A PROSPECTIVE OBSERVATIONAL CLINICAL CASE STUDY ON SMOKING AND ALCOHOL CONSUMPTION PATTERNS AMONG YOUTH AND THEIR IMPACT ON HEMATOLOGICAL, BIOCHEMICAL, AND CARDIOVASCULAR PARAMETERS WITH QUESTIONNAIRE BASED BEHAVIORAL ASSESSMENT

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Abstract

This prospective observational case study evaluated the clinical, biochemical, and behavioural impacts of smoking and alcohol consumption among youth aged 18–35. Integrating questionnaire-based assessments with haematological evaluations, the study found significant physiological deterioration primarily among students and employed males. Key results highlighted that smokers experienced reduced haemoglobin levels and chronic inflammation, while alcohol consumers exhibited elevated liver enzymes (ALT and AST), indicating early hepatic stress. These outcomes were further aggravated by sedentary lifestyles and poor dietary habits, alongside nicotine and alcohol-induced sympathetic stimulation that raised heart rates and systolic blood pressure. Ultimately, the research confirms a synergistic health decline, stratifying combined users as the highest risk category for cardiovascular disease, liver dysfunction, and metabolic disturbances compared to single-substance users or non-users.

Keywords: Smoking pattern, Alcohol consumption, Evaluation, Co-morbidities

INTRODUCTION

The transition from adolescence to young adulthood is a critical developmental period marked by increased autonomy, social exploration, and, frequently, the adoption of lifestyle habits that can have lifelong health implications. Among these, smoking and alcohol consumption remain the most prevalent and damaging behaviours[(1)]. While often viewed through a social lens, the physiological reality of these habits is one of progressive systemic deterioration. Recent clinical observations, particularly in the 18–35 age demographic, reveal that the damage is not merely a future concern but a present reality, manifesting through haematological shifts, biochemical stress & cardiovascular instability [(2)].

This is reflected in altered White Blood Cell (WBC) counts, indicating that the immune system is in a constant state of low-grade "alarm," which can lead to premature aging of the vascular system and reduced physical stamina [(3)]. While smoking primarily attacks the respiratory and circulatory systems, alcohol consumption focuses its initial damage on the liver. The liver is the primary site of alcohol metabolism, and chronic intake leads to the overproduction of enzymes like Alanine Aminotransferase (ALT) and Aspartate Aminotransferase (AST). Elevated levels of these enzymes are clinical "red flags" for hepatic stress and early-stage liver dysfunction [(4)]. Beyond the liver, substance use wreaks havoc on the body's lipid profile. There is a documented trend among users toward increased Total Cholesterol and LDL (the "bad" cholesterol), coupled with a decrease in HDL (the "good" cholesterol) [(5)].

To effectively combat substance, use among the youth, awareness plans must shift from simple "don't do it" messaging to comprehensive, multi-layered strategies. These plans focus on education, behavioural modification, and the use of cessation subsidiaries [(6)]. A biological evaluation of smoking and alcohol consumption involves assessing the structural, chemical, and functional changes that occur within the body’s organ systems. When these substances are used together, they create a synergistic effect, meaning the combined damage is greater than the sum of their individual impacts [(7)].

The liver is the primary metabolic hub for clearing toxins, making it the most critical site for biochemical evaluation. Liver Enzymes (ALT & AST): Alcohol consumption causes hepatic cells to leak enzymes into the bloodstream. Elevated levels of Alanine Aminotransferase (ALT) and Aspartate Aminotransferase (AST) are primary biological indicators of liver stress, fatty liver disease, or early cirrhosis [(8)]. It is often termed the "silent

killer" because it may remain asymptomatic for years while causing progressive damage to vital organs such as the heart, brain, kidneys, and blood vessels. Hypertension can be classified as primary (essential), which has no identifiable cause and accounts for the majority of cases, or secondary, which arises from identifiable underlying conditions such as renal disease, endocrine disorders, or certain medications [9].

Clinical tools such as the National Institutes of Health Stroke Scale (NIHSS) are widely used to assess neurological impairment and guide treatment decisions [10].

These mechanisms lead to remodelling of the vascular walls, reduced arterial elasticity, and increased peripheral resistance, creating a self-perpetuating cycle of elevated blood pressure and vascular injury. Over time, this damages the endothelium, promotes atherosclerosis, and accelerates target organ damage, particularly affecting the brain, heart, and kidneys [11].

Hypertension focuses on both lifestyle modification and pharmacologic management to achieve and maintain optimal blood pressure levels, typically below 130/80 mmHg for most patients. Lifestyle interventions include reducing dietary salt intake, maintaining a healthy weight, engaging in regular physical activity, limiting alcohol consumption, avoiding tobacco, and adopting a diet rich in fruits, vegetables, and low-fat dairy (such as the DASH diet) [12].

