Original Article

Seasonal and Time-Series Analysis of Alcohol Intoxication-Related Cases in Hyderabad, Pakistan

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ARTICLE INFO

ABSTRACT

Cases related to alcohol intoxication are important because they can help raise awareness about the dangers of excessive alcohol consumption and the need for responsible alcohol use. The present research studied the seasonal trend of alcohol intoxication-related cases in Hyderabad, Pakistan. **Objective:** To conduct seasonal and time series analysis of alcohol intoxication cases. **Methods:** Prospective study was conducted at Casualty Department, Liaquat University Hospital Hyderabad from January 2020 to December 2022. One hundred and eighty nine cases of alcohol intoxication-related cases were enrolled. Data was presented as frequency and averages of month-wise cases. Different plots i.e, seasonal index plot and time series plot were created to demonstrate the seasonal trend. **Results:** The largest number of cases were observed in April and December (n ≥ 25). The second most frequent cases occurred in months of June and November with 18 to 20 frequencies. The seasonal pattern was further illustrated by time-series analysis which showed that April and December had higher numbers of cases compared to other months. **Conclusions:** The study suggested a little decline in alcohol intoxication-related sufferer. These findings may highlight the importance to developed public awareness about the responsible use of alcohol.

INTRODUCTION

Medico-Legal Cases (MLCs) are those cases which affect legal matters related to medical issues or questions. These cases can be related to different aspects that may include claims for personal injury claims, for lawsuits related medical malpractice, about criminal cases, and regarding claims of workers' compensation [1]. Additionally, MLCs can have massive influence on all parties that may be affected in a case [2]. MLCs are appropriate predominant with attributing to alcohol intoxication since they are able to help ensuring appropriate medical care for the individuals who are harmed by alcohol-related incidents and ensuring legal representation for such individuals [3]. MLCs related to alcohol intoxication are also important in a view of help in raising alertness about the dangers of over consumption of alcohol and the need for responsible alcohol use. MLCs can also aid in promoting public health and safety by identifying individuals and organizations responsible for alcohol-related harms [4]. Plenteous research has underlined a strong link between season and mortality. The mortality rates can fluctuate with seasons

[5-7]. This changeability has been detected to occur in natural causes like cardiovascular deaths, which take peaks during hot weather and cold waves [8]. The seasonality has also been observed in unnatural causes for example drowning, hypothermia, and suicide. Drowning shows peaks in summer, hyperthermia exhibits increase in numbers during winters, whereas suicide shows various peaks depending on the region and the population [9-12]. Additionally, environmental and behavioural factors, such as weather and holidays, have been indicated as potential facilitators in seasonality pattern of disease [13]. The number and profiling of MLCs can demonstrate variation from region to region, probably because of the effect which is exerted by different cultures and seasonal variations [14]. Therefore, studying seasonal variations may assist in identifying the factors which may be involved in specific kinds of injuries or incidents, resulting to assessment in medicolegal departments. Considering alcohol intoxication in MLCs, the seasonal variation can be helpful in spotlighting the factors that can influence certain injuries, such as factors that might be common in some cultures and other social. This method studies the dynamic observations from time point 1 to time point t and helps determine the seasonal or periodic trend of particular events. This method also shows potential in forecasting the events in multiple fields, including medicine, such as forecasting disease prevalence [15]. Herein, the seasonal trend of alcohol-related MLCs was determined using three-year data from a leading tertiary care hospital in Hyderabad, Pakistan, by using a time series analysis method.

The objective of this study was to conduct seasonal and time series analysis of alcohol intoxication cases.

The objective of this study was to create average angular and proportional photogrammetry norms of adult Pakistani population, further aiding diagnosis, planning treatment and favorable outcomes of esthetics and stability at commencement of treatment, due to limited local literature and the variability of these parameters amongst different populations.

