Original article

Investigating the Relationship between Alcohol Use and Patterns of Blood Pressure Change Due to Examination Stress among Adekunle Ajasin University Academic Staff

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Abstract

Aim: This study examined the relationship between alcohol use and patterns of blood pressure changes due to examination stress among academic staff at the Adekunle Ajasin University (AAUA).

Methods: It involved using concurrent mixed methods with quantitative and qualitative approaches. Both the questionnaire and the blood pressure and pulse rate reading were used as instruments in data collection. The examined population includes all academic staff of AAUA. Multistage sampling techniques were used to select participants for the study. In stage one, a simple random sampling technique was used to select five faculties of the university. In stage two, systematic sampling techniques were used to select participants for the study; academic staff in every 5th academic staff office at the selected faculties were selected as a sample frame. Two instruments were used in gathering information for this study. The instruments were a self-constructed questionnaire and an electronic sphygmomanometer. Data were analyzed using mean and standard deviation at alpha level of 0.05.

Results: Findings revealed that there is a significant difference in the pattern of blood pressure before – $F(3, 46) = 4.260$, $P < 0.05$; during – $F(3, 46) = 3.570$, $P < 0.05$; and after the examination period – $F(3, 46) = 3.131$, $P < 0.05$, based on the respondents' level of alcohol intake.

Conclusions: It is recommended that academic staff should be educated on the detrimental health consequences of consuming alcohol to avoid high blood pressure before, during and after the examination period.

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Introduction

Blood pressure can be defined as the physical pressure of blood flowing through the arteries, i.e. the pressure that blood exerts on the inner walls of the blood vessels; it varies in different phases of the cardiac cycle and under different conditions of exertion. High blood pressure accounts for high mortality in the form of coronary heart disease and usually has no warning signs. Any form of stress is known to cause definable mental and physiological reactions in the body in the form of alteration of different biological functions, especially the heart rate and blood pressure (1). Hypertension is one of the most common health problems with negative consequences, which have devastating effects on human health. In 2016, in the Global Burden of Disease study by Risk Factors Collaborators, high systolic blood pressure was reported as the leading cause of global disease burden in both men and women (2). Today, stress has become prevalent in everyday human life, especially among different employees at various job levels. On the one hand, stress is a motivational force and on the other hand, it is a cause of depression. In fact, lack of stress represents the end of life, as there is no enthusiasm for accomplishment of goals. When an employee is at the workplace, there are different stressors present that can have a direct impact on the employee's performance (3). Following this view, work stress emerges when people perceive that they have difficulties in coping with the demands related to work and that their sense of well-being is threatened. Many stressors associated with academic staff have been identified. Examples include shortage of staff, work overload, too much administrative work, lack of support from superiors and peers, irregular payment of salaries, marking of scripts, lecturing, supervising duty during the examination period, carrying out various research works, etc., as some of the stressors that the academic staff deal with in the university system. Stress process is complex and dynamic, fluctuating over the time, places, and persons (4). Stress produces a series of distinct biological processes, such as hypothalamic-pituitary-adrenal (HPA) axis activation and associated autonomic nervous system responses (5). Many other researchers have found that work stress arises when an individual experiences a demand that exceeds his/her real or perceived abilities to successfully cope with the requirements of the job, resulting in a disorder to his/her emotional and physiological balance (3).

Examinations are frequently used to evaluate the academic ability of students in a university's education system. Apart from the students, the staff are responsible for smooth running of the examination process, for instance through setting of examination questions, invigilating and marking of scripts to results processing, which represents the academic staff's multiple roles and responsibilities within the universities. All these responsibilities and many more cause stress, which is a major concern in many, if not all educational institutions around the world. At the university level, administrative duties have increased alongside the escalating demands associated with teaching and research responsibilities. Administratively, the lecturers work as counselors, examination officers, staff advisers, department heads, members of various committees at the faculty and department level and they hold many other responsible positions in addition to their teaching duties. Thus, the lecturers work under increasing pressure to meet targets set by the university. Due to all this workload, some lecturers use alcohol to unwind and also see it as a means of socialization and relaxation. However, this may have a great effect on their blood pressure pattern. For example, it was revealed that examination stress is significantly associated with increased pulse rate, systolic and diastolic arterial pressure (6). This was further affirmed by the finding that high-dose alcohol has a biphasic effect on BP; it decreases BP up to 12 hours after consumption and increases BP > 13 hours after consumption. High-dose alcohol increases HR at all times up to 24 hours (7). The rate of alcohol consumption is very high among adults, and two out of every five people are heavy episodic drinkers (8). High blood pressure is particularly prevalent among

