of the races according to the increasing values of standard deviation obtained was brown, white, black, yellow, and indigenous. For the first two, the deviation found was very similar (14.79 and 14.85, respectively), corresponding to the most harmonious mortality distributions of all. For the black race, the value found - 32.9 - was more than double that obtained for the white and brown races. Finally, for the yellow and indigenous races, the values found (73.59 and 81.2, respectively) were more than 5 times the lowest value identified (white - 14.79), corresponding to the races with the most irregular distribution of deaths by age.

The following table 3 represents the mortality rates for each 100,000 inhabitants in the state of Mato Grosso in 2020 considering the age and race restricted to deaths related to males.

Evaluating the values found, there is a general mortality rate for males of 4.22 deaths per 100,000 inhabitants. About the racial criteria, the distribution of mortality rates slightly differs from the general one, presenting in descending order: yellow, black, brown, indigenous and white. With respective values of 10.51 deaths/100,000 inhabitants, 5.38 deaths/100,000 inhabitants, 4.35 deaths/100,000 inhabitants, 3.99 deaths/100,000 inhabitants and 3.61 deaths/100,000 inhabitants, respectively.

When the evaluation is restricted to males, the yellow race receives even greater emphasis, with a mortality rate that is almost double that of the second highest found: 10.51 deaths/100,000 inhabitants and 5.38 deaths/100,000 inhabitants for the yellow and black races, respectively. It is worth observing that this most expressive mortality rate corresponds only to deaths of males aged 65 to 74.

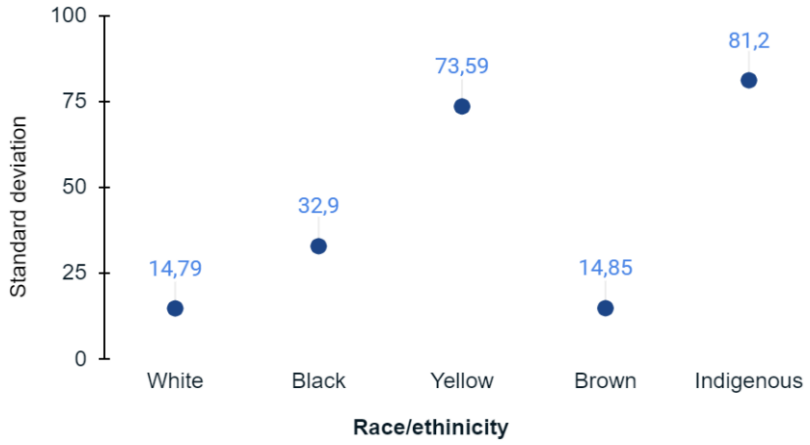

Figure 2. Standard deviation for mortality from malignant neoplasms of the liver and intrahepatic bile ducts from the sixth decade of life, according to race/ethnicity.

Table 3. Male mortality rate for malignant neoplasms of the liver and intrahepatic biliary tract in Mato Grosso in 2020, by age and race/ethnicity, per 100,000 population.

Race/ethinicity	Total	White	Black	Yellow	Brown	Indigenous
Age	4.22	3.61	5.38	10.51	4.35	3.99
0 - 4 years	0.00	0.00	0.00	0.00	0.00	0.00
5 - 9 years	0.00	0.00	0.00	0.00	0.00	0.00
10 - 14 years	0.00	0.00	0.00	0.00	0.00	0.00
15 - 19 years	0.60	0.00	0.00	0.00	1.07	0.00
20 - 24 years	0.59	0.00	0.00	0.00	1.10	0.00
25 - 29 years	0.00	0.00	0.00	0.00	0.00	0.00
30 - 34 years	0.00	0.00	0.00	0.00	0.00	0.00
35 - 39 years	0.72	0.00	7.37	0.00	0.00	0.00
40 - 44 years	0.79	0.00	0.00	0.00	1.57	0.00
45 - 49 years	2.71	2.24	9.48	0.00	1.87	0.00
50 - 54 years	5.58	8.16	0.00	0.00	4.66	0.00
55 - 59 years	8.77	10.49	15.71	0.00	6.19	0.00
60 - 64 years	27.82	19.11	42.89	0.00	33.68	0.00
65 - 69 years	27.30	6.67	0.00	231.38	40.37	400.34
70 - 74 years	53.50	37.03	0.00	275.87	73.25	0.00
75 - 79 years	68.32	59.06	132.93	0.00	67.98	0.00
80 years and older	61.25	68.84	66.77	0.00	59.03	0.00

