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Impact of Cirrhosis and Alcohol on Mortality Rates and Mitigation Efforts

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Abstract

The present study aimed to investigate the impact of national policies and awareness programs on the incidence and mortality of chronic liver diseases, specifically cirrhosis. A multi-year retrospective analysis was conducted utilizing data collected between 1990 and 2017. Results indicate that implementing these interventions was associated with a significant decrease in overall mortality and an estimated annual percentage change in cases of cirrhosis. Furthermore, the data revealed that in 2017, alcohol consumption was a leading contributor to deaths and disability-adjusted life years (DALYs) among individuals aged 15-49 years. These findings highlight the importance of continued efforts to address the issue of chronic liver disease through targeted public health interventions.

Scope:

1. Determination of various risk factors that leads to cirrhosis progression.
2. Age groups that are affected and comparisons with different populations.
3. Determination of current mortality and measures to reduce mortality.
4. Healthcare policies are established to reduce alcohol consumption indirectly, which assists in preventing this disease.

Rationale:

1. Analysis of the most affected age groups and comparisons with countries to analyze the data together.
2. Identification and analysis of existing mortality from cirrhosis.
3. To find out how mortality has changed over the years and to compare data.
4. To find out health policies established to reduce alcohol consumption.

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This analysis compares data provided by different healthcare bodies such as WHO, the Institute for Health and Metrics Evaluation (Global burden of disease study), and the Global Burden of Diseases (GBD) study conducted in 2017. The data was analyzed remotely via online resources under Charisma University's Department of Public Health and Kursk State Medical University supervision. The parties involved directly in this research are the patients whose data was provided by the healthcare bodies such as W.H.O., the Institute of Health and Metrics Evaluation, the BioMed Central journals, the Journal of Hepatology, The Lancet, and others (Ventura-Cots et al., 2019).

The main aim of conducting this research and piling the data in one place would benefit healthcare workers, providers, patients, and their families in getting more information about this disease. It would benefit the patients to make them understand how people in other parts of the world are affected by it and the differences in the countries where the mortality rate due to cirrhosis is low. Identifying the common risk factors that lead to cirrhosis and how it gradually progresses despite multiple measures taken by healthcare authorities and policymakers, the effect of alcohol plays a huge role in the development of this disease.

Analysis of the age groups most affected and comparing them with different countries to analyze the data collected. Most importantly, to find out and compare approaches taken in some countries with high mortality as compared to the countries with lesser mortality rates and what kind of changes were made over the years, and how they changed the mortality rates, including but not limited to the establishment of healthcare policies.

Methods

Study data and statistical analysis

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According to the GBD report of 2017, the data was collected from 1990-2017 by the Global Health Data Exchange query tool. The mortality estimation was the combination of data from registration and its samples, including verbal autopsies. The collected data were presented as an age-standardized mortality rate (ASR) and an estimated annual percentage change (EAPC) which included the human development index as well (HDI). The study used the sociodemographic index to collect data, which was helpful in comparing data between 195 countries involved in this study. The data was also a collection from more than 600 sources, including populational and individual alcohol consumption. The countries in this study were divided into 4 categories via the EAPC value of ≤ -1.34 was defined as a significant decrease group, $-1.3 \leq$ EAPC ≤ 0.92 was defined as remained stable or a minor decrease group, $0.99 \leq$ EAPC ≤ 3.38 was defined as a minor increase group, and EAPC ≥ 3.87 was defined as a significant increase group (Griswold et al., 2018).

Study participants

The participants were a combination of different backgrounds and risk factors, including a study population of 28 million individuals and approximately <650,000 registered cases. (Griswold et al., 2018)

Types of public policies and steps to reduce alcohol intake according to the World Health Organization

National policies: 80 countries in 2016 reported having made national alcohol policies, some of which were subnational, and a few placed a total ban on alcohol. Amongst the countries that chose to have a written national policy on alcohol include 67% of high-income countries, 43% of upper-middle-income countries and 42% of lower-middle-income countries, and 15% of low-

income countries. Such policies require the need of government funding for implementation. Still, it was provided unevenly across the world. Still, it was most prevalent in South-East Asia, Europe, and Western Pacific regions compared to Africa, the Americas, and Eastern Mediterranean regions, where the funding is relatively less (Organization, 2019).

One such policy was implemented in Russian Federation as the nation; according to the Global status report on alcohol and health, the consumption of alcohol per person was 15.8 liters in 2011. After the implementation of the National alcohol policy, the consumption of alcohol per person came down to 12.3 liters within 9 years. Alcohol psychosis also dropped to 20.5/100,000 by a significant margin from 52.3/100,000. It was a collective effort to place restrictions on the availability of alcohol and maintain the production, distribution, and control of retail sales. The fine amount was also increased for minors and placed criminal responsibility for repeat violators, which also assisted in placing the alcohol registration system at a retail level. Advertising was banned on public transportation, the internet, and electronic media. A zero-tolerance policy has established a limit of 0.0% of blood alcohol concentration limit with a limit of 0.16mg/l for breathalyzer as a maximum measurement error. Excise taxes were also increased by 10% each year following 2008, which were increased again in 2014 by 33%. After 2016 there was also an increase in the minimum price of vodka (Organization, 2019).

