Section: Otorhinolaryngology

Original Research Article

EVALUATION OF DIAGNOSTIC ROLE OF SERUM LIPID PROFILE IN HEAD AND NECK MALIGNANCY

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ABSTRACT

Background: The early detection of premalignant conditions prevents their progression to an invasive carcinoma which leads to increased quality of life among the patients. lipid profile has been one of the predominant biomarkers for predicting prognosis or monitoring the disease progression from premalignant to malignant. **Aims:** The study aims to elucidate the correlation between serum lipid profiles and the presence of head and neck cancers, potentially contributing to early diagnosis and improved patient outcomes.
Materials and Methods: Total of 60 patients, premalignant-20, malignant-20, control group-20 Histopathological, head and neck malignancy were divided as premalignant, malignant and control group. With proper written informed consent, Fasting blood samples were collected and the lipid profile studied for these parameters: TC, HDL, LDL, VLDL, TGL.
Results: These distributions suggest that head and neck malignancies are more prevalent in the middle-aged population, particularly those between 50 and 60 years of age. Total Cholesterol (TC) and High-Density Lipoprotein (HDL) levels were significantly lower in the premalignant and malignant groups compared to the normal group, suggesting their potential as early diagnostic markers. Low- Density Lipoprotein (LDL) levels were notably lower in the malignant group, indicating its specific association with malignancy. Triglycerides (TG) and Very Low-Density Lipoprotein (VLDL) also exhibited significant differences, highlighting their relevance in disease detection.
Conclusion: The present study's results demonstrated an inverse association between head and neck cancer and serum lipid profile levels, supporting the idea that lipid profile levels can be used as a diagnostic criterion for cancer early detection.
Keywords: Total Cholesterol (TC) and High-Density Lipoprotein (HDL), premalignant conditions.

INTRODUCTION

Lipids are a necessary component of human body cells as they play an integral part in forming the cell membranes of almost all cell types as seen in the lipid bilayer model. They are also important for numerous biological and biochemical functions, including the cell growth of normal and malignant cells. Lipids have a significant role in cell integrity; hence lipid alteration can be associated with malignancy. Multiple carcinogens are thought to produce free radicals and reactive oxygen species, which cause polyunsaturated fatty acids to oxidase and peroxidase. It releases peroxide radicals which affect essential constituents of the cell membrane. Because of lipid peroxidation there is greater utilisation of lipids.[1,2]

Head and neck cancers (HNC) are malignancies which include areas of the body such as the oral cavity, nasopharynx, oropharynx, hypopharynx, and larynx. Head and neck cancer (HNC), includes for 30% of the all-cancer cases. Approximately 90% of HNCs are squamous cell carcinoma, which arises from the epithelial lining of the oral cavity, pharynx and larynx. Head and neck cancers are of the leading causes of morbidity and mortality. Tobacco

consumption is one of the known etiological factors for the development of head and neck malignancy.[3] When it comes to cancer control, India's head and neck cancer burden should be the main focus, with a special emphasis on early diagnosis and disease prevention. The early detection of premalignant conditions prevents their progression to an invasive carcinoma which leads to increased quality of life among the patients. Over sixty-five percent of HNC patients in India arrive at hospital with locally advanced disease. Poor survival was caused by late-stage presentation, limited access to cancer care, and incomplete treatment in HNC patients.[4]

In recent years, lipid profile has been one of the predominant biomarkers for predicting prognosis or monitoring the disease progression from premalignant to malignant. Considering these the present study is aimed to evaluate the serum lipid profile in patients with head and neck premalignant and malignant lesions with that of clinically normal controls.

MATERIAL AND METHODS

This was a case-control study for a period of 2 years in total of 60 patients, premalignant-20, malignant-20, control group-20 in ESIC medical college and hospital, sanathnagar, Hyderabad.

Inclusion Criteria: All cases diagnosed with premalignant and malignant conditions of head and neck.

Exclusion Criteria: Obese and those with history of hypertension, diabetes mellitus, coronary artery disease and myocardial infarction, Patients having any cardiac, renal and hepatic dysfunction, those on chemotherapy and radiotherapy, on drugs interfering with lipids.