METHODS

The present study was conducted at the Casualty Department, Liaquat University Hospital and Hyderabad, Pakistan. The monthly data from January to December was collected for the years 2020 to 2022. Utilizing a non-probability sampling method, patients of all ages and age groups were selected. The approval of this study was obtained from Institutional Review Board (IRB) of Liaquat University Hospital, Hyderabad, Pakistan, (IRB letter number: LUMBHS/FM/77/19 dated 28 November 2019). The inclusion criteria were set to be the case of medico-legal nature, whereas non-medico-legal cases were not included in the present study. The data was collected in MS EXCEL sheets. The month-wise frequency of alcohol intoxication cases was recorded and their average and total was determined in MS EXCEL. Then, the month-wise occurrence of alcohol intoxication-related MLCs was transferred to Statgraphics Centurion XIX software. The months of the year were entered as sampling intervals. Subsequently, the built-in models for time-series analysis and seasonal decomposition models in Statgraphics Centurion XIX software were applied to obtain seasonal and time series pattern of alcohol intoxication-related cases at the casualty department of Liaquat University Hospital, Hyderabad, Pakistan[16]. Data were presented as monthly frequency distributions for the period of three years.

RESULTS

There were 92, 52, and 45 cases in 2020, 2021, 2022, respectively, with a total of 189 cases over the three-year period. The number of cases related to alcohol intoxication occurring in each month of three years is summarized in table 1.

Table 1: Month-Wise Frequency of Alcohol Intoxication for Three Consecutive Years

Month	Year			Total N (%)
	2020	2021	2022	
January	3	2	5	10 (5.29%)
February	7	3	6	16 (8.47%)
March	8	1	2	11 (5.82%)
April	19	4	3	26 (13.76%)
May	12	1	1	14 (7.41%)
June	10	2	8	20 (10.58%)
July	5	4	1	10 (5.29%)
August	7	3	1	11 (5.82%)
September	3	4	7	14 (7.41%)
October	2	10	2	14 (7.41%)
November	3	11	4	18 (9.52%)
December	13	7	5	25 (13.23%)
Total	92	52	45	189 (100%)

The data in figure 1 showed that the average number of total alcohol intoxication cases remained highest in the months of April and December (≥25). The second most frequencies of total alcohol intoxication cases were observed for the months of June and November with 18-20 occurrences. The least numbers of alcohol intoxication-related cases at study site were conducted during months of January and July, 10 total cases in each month. The month of April exhibited highest average cases (n=8.67), followed by December (n=8.33).The quarterly distribution of alcohol intoxication-related cases for the period of three years showed highest total for the second quarter i.e., April to June, with total 60 cases. The fourth quarter (October to December) also demonstrated similar frequency of alcohol

intoxication-related cases (n=57). The first and third quarters of three years data revealed approximately 40% less cases of alcohol intoxication-related cases than second and fourth quarters. A seasonal index plot for alcohol toxicity-related cases is given in Figure 1, which showed the seasonal pattern of alcohol intoxication-related medico-legal cases.
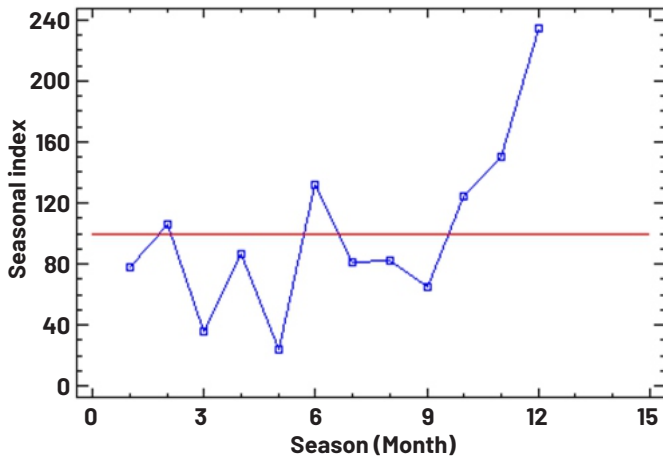