Another policy was established in Thailand, where only a fraction of people drink alcohol. The per capita alcohol consumption increased from 0.3 liters per year in 1961 to 8.5 liters per year in 2001. Regulations on alcohol logos came into the picture in 2010, and within 2 years, the sales and drinking in factories, public organizations, enterprises, cars, roads, and on the pavement were prohibited. In 2015, amendments to Alcohol Beverage Control Act were made, including

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sales prohibition within 300 meters of higher education buildings to stop purchases amongst the young population and limit the sale to a certain number of hours. In 2017 the alcohol excise tax was increased (Organization, 2019).

The benefits of national policies were that the countries that did not have a national, subnational policy or a total alcohol ban reported that they were actively trying to develop a policy.

Nationwide awareness-raising activities: Alcohol-related harms can demonstrate implementation of such policies and activities as drunk driving, alcohol being popular amongst the youth, and social harms while intoxicated are a few of the most common topics for raising awareness-raising activities. Out of 164 countries, 128 reported government support for community action.

Such an example of community action was made in Porto Alegre, Brazil, where road accidents were the leading cause of death, as 78% of drivers tested positive for alcohol. To control that, Brazil lowered the blood alcohol concentration (BAC) levels to 0.05%, and penalties of approximately $1000 would be applied to the guilty people (Organization, 2019).

Evidence before this study recognized the use of alcohol as a factor for premature death and disability. In contrast, researchers considered it to provide a protective effect on specific conditions such as diabetes and ischemic heart disease (IHD). The value added by this study informs us about the available estimates of alcohol use and consumption amongst the drinkers at that time and also a method to differentiate the consumption of alcohol consumed by tourists and separate them from the main population. New relative risk curves estimated the overall alcohol consumption that minimizes the individual attributable risk (Organization, 2019).

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These results strongly suggest that alcohol control policies should aim to reduce consumption at the total population level. To potentially reduce the impact of alcohol consumption on future health loss, countries need to review their alcohol control policies and assess how they can be changed to continue to reduce consumption at the population level.

Results

The mortality of cirrhosis increased significantly from the data collected between 1990-2017 by 47.15%. Among the countries assessed, India had the highest number of deaths at the time of the study, whereas Hungary had a drop in their cases by 45.67%. The ASR of cirrhosis mortality varied worldwide and was 16.66 per 100,000 in 1990 and 17.31 per 100,000 in 2017. The ASR was also decreased for the female patients involved in this study and was the opposite for the male patients.

The ASR of liver cirrhosis mortality was 16.66 per 100,000 in 1990 and 17.31 per 100,000 in 2017. In 1990, Central Europe (Moldova especially) and Sub-Saharan Africa had a higher ASR than the study conducted in 2017, where Europe had the highest ASR. Over the period of time, female ASR decreased, and the male counterpart increased. European countries were found to have the highest EAPCs, which included Russia, Belarus, and Lithuania, and the lowest EAPC in Mali. 3% of countries (6 countries) were grouped into a significant increase group like Belarus, Armenia, and Lithuania. 21% of countries (41 countries) were included in the minor increase group. 15.38% of countries (30 countries) were classified as a significant decrease group which consisted of major countries like Italy, Qatar, South Korea, and Spain. Moreover, 60.51% of countries were clustered into the remained stable or minor decrease group (Ye et al., 2022).

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EAPC was influential in determining liver cirrhosis mortality as it correlated with HDI in 2017 at <0.77.

The mortality burden due to Hepatitis-B Virus (HBV) and Hepatitis-C Virus (HCV) was one of the proportions to look out for. Since 1990, the proportion of HBV cases decreased from 31.93% to 29.03% in 2017, whereas HCV cases increased by 51.92% in 2017. The overall mortality cases caused by HBV increased in 16 regions. In parallel, the greatest EAPC was found in Eastern Europe, and the lowest EAPC was found in Southern and Western Sub-Saharan Africa (Ye et al., 2022).

Approximately 25.12% of deaths were a direct result of the consumption of alcohol, and countries like China and UAE had the highest increase in mortality cases of up to 15.76% and 434.87%, respectively. Various causes were analyzed, including but not limited to Non-alcoholic steatohepatitis (NASH), which comprised an overall 8.92% of deaths and other causes accounted for 11.06% of deaths. The mortality cases around the globe increased by 33.49% (Ye et al., 2022).