In relation to the most expressive isolated value, the indigenous race is highlighted. With a mortality rate of 400.34 deaths/100,000 inhabitants for males at the end of the sixth decade of life.

As for the other races, it is noticed similar standards if the sex is disregarded, with a more homogeneous distribution of deaths related to the values found from the sixth decade of life onwards.

An exception is the black race, which at the end of the sixth and beginning of the seventh decade of life did not present any deaths, but at the end of the seventh decade presented the fourth highest isolated mortality rate by age range in males - 132.92 deaths/100,000 inhabitants.

Finally, it is important to mention that from 0 to 14 years of age there were no deaths caused by this type of neoplasm in males.

Table 4 represents the mortality rates for each 100,000 inhabitants in the state of Mato Grosso in 2020 considering the variables age and race restricted to female-related deaths.

In relation to the general mortality for females, there was a total of mortality rate of 2.55 deaths/100,000 inhabitants, which corresponds to a value 40% lower than that found for males.

When we consider the racial criteri, we find different results from the general mortality rate. No deaths were found in yellow and indigenous women. In races with recorded deaths, the mortality rate in descending order was as follows: black, white and brown, with respective values of 4.23 deaths/100,000 inhabitants, 2.59 deaths/100,000 inhabitants and 2.43 deaths/100,000 inhabitants.

Furthermore, it is notable that deaths were found only after the third decade of life in women. Concurrently, the number of deaths in the registered races - black, white and brown - are also characterized by an increase with advanced age, with the most significant value of mortality for women being 75.44 deaths/100,000 inhabitants for black women over 80 years old.

Table 4. Female mortality rate for malignant neoplasms of the liver and intrahepatic biliary tract in Mato Grosso in 2020, by age and race/ethnicity, per 100,000 population.

Race/ethinicity	Total	White	Black	Yellow	Brown	Indigenous
Age	2.55	2.59	4.23	0.00	2.43	0.00
0 - 4 years	0.00	0.00	0.00	0.00	0.00	0.00
5 - 9 years	0.00	0.00	0.00	0.00	0.00	0.00
10 - 14 years	0.00	0.00	0.00	0.00	0.00	0.00
15 - 19 years	0.00	0.00	0.00	0.00	0.00	0.00
20 - 24 years	0.00	0.00	0.00	0.00	0.00	0.00
25 - 29 years	0.00	0.00	0.00	0.00	0.00	0.00
30 - 34 years	1.31	0.00	8.50	0.00	1.23	0.00
35 - 39 years	1.48	0.00	0.00	0.00	2.82	0.00
40 - 44 years	1.65	0.00	0.00	0.00	3.27	0.00
45 - 49 years	3.85	2.34	12.57	0.00	3.90	0.00
50 - 54 years	4.80	5.78	15.03	0.00	2.47	0.00
55 - 59 years	6.32	3.78	0.00	0.00	9.77	0.00
60 - 64 years	12.87	20.43	0.00	0.00	8.97	0.00
65 - 69 years	14.87	14.15	35.76	0.00	12.51	0.00
70 - 74 years	20.85	28.78	0.00	0.00	18.19	0.00
75 - 79 years	33.12	29.16	0.00	0.00	45.67	0.00
80 years and older	32.91	29.89	75.44	0.00	30.23	0.00

The results of this study revealed 120 deaths in the state of Mato Grosso in 2020, and also reported that mortality from liver and intrahepatic biliary tract cancer is more prevalent in the yellow race (4.97 deaths/100,000 inhabitants), with men aged 65 to 74 years being the most affected. On the other hand, the indigenous race has a significantly lower incidence (2.02 deaths/100,000 inhabitants), despite affecting the same sex and age range.