Figure 1: Seasonal Index Plot for Alcohol Toxicity Related Cases

The plot indicated that there is a clear seasonal pattern, with higher numbers of cases occurring in the months of April, June, November, and December. A smooth time series plot was constructed which provides a visual representation of the data over time. The plot suggests a slightly decreasing trend in the number of cases over the three-year period. Moreover, it indicates that in certain months of the year, a higher number of alcohol intoxication-related cases are presented in Liaquat University Hospital, Hyderabad, Pakistan. The graph indicated that the monthly frequency of alcohol intoxication-related cases is mostly centered on the average number of cases. However, the trend takes the peaks due to increased number of alcohol intoxication-related cases during the months of April and December
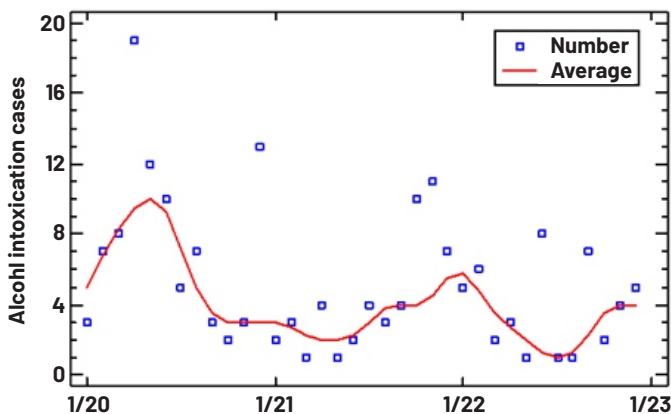

Figure 2: Smoothed Time Series Plot for Alcohol Toxicity-Related Cases

DISCUSSION

The present study found a seasonal trend in alcohol-related MLCs. Olson conducted a cross-sectional study via urine drug testing of adult patient specimens to determine the influence of season, gender, age, and geography on the detection of alcohol. This study found peaks of alcohol positivity in summer and low detection in winter [17]. However, the present study noted the highest numbers both in summer and winter; the first two highest numbers in April and December, and second two highest frequencies in July and November. The comparison between the present study and study by Olson *et al.*, study reported summer as peak season for alcoholism and the present study found both summer and winter as seasons for increased alcohol intoxication-related cases [17]. Another study determining the link between season and alcohol consumption in college student-athletes reported higher use of alcohol in out-of-sports-season athletes than their in-sports-season counterparts [18]. This can be compared to present study with reference to potential existence of seasonality and alcohol use, leading to alcohol intoxication. A time-series analysis of weekly alcohol sales in various counties of United States found that retail sales of various types of alcoholic beverages were temperature sensitive throughout the year [19]. This indicates that alcohol use increases during certain months of the year, comparing to the present study, the present study also reports a link between season and alcohol use, following the observation of higher number of alcohol intoxication-related cases in intense weathers. Seasonality in the death rates in England and Scotland was reported to be associated with alcohol intake, showing higher peaks in January every year [20]. This is similar to the present study's observation about increased alcohol toxicity cases in December (winter in Hyderabad region). The present study found an increasing trend in alcohol toxication-related MLCs both in warm and cold weather months. This is similar to a study form Unites States which found amplitude of alcohol-related hospitalizations with summer peak and winter trough [21]. The comparison between the two studies, study in United States and the present study, reveals a similarity of higher alcohol-intake related requirements of medical intervention in the months of summer or cold seasons which are usually characterized by higher heat or cold, respectively [21]. Overall, the observations in the present study are in line with the previous studies. However, the peaks observed in April in the present study differ from previously reported observations. This difference may appertain to local cultural events or social conditions exclusive to the region of the present study.

CONCLUSIONS

The seasonal trend of alcohol-related cases was studied using time series analysis. The data analysis showed that the average number of total alcohol intoxication cases was highest in April and December, with more than 25 cases in each month every year. This was followed closely by June and November, with 18-20 occurrences. Conversely, the months with the lowest number of alcohol intoxication cases were January and July, each with 10 cases. April had the highest average number of cases at 8.67, followed by December at 8.33. The study showed a potential seasonality of alcohol intoxication cases as the quarterly distribution was comparatively higher in the second quarters.

Authors Contribution

Conceptualization: AR, MAK
Methodology: AR, AS
Formal analysis: NA, MAK
Writing, review and editing: RA, MS, IB

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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