

A DEMOGRAPHIC STUDY TO DEVELOP A PREDICTION TOOL FOR LIVER DISEASE DUE TO ALCOHOL CONSUMPTION AMONGST DIFFERENT AGE GROUPS IN FIVE ETHNIC GROUPS OF ASSAM

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Abstract: Considering the significance of prevalence of liver disease, the present investigation was undertaken to develop a prediction tool of liver disease in five different ethnic groups of Assam, India. The occurrence of cirrhosis among these people is also not uncommon. It is therefore necessary to draw a relation between alcohol consumption and their liver condition this study was conducted taking into account some major indigenous ethnic groups of Assam, which are Assamese, Bengali, Bodo, Tea Tribe and Nepali. Subsequently, the survey was focused on highlighting ‘alcohol consumption’ as one of the primary causes of liver diseases, including liver cirrhosis in various ethnic groups, across Assam. Samples were collected from alcoholic individuals suffering from liver diseases, belonging from five different ethnic groups of Assam. The data was further subjected to statistical analysis and ANOVA: Single factor test was performed to check the significance of the study.

Key Words: Liver disease, Alcohol consumption, Age-wise, Ethnic, Percentage.

Introduction: Assam is a state of Northeast India where people of different ethnic group live together. For the past few years, it was seen that liver disease has become a major concern amongst different age group of people and the most common cause was alcohol. A study of patients with chronic liver disease in Guwahati, Assam, found that the most common cause was alcohol (66%), followed by non-alcoholic steatohepatitis (NASH) (16%)(Sen *et.al* 2017))

Alcohol-related liver disease (ALD) is a preventable disease that occurs when the liver is damaged by excessive alcohol consumption. The liver breaks down alcohol, but in that process, it can become seriously damaged. Each time liver filters alcohol,

some of the hepatocytes die. The liver can develop new cells, but prolonged alcohol misuse over many years can reduce its ability to regenerate. This can result in serious and permanent damage to the liver Beverage alcohol (i.e., ethanol) is chiefly metabolized in the main parenchymal cells of the liver (i.e., hepatocytes) that make up about 70 percent of the liver mass (Jones 1996). Excessive drinking over decades damages nearly every organ in the body. However, the liver sustains the earliest and the greatest degree of tissue injury from excessive drinking because it is the primary site of ethanol metabolism (Lieber 2000). Steatosis is then earliest, most common response that develops in more than 90 percent of problem drinkers who consume 4 to 5 standard drinks per day over decades (Ishak *et al.* 1991; Lieber 2004). Steatosis is the earliest response to heavy drinking and is characterized by the deposition of fat in hepatocytes. Steatosis can progress to steatohepatitis, which is a more severe, inflammatory type of liver injury. This stage of liver disease can lead to the development of fibrosis, during which there is excessive deposition of extracellular matrix proteins. The fibrotic response begins with active pericellular fibrosis,

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which may progress to cirrhosis, characterized by excessive liver scarring, vascular alterations, and eventual liver failure.(Osna et al.2017)

In this study, it has been primarily focused to analyse the samples affected with Liver Disease and the samples affected with liver disease in relation to Alcohol Consumption, in the different age ranges of those five ethnic groups, across Assam. An attempt was made to draw a relation between the disease and the basis of its occurrence, by collecting necessary samples from five different ethnic groups of Assam.

Materials and Methods

Ethics statement: In accordance with the guidelines established by the institutional Animal Ethical Committee (IAEC), this study does not require any approval, as this work is based on questionnaire survey and no experiments was performed in any animals or human being .

Study area: The present study was conducted in various districts of Assam.

Our sample site contains the following districts- Kamrup Rural, Baksa, Darrang, Nagaon, Udalguri, Morigaon, Dibrugarh, Tinsukia, Bongaigaon, Kokrajhar, Chirang.