Implementation of national policies to control alcohol consumption assisted in decreasing overall sales and preventing more people from being affected in certain parts of the world. Despite extra tax on such purchases, there was a significant increase in overall mortality cases. The two regions, Asia Pacific (high-income) and Western Europe had a decrease in the overall number of cases of mortality by a slight percentage, and these are the regions where significant efforts were made to decrease alcohol consumption through the establishment of national policies and awareness campaigns.

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Table 1. Mortality, ASR, and trend of liver cirrhosis (Ye et al., 2022)

Characteristics	2017	
	Mortality cases No. $\times 10^3$ (95% UI)	ASR per 100,000 N (95% UI)
Overall	1,322.87 (1,268.20–1,449.13)	17.31 (16.60–18.97)
Sex		
Male	882.67 (838.34–966.51)	23.02 (21.86–25.21)
Female	440.20 (415.54–518.43)	11.57 (10.92–13.62)
Socio-demographic index		
Low	171.16 (148.49–217.56)	13.27 (11.51–16.87)
Low-middle	363.70 (329.01–404.22)	21.33 (19.30–23.71)
Middle	366.92 (349.88–412.84)	17.55 (16.74–19.75)
Middle-high	215.78 (205.55–245.43)	15.55 (14.82–17.69)
High	201.83 (195.82–208.23)	17.71 (17.18–18.27)
Etiology		
Hepatitis B	383.97 (349.07–441.67)	5.03 (4.57–5.78)
Hepatitis C	342.24 (312.60–381.10)	4.48 (4.09–4.99)
Alcohol consumption	332.27 (303.00–373.28)	4.35 (3.97–4.89)
NASH	118.03 (108.62–128.58)	1.54 (1.42–1.68)
Other causes	146.36 (130.86–164.57)	1.92 (1.71–2.15)
Region		
Asia Pacific–high income	35.08 (32.40–37.04)	18.75 (17.32–19.80)
Central Asia	30.86 (28.66–32.91)	33.94 (31.52–36.19)
East Asia	167.64 (154.66–215.37)	11.28 (10.41–14.50)
South Asia	295.61 (268.24–378.26)	16.58 (15.05–21.22)
Southeast Asia	176.32 (164.70–190.08)	26.70 (24.94–28.78)
Australasia	2.48 (2.23–2.74)	8.73 (7.87–9.67)
Caribbean	7.29 (6.49–8.62)	15.77 (14.03–18.63)
Central Europe	30.99 (29.83–32.15)	26.99 (25.98–28.00)
Eastern Europe	78.29 (75.81–80.58)	37.24 (36.07–38.33)
Western Europe	74.23 (70.80–78.16)	17.14 (16.35–18.05)
Andean Latin America	11.23 (10.16–12.32)	18.28 (16.54–20.05)
Central Latin America	59.05 (56.63–62.09)	23.11 (22.16–24.30)
Southern Latin America	12.82 (11.69–14.02)	19.54 (17.81–21.37)
Tropical Latin America	36.94 (35.69–38.04)	16.89 (16.32–17.39)
North Africa and Middle East	77.39 (61.26–90.64)	12.89 (10.21–15.10)
North America–high income	67.35 (65.13–69.62)	18.66 (18.05–19.29)
Oceania	1.73 (1.44–2.11)	13.77 (11.46–16.70)
Central Sub-Saharan Africa	20.33 (15.74–26.35)	16.71 (12.94–21.66)
Eastern Sub-Saharan Africa	57.85 (44.09–69.97)	14.71 (11.21–17.80)
Southern Sub-Saharan Africa	6.78 (5.63–7.91)	8.77 (7.28–10.23)
Western Sub-Saharan Africa	72.60 (48.86–101.65)	16.73 (11.26–23.43)

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Discussion

Alcohol use led to 2.8 million deaths in 2016 and more than 1.32 million deaths in 2017. The ASR was more or less unchanged or decreased slightly from 1990 to 2017 in all GBD regions except eastern Europe and central Asia, where the age-standardized death rate increased mainly due to alcohol-related liver disease prevalence. Past findings of such cases suggested a protective effect on a small amount of alcohol consumption. However, this data was limited by a small sample size (Sepanlou et al., 2020).

Failure to address the harmful effects of alcohol use/abuse, particularly at high consumption levels, can have long-lasting effects on population health. The mortality crisis in Russia can be taken as an example, where alcohol use was the primary cause of increased mortality starting in the 1980s and led to 75% of deaths among men aged 15–55 years. Consequently, low-to-middle Sustainable Development Index (SDI) countries could benefit from establishing a policy today to keep alcohol consumption low and prevent greater health loss in the future (Griswold et al., 2018).

Conclusion

In summary, liver cirrhosis is one of the major threats to population health even though the mortality by HBV-affected cases was decreased. Still, the number of patients who lost their lives due to HBV was high in developing countries (Ye et al., 2022).

The development of policies is still a major concern in controlling the consumption of alcohol and aiming for decreased mortality indicators. This study informs and illustrates the burden of

cirrhosis worldwide to construct and verbalize more practical and effective long-term prevention strategies.

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