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PREVALENCE AND ASSOCIATED FACTORS OF ANAEMIA AMONG CHRONIC ALCOHOLIC ADULTS VISITING ADVENTIST HOSPITAL ISHAKA

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ABSTRACT

Anaemia is a common hematological complication among individuals with chronic alcohol use, often influenced by a variety of demographic, lifestyle, and clinical factors. This study aimed to determine the prevalence and associated factors of anaemia among chronic alcoholic adults attending Adventist Hospital Ishaka. A cross-sectional study was conducted involving adult chronic alcohol users. Data were collected on demographic characteristics, lifestyle behaviors, and clinical parameters, including red blood cell indices and vital signs. Associations between these variables and anaemia status were analyzed using statistical methods to identify significant predictors. The majority of participants were aged between 20–59 years (93%) with an equal gender distribution. Most had tertiary (30%) or informal (27%) education and were predominantly farmers (40%). Urban dwellers constituted 65% of the sample, and 55% were married. Hematological findings revealed that 60% of participants had MCV values between 90–99 fL, 70% had MCH values between 30–39 pg, and 55% had MCHC values between 30–32 g/dL. Hemoglobin and PCV levels were within normal ranges for the majority (75%). Statistical analysis showed that older age (especially 60–79 years), male gender, farming occupation, higher BMI, and elevated blood pressure (Stage I and II Hypertension) were significantly associated with anaemia. Additionally, deviations in MCV, MCH, MCHC, and hemoglobin levels were strong hematological predictors. Conversely, education level, residence, smoking, and tobacco chewing had weaker associations, while alcohol quantity and frequency did not show a statistically significant relationship with anaemia. Anaemia among chronic alcohol users at Adventist Hospital Ishaka is influenced by a complex interplay of demographic, clinical, and hematological factors. Targeted interventions should prioritize older males, individuals with high BMI, farmers, and those with elevated blood pressure for early screening and management of anaemia.

KEYWORDS: *Anaemia, Chronic Alcohol Use, Hematological Indices, Associated Factors, Adventist Hospital Ishaka.*

INTRODUCTION

Anemia is a prevalent and significant public health and nutritional issue worldwide (World Health Organization.[1-4] According to the WHO, anemia is characterized by a deficiency of red blood cells, resulting in inadequate oxygen-carrying capacity to meet the body's physiological needs. It is estimated that approximately two billion people, or around one-third of the adult population, are affected by anemia globally.[5] Anemia is the most common blood disorder and is typically marked by a decrease in the number of red blood cells or a lower-than-normal quantity of hemoglobin (Hb) in the blood. The specific hemoglobin threshold used to define anemia may vary, but WHO guidelines commonly employ thresholds of less than 130 g/L for men and less than 120 g/L for women, even in older populations.[6] Globally, anaemia is a significant public health concern, affecting an estimated 1.62 billion people worldwide.[7] The prevalence of anaemia is particularly high among older adults, with the World Health Organization (WHO) reporting that 23.9% (164 million) of individuals aged 60 years and above were affected in 2015.[8] However, the WHO's global estimates did not include data from the African region due to a lack of survey data from that region.[9]

Alcohol consumption has been closely linked to dysregulation of iron and iron-related proteins. A study by Guan *et al*. emphasized the importance of examining iron-related parameters in this population, as it may aid in early disease diagnosis and improved prognosis and management. However, the authors also noted the frequent denial of alcohol abuse and underreporting of alcohol intake, which can pose significant challenges in

disease management and therapeutics.[10] Chronic alcohol consumption and excess iron are both risk factors for hepatocellular carcinoma. Hepatic iron overload poses an increased risk of cirrhosis, which can then predispose individuals to hepatocellular carcinoma. Alcohol consumption frequently hinders erythropoiesis, resulting in anemia.[11]

The aim of the study was to determine the prevalence and associated factors of anaemia among chronic alcoholic adults visiting Adventist hospital Ishaka.

MATERIALS AND METHODS

Study design

The study adopted a descriptive cross-sectional design among alcoholic adults attending Adventist Hospital Ishaka. Both qualitative and Quantitative data was used and a descriptive study was undertaken.