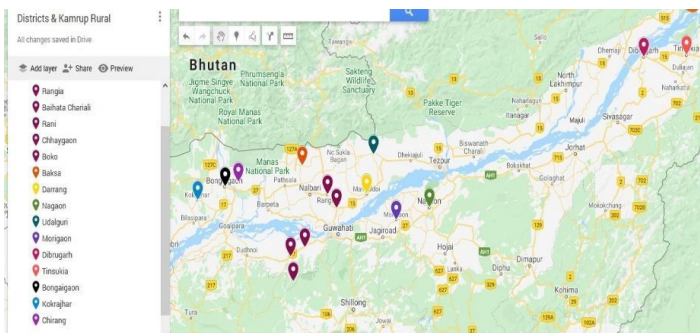


Fig I- Locations of the districts of sample sites

Sample Size – 779 Respondents

Sample Unit – Students, people working in different sectors,housewives and retired persons belonging to the desired ethnic groups i.e. Assamese, Bengali, Bodo,Tea Tribe and Nepali are the sample unit in this research project.

Sampling Area – Different areas of Assam

Sampling Method – Non Probability convenience sampling method is used in this Research study.

Collection of data through Questionnaire: In this method of data collection, a questionnaire, consisting of number of questions relevant to the

research topic is printed or typed and sent or mailed to the concerned respondents who are expected to read, understand and answer those questions on their own and return the questionnaire.

Statistical Methods Used -Single Factor ANOVA calculated.

Result: 779 of total respondents, 333 were effected by liver disease (Table I), out of which 197 were alcohol users (Table II).

Table- I: Numbers and Percentage of respondents effected with Liver disease of different Ethnic Groups (Source- Field Survey)

Serial Number	Ethnic Groups	Total Number	Number of Respondents with Liver Disease	Percentage Effected
1	Assamese	292	125	42.80
2	Bodo	274	116	42.33
3	Bengali	101	46	45.54
4	Tea Tribe	70	42	60.00
5	Nepali	42	4	9.52
Total		779	333	

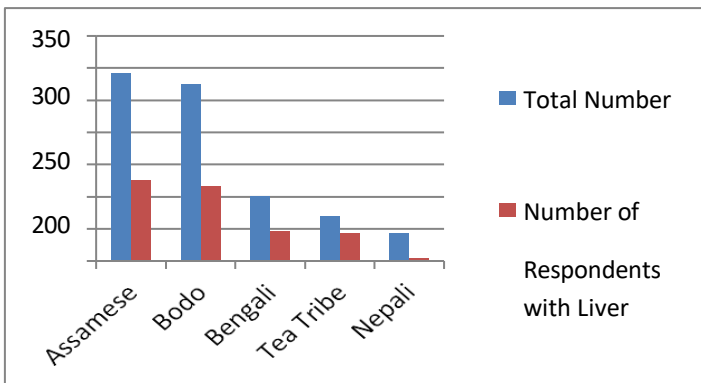


Fig II -Bar graph of the Occurrence of Liver Disease in different Ethnic Groups

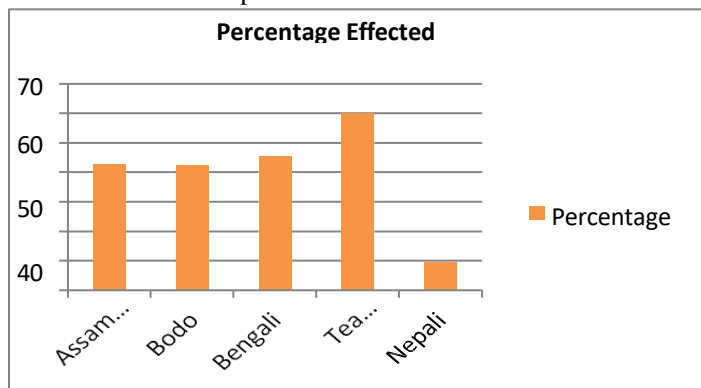


Fig III -Bar Graph of the Percentage of Respondents effected with Liver Disease of different Ethnic groups

Table-II: Numbers and Percentage of respondents affected with Liver Disease and are Alcohol users of different Ethnic groups (Source- Field Survey)

S. No.	Ethnic Groups	Number of Respondents with Liver Diseases	Number of Respondents affected with Liver Disease and are Alcohol users	Percentage of Respondents affected with Liver Disease and are Alcohol users (%)
1	Assamese	125	54	43.20
2	Bodo	116	76	65.51
3	Bengali	46	21	45.65
4	Tea Tribe	42	42	100
5	Nepali	4	4	100
Total		333	197	