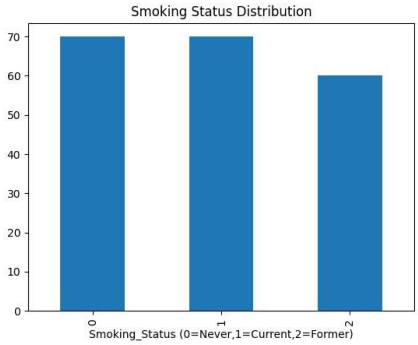
MATERIALS AND METHODOLOGY

This prospective observational study is being conducted at NG Hospital & Research Centre, a specialized care center. This site was chosen due to its patient diversity and access to various type of pulmonary and liver illness [13]. Clinical data were collected from patient [14]. Patients with confirmed stroke undergoing treatment were included. Sampling was purposive, and the sample size (n = 200) was calculated using Fisher's formula (Z = 1.44, p = 0.05, d = 0.04).

Patients with stroke who consented to participate were enrolled, while those under palliative care or with incomplete records were excluded [15]. Ethical approval was obtained from the Institutional Review Board [16]. Treatment regimens followed standard clinical guidelines [17]. Data were recorded using a structured Proforma covering demographics, diagnostic reports [18]. Data were analysed using SPSS software with descriptive and inferential statistics (Chi-square, t-test/ANOVA, regression) [19,20].

RESULT

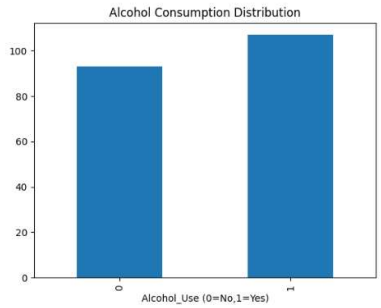
6.1. SMOKING STATUS DISTRIBUTION



The chart illustrates the distribution of smoking habits across a sample size of approximately 200 individuals. The data shows a balanced distribution between those who have never smoked and those who currently smoke, with both categories reaching a peak frequency of 70. Former smokers represent the smallest portion of the group, with a count of 60.

Overall, the distribution is relatively uniform, though it highlights that a significant majority of the participants (130 out of 200) have a history of smoking, whether past or present. This near-equal split between "Never" and "Current" smokers suggests a dataset that is well-represented for comparative studies between these two primary groups.

6.2. ALCOHOL CONSUMPTION

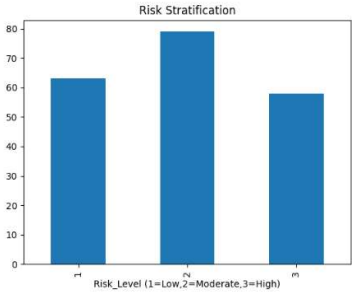


The chart illustrates the distribution of alcohol consumption within a sample size of exactly **200 individuals**. The data indicates that alcohol use is more prevalent than non-use in this specific group, with 107 individuals reporting "Yes" and 93 individuals reporting "No".

Overall, the sample shows a relatively balanced split, with a slight majority (53.5%) of the participants reporting alcohol consumption compared to the 46.5% who do not. This

suggests a nearly even division within the dataset, allowing for a balanced comparative analysis between these two distinct groups regarding their health or lifestyle habits.

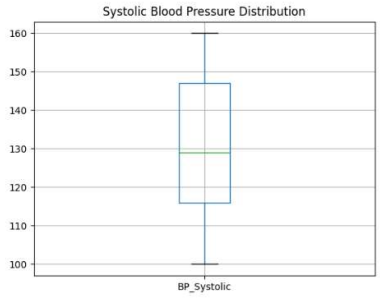
6.3. RISK STRATIFICATION



The chart presents the distribution of risk levels within a sample population of 200 individuals. The data reveals that the majority of the participants fall into the Moderate Risk category, which is the most frequent classification with 79 individuals. The Low-Risk group follows with 63 individuals, while the High-Risk category represents the smallest portion of the sample at 58 individuals.

Overall, the distribution suggests a "bell-shaped" tendency toward moderate risk, though the counts for all three categories are relatively close. This indicates a diverse dataset where over two-thirds of the population (137 individuals) are classified as having either moderate or high risk, which could be a significant factor for further health or safety-related analysis.

6.4. BLOOD PRESSURE DISTRIBUTION

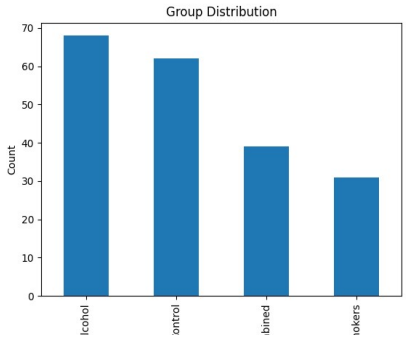


The box plot visualizes the distribution of systolic blood pressure within the dataset. The median value is approximately 129 mmHg, indicating that half of the population has a systolic reading at or below this point. The "box" represents the interquartile range (IQR),

spanning from approximately 116 mmHg to 147 mmHg, which contains the middle 50% of the recorded data.