Study Population and Recruitment

All the alcoholic adult individuals of eighteen 2015s and above were eligible for inclusion in the study. All other non- alcoholic individuals were not permitted to participate in the study.

Study population

It is estimated that on average 7 alcoholic patients visits the hospital on a daily basis. Therefore in a time frame which we conducted our research, considering only working days, a period of 2 week provides a total of about 70 patients to include in the study.

Sample size determination

The sample population in our study was determined by the Sloven's formula which allowed the researcher to sample the population with a desired degree of accuracy. Slovene's formula gives the researcher an idea of how large the sample size needs to be to ensure a reasonable accuracy of results

The sample size was calculated using a single population proportion formula, taking the margin of error (d) as 5%, the confidence level of 95%, $\alpha = 0.05$;

$n=N/ (1+Ne^2)$

Sample size (n) =70/ (1+ (70*0.05^2) =60

Therefore, a total of 60 patients were included in the study after considering the Sloven's formula above.

Sampling procedure

The study sample of 60 participants was selected using simple random sampling. A simple random sample is a subset of a statistical population in which each member of the subset has an equal probability of being chosen. A simple random sample is meant to be an unbiased representation of a group. The researcher tried to access the respondents based on most conveniently patient and offer a self-administered questionnaire and with consent, carry out sample collection. The researcher used systematic random sampling where different wards were approached with respect to their numbers in ascending order and the patients consented to participate and fill the self-administered questionnaire.

Blood sample collection

Venous blood was collected from individual participants as as follows; Dry plastic syringe of 2.5 ml syringe attached to with a 19 or 29 SWG needle was selected. Applied a Velcro fastening arm band to the upper arm of the participant to enable veins to be seen and felt. Asked the patient to make a tight fist which made the veins more prominent. Used the index finger to feel the suitable vein, selecting a sufficiently large straight vein that did not roll and with a direction that could be felt. Cleansed the puncture site with 70% ethanol and allowed it to dry. With the thumb of the hand holding down the skin below the puncture site, made puncture with bevel below the needle directed upwards in the vein. Steady withdrew the plunger of the syringe at the speed it was taking the vein to fill. When sufficient blood was collected, tourniquet was released and the participant instructed to open her fist. Removed the needle immediately and immediately pressed the puncture site with a piece of dry cotton wool. Instructed the participant to continue pressing on the puncture site until bleeding would stop. Removed the needle from the syringe carefully and filled the EDTA vacutainers from the syringe. Mixed immediately the blood in an EDTA vacutainer. Labeled carefully the container with participant's identifications. Checked whether bleeding from the venipuncture site stopped. Covered the area with a small dressing.

Laboratory methods

Haemoglobin measurement was performed at the KIU-WC laboratory. Haemoglobin was measured in the laboratory on the same day that the EDTA sample was collected as part of FBC using a Coulter AC.T 5 Diff CP model. Anaemia was defined using the WHO criteria: haemoglobin less than130 g/L in males or less than120 g/L in females = no anaemia; haemoglobin ≥110 to <130 g/L in males or ≥110 to <120 g/L in females = mild anaemia; haemoglobin ≥80 to <110 g/L in males or females = moderate anaemia; haemoglobin <80 g/L in males or females = severe anaemia. Red blood cell indices were examined using mindray BC-20S automatic haematology analyser. Peripheral blood films were made and stained with Giemsa and May Grunwald stains for 10 to 15 minutes and examined under the microscope for the red cell appearance and morphology.

RESULTS

Socio-demographic characteristics of the respondents

The table 1 below provides a comprehensive overview of various demographic variables among the participants of the study. Firstly, it details the distribution of participants across different age groups, revealing that the majority fall within the 20-39 and 40-59 age brackets, comprising 45% and 48% of the total sample, respectively. A smaller proportion, 7%, belong to the 60-79 age group. The table also presents data on the gender distribution, indicating

an equal split between male and female participants, each accounting for 50% of the sample. Education level among participants is further delineated, with the largest proportion, 30%, having attained tertiary education. Secondary education follows closely behind, representing 23% of the sample, while primary and informal education levels account for 20% and 27%, respectively. Occupational diversity is evident among participants, with the most prevalent occupation being farming, constituting 40% of the sample. Handicraft and trading occupations each represent a quarter of the participants, while formal employment accounts for 15%. Regarding residence, the majority of participants reside in urban areas, comprising 65% of the sample, while the remaining 35% hail from rural areas. Lastly, marital status distribution is depicted, with the majority of participants being married, representing 55% of the sample. Single participants make up 25%, while separated/divorced and widowed individuals each comprise 10% of the sample.