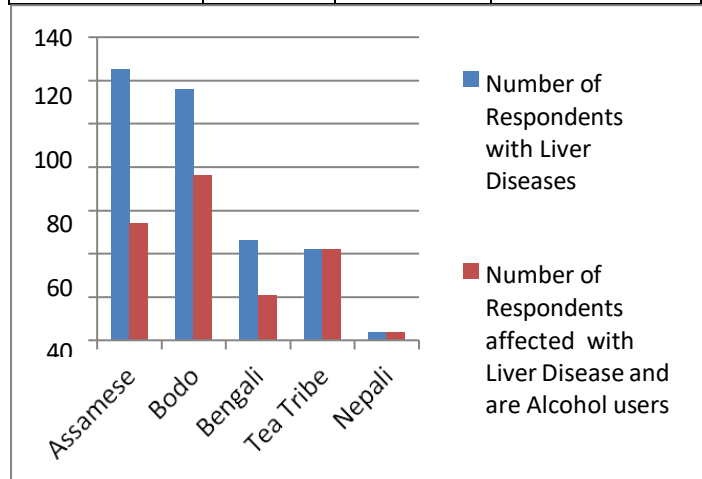


Fig IV -Bar graph of the Number of Respondents affected with Liver Disease and are Alcohol users

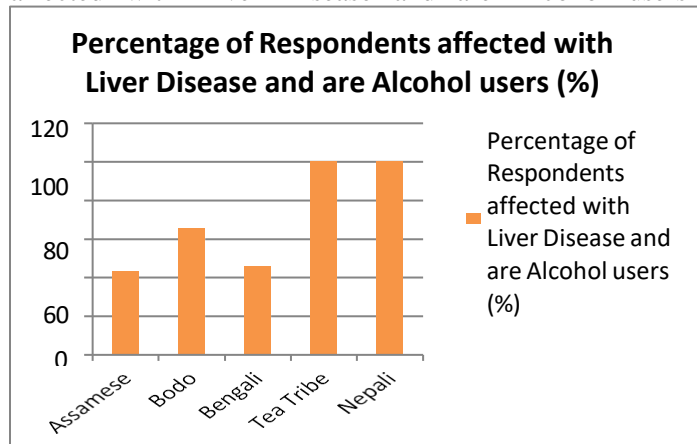


Fig V -Bar graph of the Percentage of Respondents of different ethnic groups affected with Liver Disease and are Alcohol users

Table-III: Standard Deviation of the Data of the Respondents affected with Liver Disease and are Alcohol users of different Ethnic Groups

SL. No.	Ethnic Groups	No. of Respondents effected with Liver Disease and are Alcohol users (x)	(Xi - μ)	(Xi - μ) ²
1	Assamese	54	14.6	213.16
2	Bodo	76	36.6	1339.6
3	Bengali	21	- 18.4	338.6
4	Tea Tribe	42	2.6	6.76
5	Nepali	4	- 35.4	1253.2
		μ = 39.4		Σ =3151.32

Analysis of the Respondents effected with Liver Disease and are Alcohol users of different Age Ranges of different Ethnic Groups

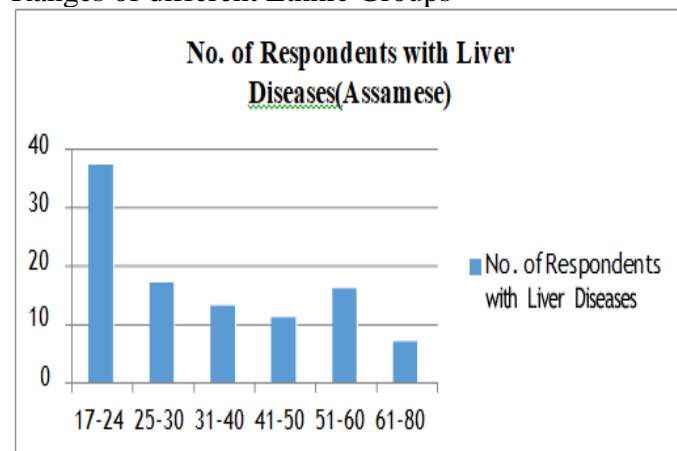


Figure VI- Bar graph representing no.of respondents with liver disease (Assamese) In Assamese ethnic group- Alcohol consumption is highest seen in the age group 17-24 (Fig-7)