In addition, this study found that liver and intrahepatic bile ducts cancer are more prevalent in the yellow race, with 4.97 deaths/100,000 population. This fact is probably due to the alcohol dehydrogenase (ADH) isoform expressed in the race, which is responsible for generating greater amounts of acetaldehyde, a known carcinogen with mutagenic properties (Wang et al., 2020; Xu et al., 2022).

One of the main risk factors for the development of liver carcinoma is alcohol abuse (Zhang et al., 2022). After ingestion, this substance is metabolized in hepatocytes, leading to the production of acetaldehyde. The enzyme ADH is primarily responsible for the metabolization of ethanol. Among the various ADH isoenzymes, those belonging to class I are especially important in the metabolization of alcohol. This class is found in the hepatocyte and is localized at three gene loci: ADH1, ADH2 and ADH3. Among these, only the ADH2 and ADH3 genes are subject to polymorphism, and they can have the alleles ADH2*2 and ADH3*1, respectively. The isoenzymes encoded by these polymorphic alleles have a greater capacity to oxidize ethanol, leading to higher levels of acetaldehyde in the body (Wang et al., 2020; Ren et al., 2020).

A study conducted at Fernando Pessoa University in Porto suggests that the ADH2*1 allele is more frequent in Caucasians and African Americans, while the ADH2*2 allele is predominant among Chinese and Japanese (Bucho, 2012).

Data highlighted in this study is that, although the vast majority of yellow individuals are rapid metabolizers of ethanol, the mortality rate found for the race is composed exclusively of males, with values of 10.51/ 100,000 population.

The reasons why alcohol abuse is more frequent in men go beyond cultural and social issues. According to Hughes et al. (2016), in the US, until 1990, the great distinction between genders meant that researchers did not associate studies on alcoholism with the female figure. That way, the first

studies on the effects of alcohol on the human body were conducted only on men.

From a biological standpoint, women tolerate less alcohol because they express lower values of the ADH enzyme and because of their body constitution, that is, the greater proportion of fat and less body water, which favor greater bioavailability of alcohol in the body (Oliveira et al., 2012). Together, these factors can lead to intoxication in women with 50% lower doses than in men and are a protective factor against substance abuse. However, this is not the only protective factor for women. According to Wu et al. (2010), the androgen receptor plays a key role in the development of liver cancer in hepatitis B carriers. In the cited research, 2 groups of mice were used, one of which was a carrier of androgen receptors, while the other group did not possess them; both groups were exposed to the hepatitis B virus. The results showed that 90% of the mice with such receptors developed liver cancer, compared to only 27% of the group without the receptor. This happened because, before damaging the liver tissue and causing cancer, the virus binds to androgen receptors and has its replication facilitated by them (Lin et al., 2020). Since hepatitis B virus infection is one of the main risk factors for developing liver cancer, this data becomes extremely relevant.

In addition, hepatitis B is also a crucial factor when analyzing the data for the indigenous population. This group has the most significant single values both in terms of overall mortality as in relation of male gender and age. When analyzing the parameters of the indigenous race, the concentration of cases in males in the 65 to 69 age group stands out, with a mortality rate that reaches 400.34 deaths per 100,000 inhabitants. The composition of the overall mortality rate in the indigenous race (181.59 deaths per 100,000 inhabitants) is composed entirely of the male subgroup since no cases were registered in the female subgroup.

A study conducted by Borges et al. (2019) on cancer mortality in indigenous populations points to an epidemiological profile with a prevalence of neoplasms related to infectious agents. The main types of cancer found were stomach, liver, and cervix, strongly associated with *Helicobacter pylori*, hepatitis B virus (HBV), and human papilloma virus (HPV), respectively.