blacks and serves as a major risk factor for coronary heart disease, stroke, and heart failure (9). As a result, prevention of high blood pressure early in life is essential for reducing the burden of hypertension for blacks later in life; it likewise serves as a form of primary prevention for heart disease and stroke (8).

Alcohol consumption is positively associated with BP (10). Consequently, alcohol consumption and high blood pressure are among the top five risk factors responsible for the growing global burden of non-communicable diseases (NCD), and are key parts of the World Health Organization (WHO) goals to reduce NCD mortality by 25% by 2025. From a public health perspective, both alcohol consumption and high blood pressure are among the most important risk factors for the global burden of NCDs (11).

A reduction in alcohol consumption will aid a reduction in blood pressure, which has the potential for substantial synergistic health gains in terms of morbidity, mortality, and healthcare costs; yet only about half of the hypertension guidelines worldwide recommend a reduction in alcohol consumption to reduce high blood pressure (12). This would be an important contribution to reaching the goals of the WHO Global Action Plan for prevention of NCDs (13), which stipulates a 10% relative reduction of harmful alcohol use and a 25% reduction in raised blood pressure by 2025 to reduce NCD mortality by 25%.

Lecturers at the Adekunle Ajasin University are no exception. Due to these reasons, the aim of present study was to establish the relationship between alcohol use and patterns of blood pressure changes due to examination stress among academic staff at the Adekunle Ajasin University. The main objective of this study is to investigate the relationship between alcohol use and patterns of blood pressure changes due to examination stress among academic staff at the Adekunle Ajasin University. We hypothesized that alcohol use will have no significant effect on patterns of blood pressure changes due to examination stress among academic staff at the Adekunle Ajasin University.

Material and Methods

Descriptive research design of the survey type was used in this study. This method involves observing and describing a subject's behavior without influencing it in any way. It involves gathering data that describe events and then organizing, tabulating, depicting, and describing the data collection (14). Furthermore, it serves to organize findings in order to fit them with explanations, and then to test or validate those explanations (15).

The population for this study consisted of all academic staff of the Adekunle Ajasin University, Akungba Akoko. Multistage sampling techniques were used to select participants for the study. In stage one, a simple random sampling technique was used to select five faculties of the university. In stage two, systematic sampling techniques were used to select participants for the study; academic staff in every 5th academic staff office at the selected faculties were selected as a sample frame. A total of fifty (50) participants were enrolled as the sample size for this study.

Two instruments were used in gathering information for this study. The instruments are a self- constructed questionnaire and an electronic sphygmomanometer used to measure the participants' blood pressure. The questionnaire examined the demographic data of the respondents (age, gender and length of service) and how often the academic staff at the Adekunle Ajasin University, Akungba Akoko (AAUA), consume alcohol, which is defined in categories as follows – do not consume, occasionally, moderately and a lot. Likewise, blood pressure pattern values were measured using a sphygmomanometer and recorded in millimeters of mercury (mmHg) before, during and after the examination period. The pattern of blood pressure distribution is determined in accordance with the categories stated below: Normal – below 120 mmHg; Elevated – 120–129/80 mmHg; High Blood Pressure Stage 1 (HBP 1) – 130/80–139/89 mmHg; High Blood Pressure Stage 2 (HBP 2) – 140/90 mmHg and higher.

Items in the self-constructed questionnaire were carefully reviewed and submitted to experts in the related field for their review of the instrument; comments and corrections made by experts were carefully incorporated by the researcher. Likewise, the sphygmomanometer was calibrated to ensure its adequacy for use.