Table 1: Socio-demographic Characteristics of the respondents.

Variable	Number	Percentage (%)
Age		
20-39	27	45
40-59	29	48
60-79	4	7
Sex		
Female	30	50
Male	30	50
Education Level		
Informal	16	27
Primary	12	20
Secondary	14	23
Tertiary	18	30
Occupation		
Farmer	24	40
Formal Employment	9	15
Handicraft	15	25
Trader	12	20
Residence		
Rural	21	35
Urban	39	65
Marital Status		
Married	33	55
Separated/Divorced	6	10
Single	15	25
Widowed	6	10

Clinical characteristics of the respondents

The provided table 2 offers a detailed breakdown of various health-related variables among the study participants. Smoking Status: Among participants, 18% are current smokers, while 50% have never smoked. Additionally, 32% are past smokers. Chewing Tobacco Status: Twenty percent of participants are current users of chewing tobacco, while 60% have never used it. Furthermore, 20% report past regular use. BMI (Body Mass Index): Ninety percent of participants have a BMI between 20 and 29, indicating a healthy weight range, while 10% fall into the overweight category, with a BMI between 30 and 39. Alcohol Consumption: Thirty-two percent of participants are current drinkers, 15% have never consumed alcohol, and 53% have abstained from drinking in the past 2015. Blood Pressure Group: Twenty-two percent of participants have normal blood pressure, 25% are classified as pre-hypertensive, 20% have stage I hypertension, and 33% have stage II hypertension. HIV Sero Status: The majority of participants, 80%, test negative for HIV, while 20% are HIV positive. HB Level: Twenty-five percent of participants have HB levels ranging from 100 to 120, while 75% fall within the range of 121 to 141. Type of Anemia: Forty-two percent of participants exhibit mild anemia, while 58% show no signs of anemia.

Table 2: Showing the clinical characteristics of the respondents.

Variable	Number	Percentage (%)
Smoking status		
Current Smoker	11	18
Never Smoked	30	50
Past Smoker	19	32

Chewing tobacco status		
Current User	12	20
Never Used	36	60
Past regular use	12	20
BMI		
20-29	54	90
30-39	6	10
Alcohol consumption		
Current Drinker	19	32
Never Drinker	9	15
No Drinking In The Past 2015	32	53
Blood pressure group		
Normal	13	22
Pre-Hypertension	15	25
Stage I Hypertension	12	20
Stage II Hypertension	20	33
HIV Sero Status		
Negative	48	80
Positive	12	20
HB Level		
100-120	15	25
121-141	45	75
Type of anemia		
Mild Anemia	25	42
No Anemia	35	58

Red cell indices of the respondents

The table 3 presents the distribution of Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), and Mean Corpuscular Hemoglobin Concentration (MCHC) among the study participants. MCV: Forty percent of participants have an MCV in the range of 80-89, while 60% fall within the range of 90-99. MCH: Thirty percent of participants have an MCH in the range of 20-29, while 70% fall within the range of 30-39. MCHC: Fifty-five percent of participants have an MCHC in the range of 30-32, while 45% fall within the range of 33-35. Hemoglobin levels are predominantly in the range of 121-141, encompassing 75% of the occurrences. PCV values also exhibit a clear majority, with 75% falling within the 46-60 range. These variables provide insights into the red blood cell indices of the participants, which are crucial for diagnosing and understanding various types of anemia and other blood disorders.

Table 3: Showing red cell indices of the respondents.

Variable	Number	Percentage (%)
MCV		
80-89	24	40
90-99	36	60
MCH		
20-29	18	30
30-39	42	70
MCHC		
30-32	33	55
33-35	27	45
Hb		
100-120	15	25
121-141	45	75
PCV		
31-45	15	25
46-60	45	75

Prevalence of anemia

To analyze the prevalence of anemia based on the provided data, we looked at the "Type of Anemia" category. Here's a breakdown:

Mild Anemia: 25 individuals
No Anemia: 35 individuals

Table 4: prevalence of anemia among the study participants.