The overall range of the data is 60 mmHg, extending from a minimum of 100 mmHg to a maximum of 160 mmHg. The plot shows a relatively balanced spread without extreme outliers, suggesting a consistent range of blood pressure readings across the surveyed group.

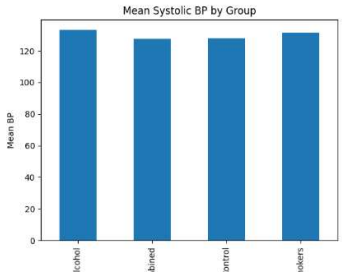
6.5. COMPARISON OF GROUP DISTRIBUTION



The chart illustrates the allocation of 200 participants across four distinct study groups. The Alcohol group is the largest, containing 68 individuals, followed closely by the Control group with 62. These two primary groups make up the bulk of the dataset. In contrast, the Combined and Smokers groups are significantly smaller, with 39 and 31 participants respectively.

The distribution shows a clear emphasis on the first two categories, which combined represent 65% of the total sample. This structure suggests a study design likely focused on comparing a control group against specific lifestyle factors, with the "Smokers" and "Combined" (likely representing both alcohol and smoking) groups serving as smaller comparative cohorts.

6.6. COMPARISION OF GROUP BY BLOOD PRESSURE



The chart compares the average systolic blood pressure across four distinct cohorts. The Alcohol group exhibits the highest mean systolic blood pressure at approximately 134 mmHg, followed by the Smokers group at 132 mmHg. Interestingly, the Control and Combined groups show nearly identical results, both averaging around 128 mmHg.

Overall, the data suggests that while there are variations between the groups, the differences in mean systolic pressure are relatively narrow, spanning a range of only 6 mmHg. The higher averages in the "Alcohol" and "Smokers" categories compared to the "Control" group may indicate a slight correlation between those specific lifestyle factors and elevated systolic readings in this dataset.

DISCUSSION

The majority of participants belonged to the 18–35 years age group, reflecting the targeted youth population. A higher proportion of male participants was observed among smokers and alcohol consumers, which is consistent with social and behavioural trends reported in previous studies. Occupational distribution indicated that students and employed individuals constituted the major user groups, suggesting lifestyle and peer influence as contributing factors. The study revealed that a considerable proportion of participants were current smokers and/or alcohol consumers, with varying frequency and duration.

- **Smoking:** Most users fell under the moderate to heavy category, indicating habitual use rather than occasional exposure.
- **Alcohol consumption:** A significant number reported weekly to frequent intake, with mixed types of alcohol being commonly consumed.

Combined users (both smoking and alcohol) represented a high-risk subgroup, which is clinically significant due to the synergistic harmful effects.

A trend toward reduced hemoglobin levels was observed among smokers, possibly due to chronic exposure to carbon monoxide affecting oxygen transport. Variations in WBC counts suggested underlying inflammatory or stress responses in users. These findings align with known physiological effects of tobacco exposure on blood parameters.

Elevated ALT and AST levels were predominantly seen in alcohol consumers and combined users, indicating hepatic stress or early liver dysfunction. This supports the established hepatotoxic effects of chronic alcohol intake. Increased total cholesterol and LDL

levels, along with reduced HDL levels, were observed among smokers and alcohol users. These changes indicate a higher risk for atherosclerosis and cardiovascular diseases. Some participants showed elevated glucose levels, suggesting a potential association between lifestyle habits and metabolic disturbances.

Blood pressure was found to be higher among smokers and combined users compared to non-users. Increased heart rate was also noted, reflecting sympathetic stimulation due to nicotine and alcohol. These findings indicate an increased risk of hypertension and cardiovascular complications in the study population.

A significant proportion of users had low to moderate physical activity levels and unhealthy dietary habits, such as frequent consumption of junk food. These factors may further aggravate the adverse effects of smoking and alcohol consumption.

Based on clinical, biochemical, and lifestyle parameters, Combined users were predominantly classified under high-risk category while Single users (smoking or alcohol) fell under moderate risk and non-users were mostly in the low-risk group. This clearly demonstrates the cumulative and synergistic impact of dual substance use.

CONCLUSION

The study concludes that substance use among the 18–35 age group—primarily students and employed males—leads to significant physiological and metabolic deterioration. Clinical findings reveal that smokers suffer from reduced haemoglobin and chronic inflammation, while alcohol consumers show clear signs of hepatic stress through elevated ALT and AST levels. These issues are further compounded by poor dietary habits and sedentary lifestyles, which, alongside nicotine and alcohol's sympathetic stimulation, result in increased blood pressure and heart rates. Ultimately, the research confirms a synergistic health decline, stratifying combined users as the highest risk category for cardiovascular disease, liver dysfunction, and metabolic disturbances compared to single-substance users or non-users.

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