The survey was conducted within a semester that lasted for 4 months. The first application of the instrument occurred one month before the examination period, since not many academic activities were happening at the time. The examination period was a 14-day written exam period, while two weeks after the examination period, another set of data was retrieved and recorded. The survey was also based on continuous alcohol consumption, indicating that before, during or after the examination period, alcohol drinking or lack thereof is a peculiar lifestyle. The instruments were applied by the researcher and two trained research assistants with a 100% guarantee of keeping information confidential. The instrument was applied at each selected faculty at intervals before, during and after the examination period. All questionnaire forms, which also contain information about blood pressure patterns of individual participants, were distributed, retrieved and screened after the last administration. After allowing the respondent to rest for about five minutes, blood pressure was rechecked; the average scores were recorded thereafter. This was repeated when the respondent completed the filling of the questionnaires.

Ethical Consideration

Informed consent of each subject, ethical and official approval from the local research ethics committee of the Department of Human Kinetics and Health Education, Faculty of Education, Adekunle Ajasin University Akungba Akoko was obtained for the study and the investigation was performed in accordance with the principles outlined in the study.

Statistical Analysis

To determine the reliability of the instrument, a test-retest technique for a two-week interval was employed. This was applied on 5 randomly selected respondents from the target population. These respondents were excluded from the main study. A reliability of 0.89 was obtained using the Pearson product-moment correlation coefficient, which was considered adequate for the study. Alpha was set at 0.05. The IBM SPSS version 25 was used for statistical analysis in this study. Frequency counts and percentages were used to describe the participants' information, level of alcohol intake and blood pressure changes due to examination stress. On the other hand, ANOVA was used to test the hypothesis at 0.05 alpha level. Systolic blood pressure (mmHg) and diastolic blood pressure (mmHg) records among AAUA academic staff based on level of alcohol intake were measured using the t-test. The Kolmogorov-Smirnov test was used to test for normality of distribution.

Results

Table 1 shows that 34 (68%) respondents do not consume alcohol, 12 (24%) consume alcohol at times, 2 (4%) consume alcohol moderately, while 2 (4%) drink a lot.

Table 1: Frequency distribution of respondents by level of alcohol intake

	Frequency	Percent
Do not consume	34	68.0
Occasionally	12	24.0
Moderately	2	4.0
A lot	2	4.0
Total	50	100.0

Results in Table 2 reveal that the blood pressure measurement of 24 (48%) respondents before examination was normal, for 22 (44%) it was elevated, 4 (8%) recorded high blood pressure stage 1, while none was at high blood pressure stage 2. Furthermore, the blood pressure measurement of 15 (30%) respondents during examination was normal, for 15 (30%) it was elevated, 17 (34%) recorded high blood pressure stage 1, while none was at high blood pressure

stage 2. Likewise, the blood pressure measurement of 22 (44%) respondents after examination was normal, for 22 (44%) it was elevated, 6 (12%) were at high blood pressure stage 1, while none was at high blood pressure stage 2.

Table 2: Frequency distribution of respondents by blood pressure measurement

Pattern of blood pressure	Before examination		During examination		After examination	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
normal (below 120 mmHg)	24	48.0	15	30.0	22	44.0
elevated (120–129/80 mmHg)	22	44.0	15	30.0	22	44.0
HBP 1 (130/80–139/89 mmHg)	4	8.0	17	34.0	6	12.0
HBP 2 (140/90 mmHg and higher)	0	0	0	0	0	0
Total	50	100.0	50	100.0	50	100.0

Table 3: Systolic blood pressure (mmHg) and diastolic blood pressure (mmHg) records of AAUA academic staff

Parameters		Do not consume alcohol (n = 34) Mean ± SD	Occasionally (n = 12) Mean ± SD	Moderately/a lot (n = 4) Mean ± SD	Total (n = 50) Mean ± SD
SBP	Before examination	112.26 ± 21.84	122.75 ± 5.64	125 ± 2.83	115.80 ± 18.88
	During examination	119.85 ± 9.76	126.25 ± 8.09	200 ± 4.25	122.40 ± 9.86
	After examination	117.18 ± 8.83	122 ± 6.22	129 ± 4.24	119.28 ± 8.67
DBP	Before examination	70 ± 14.61	72.75 ± 5.91	78 ± 11.31	71.30 ± 12.93
	During examination	74.03 ± 8.88	75.42 ± 6.56	115.5 ± 12.34	74.54 ± 8.40
	After examination	72.62 ± 8.82	73.50 ± 8.15	77.25 ± 5.31	73.20 ± 8.44