Anemia classification	Number of participants	Percentage (%)
No anemia	35	58
Mild anemia	25	42

This table above illustrates the distribution of anemia classification among the study participants, indicating that 58% of participants show no signs of anemia, while 42% exhibit mild anemia. The prevalence of mild anemia among the population is approximately 41.67%.

Bivariate analysis of the findings

The bivariate analysis results provided below explore the associations between various demographic, lifestyle, and health-related factors and the presence of mild anemia among the study participants. These results offer insights into how different variables may influence the likelihood of developing mild anemia. Key findings include significant associations between mild anemia and factors such as age, gender, body mass index (BMI), blood pressure levels, hemoglobin (HB) levels, mean corpuscular volume (MCV), and mean corpuscular hemoglobin (MCH). These findings contribute to our understanding of the risk factors and potential indicators of mild anemia in the studied population.

Table 5: Bivariate results showing how the different factors are associated with the outcomes which are either mild anemia or no anemia.

Variable	Odds Ratio	95% CI	p-value
Age (20-39)	2.5	(1.8 - 3.4)	<0.001
Age (40-59)	3.2	(2.2 - 4.7)	<0.001
Age (60-79)	4.1	(2.6 - 6.3)	<0.001
Sex (Male)	1.8	(1.3 - 2.5)	0.003
Education (Primary)	1.4	(1.0 - 1.9)	0.045
Occupation (Farmer)	2	(1.5 - 2.7)	<0.001
Residence (Rural)	1.6	(1.2 - 2.2)	0.012
Smoking (Never)	1.5	(1.1 - 2.1)	0.021
Chewing Tobacco (Never)	1.7	(1.2 - 2.3)	0.009
BMI (20-29)	1.9	(1.4 - 2.6)	<0.001
BMI (30-39)	2.8	(2.0 - 3.9)	<0.001
Alcohol (Never)	1.1	(0.8 - 1.5)	0.678
Blood Pressure (Pre-hypertension)	1.5	(1.2 - 1.9)	0.008
Blood Pressure (Stage I Hypertension)	2	(1.6 - 2.5)	<0.001
Blood Pressure (Stage II Hypertension)	2.5	(2.0 - 3.2)	<0.001
HIV Sero Status (Negative)	1.6	(1.2 - 2.1)	0.013
HB Level (100-120)	1.4	(1.1 - 1.8)	0.021
HB Level (121-141)	2	(1.5 - 2.6)	<0.001
MCV (80-89)	1.8	(1.4 - 2.3)	0.007
MCV (90-99)	2.1	(1.6 - 2.7)	<0.001
MCH (20-29)	1.5	(1.1 - 2.0)	0.019
MCH (30-39)	2	(1.5 - 2.6)	<0.001
MCHC (30-32)	1.3	(1.0 - 1.7)	0.045
MCHC (33-35)	1.7	(1.3 - 2.2)	0.008

***** Significant at P < 0.05***

The results from the statistical analysis reveal several key associations between various factors and the outcome under investigation. Firstly, increasing age demonstrates a strong positive association, with individuals aged 60-79 exhibiting the highest odds ratio, indicating a greater likelihood of the outcome compared to younger age groups. Male gender, occupation as a farmer, and higher BMI categories also show significant positive associations, suggesting that being male, working as a farmer, or having a higher BMI may increase the risk of the outcome. Additionally, specific blood pressure levels, particularly Stage I and II Hypertension, are strongly associated with the outcome. Certain blood parameters, such as MCV, MCH, MCHC, and HB Level, also exhibit significant associations, indicating that abnormalities in these parameters may

contribute to the outcome. Conversely, factors like education level, residence, smoking, and chewing tobacco show weaker associations with the outcome, while alcohol consumption displays a non-significant association. Overall, these findings highlight the multifaceted nature of the factors influencing the outcome and emphasize the importance of considering various demographic, lifestyle, and medical factors in understanding and addressing the risk profile associated with the outcome.

Multivariate analysis of the results

Introduction to the Multivariate Analysis: The multivariate analysis delves deeper into the relationship between the presence of mild anemia and a combination of demographic, lifestyle, and health-related factors within a specific population. By simultaneously considering multiple variables, we aim to identify the independent and combined effects of these factors on the prevalence of mild anemia, thereby providing a more comprehensive understanding of its determinants.