About liver cancer, it is interesting to reinforce the already cited relationship between hepatitis B virus and androgen receptor, since the mortality rate of the present study found only data in the male population. It is also necessary to consider that indigenous people have their rates influenced by the reality in which they live. Many times, the opening hours of the basic health units and the great distance between some residences and the public health services represent barriers to access for care. Another point to be considered is the difficulty of communication between professionals and patients due to language, as pointed out by Borghi et al. (2015).

Furthermore, a risk factor that permeates all the groups analyzed and has great relevance in developing countries is exposure to aflatoxins. The main aflatoxin is B1 (AB1), a mycotoxin produced by the proliferation of the fungus *Aspergillus flavus* in cereals and oilseeds. Contamination can occur from planting to grain storage, provided favorable conditions of humidity and temperature. This toxin is considered one of the most potent natural hepatocarcinogens and can lead to the development of malignant liver neoplasia even when ingested in small amounts. AB1 acts in the body after being biotransformed into AFB1-epoxide in the hepatocyte. This metabolite covalently binds to DNA and leads to mutations in tumor suppressor genes, such as the p53 gene, which facilitates uncontrolled cell proliferation and tumor formation (Rushing; Selim, 2019; Yang et al., 2019).

Cristo et al. (2015) state that despite the Brazilian legislation and monitoring by the health surveillance controlling the quality of products, high levels of aflatoxins continue to be found in several crops intended for human consumption, such as corn and peanuts.

In addition, the variable age deserves attention. In all the races analyzed and, in both sexes, there is a tendency to a gradual increase in the number of cases recorded with the passing of the years, with significant values starting in the sixth decade of life. This value is almost triple of the value found in the fifth decade of life (20.63 vs. 7.59 deaths per 100,000 inhabitants) and corresponds to more than 90% of the cases registered in the state of Mato Grosso. According to INCA, elderly people over 65 are 11 times more likely to develop cancer than younger people. This happens because of the downfall in several body functions, which influences the success of cell divisions.

The fundamental role that telomeres and telomerases play in normal cell replication is recognized (Souza, 2017). Telomeres are non-coding terminal structures of chromosomes, which ensure the integrity and stability of the genetic material. At each cell replication, a small portion of telomeres is lost, because DNA-polymerase is unable to synthesize these terminal portions. Therefore, this function is delegated to telomerases, enzymes whose function is to complement the telomeric sequences that would be lost. However, as the body ages, telomerase production declines and chromosomes become more vulnerable to instability, since the non-coding portions will soon be used up, and mutations will fall on the coding portions. This chromosomal instability predisposes older individuals to mutations in genes that are essential for tumor formation.

Finally, it is important to note that this study has some limitations such as: the possibility that the data from the Mortality Information System are underestimated due to under-diagnosis. Another difficulty was that in DATASUS the deaths reported did not relate the cause of death by CID 10 C22 with

risk factors for the development of liver and intrahepatic biliary tract cancer.

Conclusion

It is concluded that, concerning the mortality due to malignant neoplasms of the liver and intrahepatic biliary tract in the state of Mato Grosso, in 2020, the most affected profile is composed of yellow males, especially after the sixth decade of life. An important detail is the fact that the most affected race derived exclusively from male cases, since in the female profile there are no deaths reported in yellow people. Moreover, it is interesting to note that in the yellow males, the expressive number of deaths is restricted to the 65 to 74 age group. Despite this curious scenario, in both sexes and in all races with registered deaths, there is a tendency for the number of registered cases to gradually increase with the passing of life years.

Until now, there is no evidence that screening for cancer of the liver and intrahepatic bile ducts is cost-effective to the government. Thus, there is no formal indication to do it.

Given this scenario, professionals can only focus on early diagnosis based on common signs and symptoms of this pathology, such as the presence of an upper abdominal mass, abdominal pain, jaundice, fatigue, inappetence, and unexplained weight loss.

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