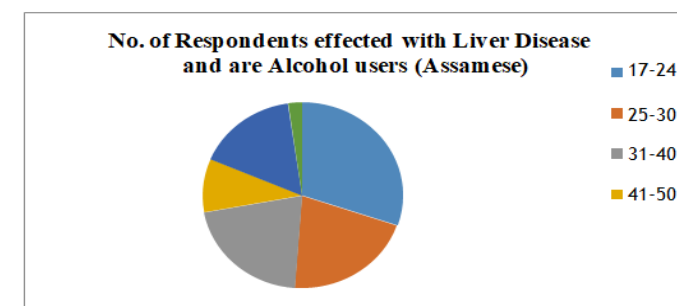


Figure VII-Pie chart representing no. of respondents with alcoholic liver disease (Assamese)

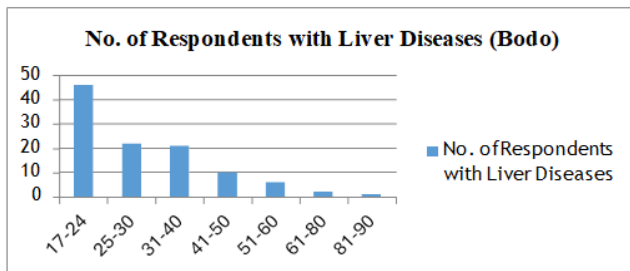


Figure VIII – Bar graph representing no.of respondents with liver disease (Bodo)
In Bodo ethnic group- Alcohol consumption is highest seen in the age group 31-40 (Fig-9)

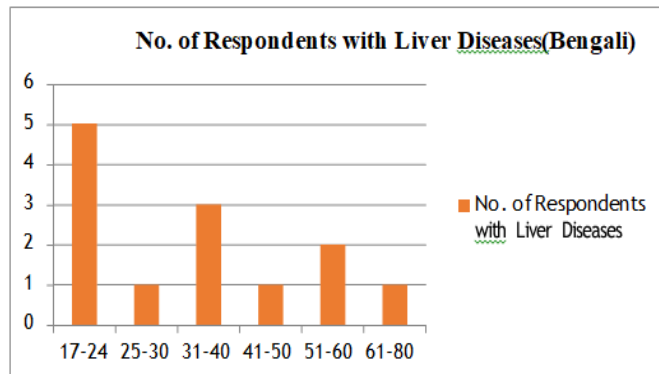


Figure XII –Bar graph representing no. of respondents with liver disease (Bengali)
In Bengali ethnic group- Alcohol consumption is highest seen in the age group 17-24 (Fig-13)

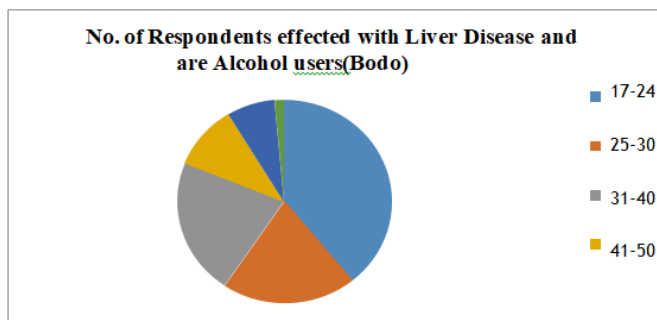


Figure IX– Pie chart representing no. of respondents with alcoholic liver disease (Bodo)

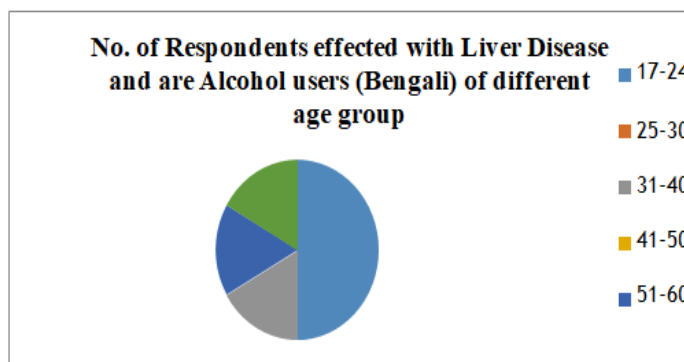


Figure XIII – Pie chart representing no. of respondents with alcoholic liver disease (Bengali)