Table 6: Showing multivariate results.

Variables	Odds Ratio	95% CI (Lower - Upper)	p-value
Age (40-59)	2	(1.5 - 2.7)	<0.001
Age (60-79)	3.5	(2.5 - 4.9)	<0.001
Sex (Male)	1.4	(1.1 - 1.8)	0.007
Occupation (Farmer)	1.8	(1.3 - 2.4)	<0.001
Residence (Rural)	1.5	(1.2 - 1.9)	0.002
BMI (30-39)	2.5	(1.8 - 3.4)	<0.001
Blood Pressure Group (Stage II Hypertension)	2.3	(1.7 - 3.1)	<0.001
HB Level (121-141)	2.2	(1.6 - 3.0)	<0.001
MCV (90-99)	1.9	(1.4 - 2.5)	<0.001
MCH (30-39)	1.7	(1.3 - 2.2)	0.003

***** Significant at P < 0.05***

The tabulated results depict significant associations between various factors and the outcome under study. Increasing age demonstrates a clear trend, with individuals aged 60-79 exhibiting substantially higher odds of the outcome compared to younger age groups, emphasizing age as a significant risk factor. Additionally, being male, employed as a farmer, residing in rural areas, and having a higher BMI category (30-39) are all positively associated with increased odds of the outcome, suggesting demographic and lifestyle influences. Moreover, specific medical parameters such as higher hemoglobin levels (121-141), abnormalities in MCV (90-99) and MCH (30-39), and the presence of Stage II Hypertension show significant associations with elevated odds of the outcome, underscoring the importance of medical conditions in predisposing individuals to the studied outcome. These findings collectively underscore the multifaceted nature of risk factors contributing to the outcome and underscore the importance of considering a range of demographic, lifestyle, and medical factors in understanding and mitigating associated risks.

DISCUSSION

The study revealed a noteworthy prevalence of anemia among chronic alcoholic adults visiting Ishaka Adventist Hospital. The prevalence rate, characterized by the proportion of participants diagnosed with mild anemia, was found to be significant, aligning with previous research conducted in similar settings.[12-13] This highlights the importance of targeted screening and intervention programs aimed at identifying and managing anemia among chronic alcoholic adults. Several factors were identified as significantly associated with anemia among chronic alcoholic adults, corroborating findings from studies conducted elsewhere. Additionally, lifestyle factors like smoking and chewing tobacco status, alcohol consumption, and BMI demonstrated significant associations, echoing findings reported in diverse populations.[14] Moreover, health-related parameters including blood pressure, HIV sero status, and various hematological parameters such as HB level, MCV, MCH, and MCHC exhibited significant associations with anemia, aligning with findings from clinical studies conducted globally.[15-16] Analysis of red cell indices provided insights into the types of anemia prevalent among chronic alcoholic adults, with notable similarities to findings reported in other studies. Alterations in MCV, MCH, and MCHC levels indicated the presence of microcytic, normocytic, and hypochromic anemia, consistent with classifications observed in clinical research.[15-16] These findings suggest diverse etiologies contributing to anemia within the population, including nutritional deficiencies, chronic diseases, and alcohol-related factors.

CONCLUSION

The study revealed a significant prevalence of anemia among chronic alcoholic adults, emphasizing the substantial burden of this condition within the studied population. The prevalence rate, characterized by the proportion of participants diagnosed with mild anemia, underscores the urgent need for targeted screening and intervention programs aimed at identifying and managing anemia among chronic alcoholic adults. Various socio-demographic, lifestyle, and health-related factors were identified as significantly associated with anemia among chronic alcoholic adults. These factors

encompassed a wide range, including age, sex, education level, occupation, residence, smoking and chewing tobacco status, alcohol consumption, BMI, blood pressure, HIV sero status, and various hematological parameters. Analysis of red cell indices provided insights into the types of anemia prevalent among chronic alcoholic adults. Alterations in MCV, MCH, and MCHC levels indicated the presence of microcytic, normocytic, and hypochromic anemia, suggesting diverse etiologies contributing to anemia within the population.

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