Systolic blood pressure of all individuals when there were no examinations was 115.80 ± 18.884 mmHg; during examinations, it rose to 122.40 ± 9.86 mmHg; while after the examinations, it decreased to 119.28 ± 8.67 mmHg. Diastolic blood pressure recorded when there were no examinations was 71.30 ± 12.93 mmHg; during examinations, it was 74.54 ± 8.40 mmHg; while after the examinations, it decreased to 73.20 ± 8.44 mmHg.

Table 4: ANOVA showing the differences between patterns of blood pressure changes due to examination stress based on alcohol intake

	Alcohol intake	N	Mean	Std. deviation		Sum of squares	df	Mean square	F	Sig.
Average BP measurement before examination	Do not consume alcohol	34	1.41	.609	Between groups	4.348	3	1.449	4.260	.010*
	Occasionally	12	1.92	.515	Within groups	15.652	46	.340		
	Moderately	2	2.50	.707	Total	20.000	49			
	A lot	2	2.00	.000						
	Total	50	1.60	.639						
Average BP measurement during examination	Do not consume alcohol	34	1.91	.900	Between groups	8.068	3	2.689	3.570	.021*
	Occasionally	12	2.58	.793						
	Moderately	2	3.50	.707	Within groups	34.652	46	.753		
	A lot	2	2.50	.707	Total	42.720	49			
	Total	50	2.16	.934						
Average BP measurement after examination	Do not consume alcohol	34	1.50	.663						
	Occasionally	12	2.00	.603						
	Moderately	2	2.50	.707	Between groups	3.880	3	1.293	3.131	.035*
	A lot	2	2.00	.000	Within groups	19.000	46	.413		
	Total	50	1.68	.683	Total	22.880	49			

P < .05 * – significant, ** – not significant

Table 4 shows that there is a significant difference in the patterns of blood pressure before (F (3, 46) = 4.260, P < 0.05), during (F (3, 46) = 3.570, P < 0.05) and after the examination period (F (3, 46) = 3.131, P < 0.05), based on the respondents' level of alcohol intake.

Discussion

At many Nigerian universities, administrative duties have increased alongside the escalating demands associated with teaching and research responsibilities. Lecturers work as counselors,

examination officers, staff advisers, department heads, members of various committees at the faculty and department level and they hold many other responsible positions in addition to their teaching duties. Thus, lecturers work under increasing pressure to meet targets set by the university. Due to all this workload, some lecturers use alcohol to unwind and also see it as a means of socialization and relaxation. However, this may have a great effect on their blood pressure pattern.

This study revealed that the systolic blood pressure (SBP) of individuals who drink moderately/a lot (125 ± 2.83 mmHg) is higher than of those who drink occasionally (122.75 ± 5.64 mmHg) and those who do not drink alcohol at all (112.26 ± 21.84 mmHg) before examinations commence; SBP of individuals who drink moderately/a lot (200 ± 4.25 mmHg) is higher than of those who drink occasionally (126.25 ± 8.09 mmHg) and those who do not drink alcohol at all (119.85 ± 9.76 mmHg) during examinations; while SBP of individuals who drink moderately/a lot (129 ± 4.24 mmHg) is higher than of those who drink occasionally (122 ± 6.22 mmHg) and those who do not drink alcohol at all (117.18 ± 8.83 mmHg) after the examinations. The findings of this study indicate that systolic blood pressure of all individuals was low when there were no examinations; it increased during examinations and decreased after the examinations. Systolic blood pressure was significantly higher in the period during examinations than when there were no examinations (before and after). The study was in line with the findings of (6) that revealed in their study that examination stress is significantly associated with increased pulse rate, systolic and diastolic arterial pressure.