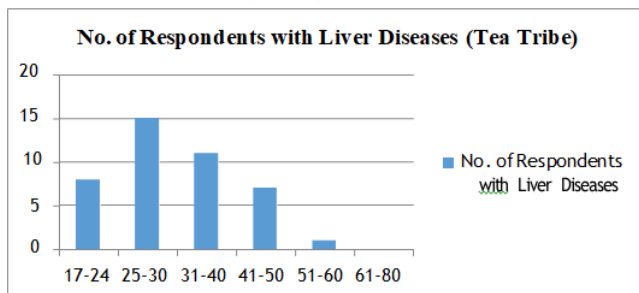


Figure X – Pie chart representing no. of respondents with alcoholic liver disease (Tea tribe)
In Tea tribe ethnic group- Alcohol consumption is highest seen in the age group 25-30, 31-40 (Fig-11)

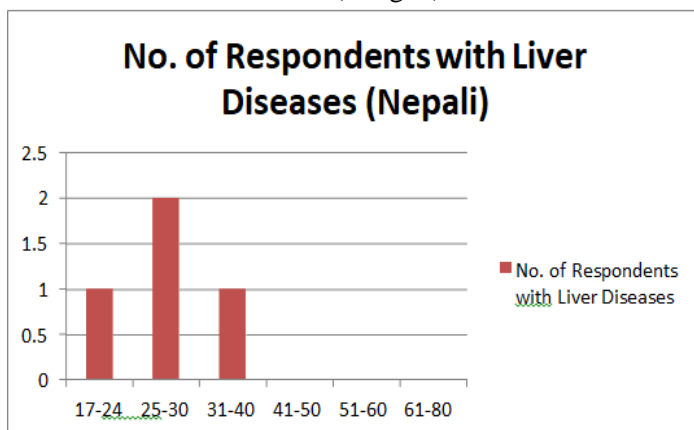


Figure XIV – Bar graph representing no. of respondents with liver disease (Nepali)
In Nepali ethnic group- Alcohol consumption is highest seen in the age group 25-30 (Fig 15)

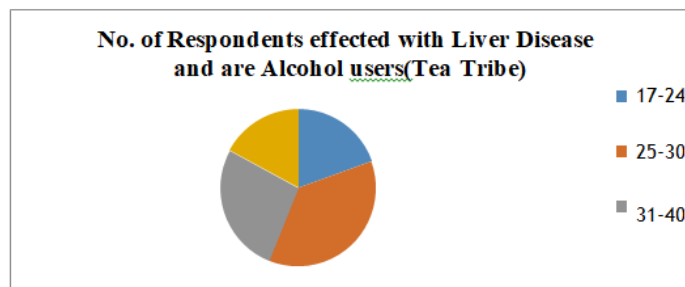


Figure XI – Pie chart representing no. of respondents with alcoholic liver disease (Tea tribe)

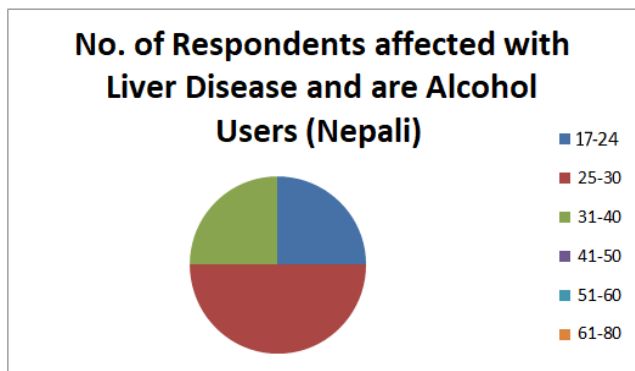


Figure XV –Pie Chart representing no. of respondents with Alcoholic Liver Disease (Nepali)

Standard Deviation, Standard Error of Mean, of the above data

$$\text{Mean, } \mu = \sum Xi / N = 197 / 5 = 39.4$$

$$\text{Standard Deviation, } \sigma = \sqrt{\sum (Xi - \mu)^2 / N - 1} = \sqrt{3151.32 / 5 - 1} = 28.07$$

$$\text{Standard Error of Mean, SEM} = \frac{\sigma}{\sqrt{n}} = 28.07 / \sqrt{5} = 12.53$$

Anova: Single factor

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SUMMARY						
Groups	Count	Sum	Average	Variance		
Group 1 (LD)	5	333	66.6	2699.8		
Group 2 (Alc +LD)	5	197	39.4	787.8		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between						
Groups	1849.6	1	1849.6	1.060672	0.33319	5.317655
Within Groups						
Within Groups	13950.4	8	1743.8			
Total						
Total	15800	9				

Analysis of data taking age range as the criteria, reveals that occurrence of alcoholic liver disease showed an irregular value among the considered specific age range of studied sample units. The people between 17-30 were considered as young; those between 31-60 as middle aged and above 61 as older. In the Assamese ethnic group, it was found that younger generation was highly affected with

Liver Disease, out of which mostly, were Alcohol consumers, whereas the middle and older aged people were moderately affected.

In case of Bodo ethnic group, it was found that majority of the respondents belonging to the younger generation were highly affected with Liver Disease, of which almost all were found to be Alcoholic. Whereas, those belonging to middle aged were moderately affected with Liver Disease and more than 50% of them were Alcohol consumers. In older aged range, the number of respondents affected with Liver Disease was significantly low.

Among the Tea Tribe ethnic group, the respondents belonging to younger and middle aged generation affected with Liver Disease were found to be in the average range, but all of them were alcohol consumers. Whereas, among the older age, the number respondents were very less to come up with any kind of assumption.

In the Bengali ethnic group, it was found that among all the specified age range i.e younger, older and middle aged, the number of respondents belonging to each group affected with Liver Disease are below the average range, of which number of alcohol consumers were quite less in younger and middle-aged group, but negligible in older generation.

Among the Ethnic group Nepali, the respondents belonging to middle aged group were found to be mostly affected with Liver Disease, of which more than 50% were Alcoholic. Whereas among younger generation, the number of respondents affected with Liver Disease was moderate but all were Alcoholic.

Discussion: After thorough analysis of the data , it was found that approximately 42.8% of the total 779 respondents indicated the presence of some kind of liver disease. The dispersion of the respondents with liver disease was uneven, with higher occurrence rate in some ethnic groups but lower in others. The respondents from Tea Tribe, showed the highest percentage of liver disease i.e 60% and least count of 9.52%, was depicted in the Nepali respondents. In Bengali and Bodo ethnic groups, the respondents affected with liver disease were found to be in the average range, whereas in Assamese tribe, it was more than the average range, since the

number of respondents were significantly low. On further analysis of data taking age range as the criteria, it revealed that occurrence of alcoholic liver disease showed an irregular value among the considered specific age range of studied sample units. The people between 17-30 were considered as young; those between 31-60 as middle aged and above 61 as older.

Hence, in the ethnic group Assamese, Bodo, Bengali and Tea Tribe, it was found that the younger generation was highly affected with Liver Disease and most of them were Alcohol consumers.

The p-value obtained in the ANOVA test was 0.33 which was much greater than the basic p-value for ANOVA (0.05), which means that the data deviated to a greater extent and hence it can be concluded that data has errors and is not significant.

Due to the various limitations such as low sample size, problems in hospital visits, communication gaps, it resulted in the conclusion being mere assumptions and only indicated the probability of occurrence of the disease associated with it. Despite this, with statistical analysis on the collected data, the result provides us with a rough idea about the prevalence of alcoholic liver disease in the sample studied, which will later, aid in further research or studies based on solidly built evidence.

Source -No funding source

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Conflict of Interest - The authors declare that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

Conclusion:

The study is aimed to find out a prediction tool for liver disease and relationship between alcohol consumption and its impact on developing liver cirrhosis among different ethnic groups residing in and around Assam. Hence, from the study, a conclusion can be made that high consumption of alcohol may be a major risk factor for the occurrence of liver disease that over years increases the chances of liver cirrhosis. Thus, from this

survey, a hypothesis may be developed that “Alcohol consumption may be a major factor for the occurrence of Liver Disease that further enhances the chance of Liver Cirrhosis “, as the whole survey is fully based on Random Sampling Method so it doesn’t support with a strong evidence to the hypothesis cited above, but it gives an idea to go for the clinical trials for the future prospective to support the above hypothesis with clear evidence.

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