Diastolic blood pressure (DBP) of individuals who drink moderately/a lot (78 ± 11.31 mmHg) is higher than of those who drink occasionally (72.75 ± 5.91 mmHg) and those who do not drink alcohol at all (70 ± 14.61 mmHg) before examinations commence; DBP of individuals who drink moderately/a lot (115.5 ± 12.34 mmHg) is higher than of those who drink occasionally (75.42 ± 6.56 mmHg) and those who do not drink alcohol at all (74.03 ± 8.88 mmHg) during examinations; DBP of individuals who drink moderately/a lot (77.25 ± 5.31 mmHg) is higher than of those who drink occasionally (73.50 ± 8.15 mmHg) and those who do not drink alcohol at all (72.62 ± 8.82 mmHg) after the examinations. In other words, diastolic blood pressure record when there were no examinations was normal, it increased drastically during examinations and became normal again after the examinations. Diastolic blood pressure, which is defined as the minimum pressure during ventricular diastole, with a normal range of 60–90 mmHg and an average of 90 mmHg in adults, was within the normal value during the examination period and the period when there were no examinations (before and after). This could be explained by stimulation of the adrenergic nervous system, which leads to release of catecholamines, in particular noradrenaline at the postsynaptic neuron and adrenaline or epinephrine from the adrenal medulla, which results in activation of α 1, β 1 and β 2 receptors, consequently elevating systolic blood pressure (16). Likewise, the number of hours stayed for examination and invigilation, where many staff members may supervise two to three examinations in a day, long distance covered before reaching the examination center, sitting arrangements of students, counting and marking of exams could be underlying factors as to why systolic blood pressure is elevated. On the other hand, the decrease of systolic blood pressure after examinations have passed can be explained by stating that the decrease results from decrease in peripheral arteriolar resistance and/or cardiac output by a variety of mechanisms at different sites, such as dilatation of resistance vessels, heart pumping against lower resistance, dilatation of capacitance vessels, reduction of venous return to reduce cardiac output, reduction of sympathetic drive to the heart which leads to lower cardiac output, especially in response to examination stress (16).

The findings from the analysis of hypothesis one showed that there is a significant relationship between alcohol and patterns of blood pressure changes due to examination stress among academic staff at the Adekunle Ajasin University. The results also showed that academic staff who consume alcohol moderately had the highest

blood pressure before examinations (mean = 2.50), followed by those who consume it a lot (mean = 2.00) and those who drink alcohol often (mean = 1.92), while people who do not consume alcohol at all (mean = 1.41) had the lowest blood pressure before examinations. During examinations, staff who consume alcohol moderately had the highest blood pressure (mean = 3.50), followed by those who consume it a lot (mean = 2.50) and those who drink alcohol often (mean = 2.58), while people who do not consume alcohol at all (mean = 1.91) had the lowest blood pressure during the examination period. After the examinations, staff who consume alcohol moderately had the highest blood pressure (mean = 2.50), followed by those who consume it a lot (mean = 2.00) and those who drink alcohol often (mean = 2.00), while people who do not consume alcohol at all (mean = 1.50) had the lowest blood pressure after the examinations. Thus, academic staff of the Adekunle Ajasin University, Akungba Akoko, who consume alcohol a lot and moderately are at greater risk of having high blood pressure than academic staff who consume a little or who do not consume alcohol at all, regardless of whether this occurs before, during or after the examination period, which is in agreement with (7).

Conclusion

There is a significant relationship between alcohol and patterns of blood pressure changes due to examination stress among academic staff at the Adekunle Ajasin University; those who consume alcohol a lot and moderately are at higher risk of having elevated blood pressure than academic staff who consume a little or do not consume alcohol at all, regardless of whether this occurs before, during or after the period of examination. Based on the findings of this study, the following recommendations are made: a) Health educators should design effective awareness programs on blood pressure management to educate staff on blood pressure and work stress; b) Stress management techniques and a healthy lifestyle through education about health should be made available to the academic staff; and c) Academic staff should be educated on detrimental health consequences of consuming alcohol to avoid high blood pressure before, during and after the examination period.

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[1] **Author contribution.** Single author contribution