Controls: Healthy subjects with normal hepatic, renal, cardiac function and had no compliant or history of any major illness in recent past.

Methodology

Histopathological, head and neck malignancy were divided as premalignant, malignant and control group. With proper written informed consent, Fasting blood samples were collected and the lipid profile studied for these parameters: TC, HDL, LDL, VLDL, TGL.

Very low-density lipoprotein: calculated by the formula. VLDL = Triglyceride / 5 and Low density lipoprotein: by the formula » LDL = Total cholesterol-(VLDL-HDL). Data entered into excel sheets and results were derived by SPSS software.

RESULTS

The study aims to elucidate the correlation between serum lipid profiles of normal, premalignant and malignant lesions of head and neck, potentially contributing to early diagnosis and improved patient outcomes. [Table 1]

The majority of patients were in the 50-60 age group, comprising 31.7% (19 patients) of the sample, followed by the 30-40 age group at 26.7% (16 patients), and the 40-50 age group at 25% (15 patients). These distributions suggest that head and neck malignancies are more prevalent in the middle-aged population, particularly those between 50 and 60 years of age. The majority of the patients were males, accounting for 64% of the sample, while females made up 36%. Of these, 24 patients (40%) reside in rural areas, while 36 patients (60%) reside in urban areas. Each category contains an equal number of patients, with 20 individuals (33.3%) in each group. Leucoplakia and oral submucosal fibrosis of more percentage among 20 study participants of premalignant patients.

Comments: The table shows the distribution of 20 patients of malignant lesions. Of these, 02 patients (10%) includes papillary carcinoma of thyroid, 01(5%) mucoepidermoid carcinoma of parotid, 05(25%) tongue carcinoma, 05(25%) of buccal mucosa carcinoma, carcinoma of hard palate 01(05%), lip carcinoma 01(5%), carcinoma of lower alveolus 01(5%), carcinoma of larynx 05(25%). [Table 2]

Comments: The table above presents the distribution of 60 patients based on their smoking and alcohol consumption statuses. Among the patients, which shows more correlation with risk factors and malignancy. [Table 3]

Among them, manual labourers comprised the largest group with 33.3% (20 patients), followed by office workers at 25% (15 patients). Unemployed or retired individuals made up 16.7% (10 patients), farmers represented 13.3% (8 patients), and the remaining 11.7% (7 patients) fell into the 'Others' category. The varied occupational backgrounds provide a comprehensive view of the patient demographics, which is crucial for understanding the potential occupational risk factors associated with these malignancies. [Table 4]

Out of the total 60 patients, 20 (33.33%) have a positive family history, indicating they have family members who have been affected by the condition. Conversely, 40 patients (66.67%) have a negative family history. Half of the patients (30 individuals, 50%) are well-nourished, while 20 patients (33.3%) are moderately malnourished, and 10 patients (16.7%) are severely malnourished. [Table 6]

High-density lipoprotein (HDL) is significantly higher in normal patients (mean 68.4 mg/dL, S.D 5.48) compared to premalignant (mean 49.34 mg/dL, S.D 33.69) and malignant (mean 49.01 mg/dL, S.D 32.43) groups. [Table 7]

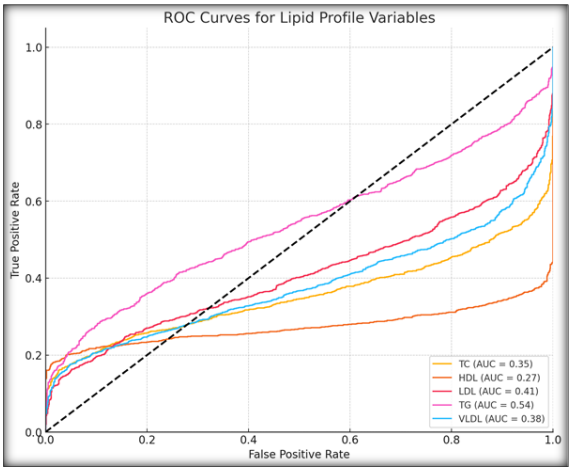

Figure 1: ROC curves for lipid profile variables

The ROC analysis reveals that Triglycerides (TG) have the highest potential among the lipid profile variables for discrimination, but their performance is still limited. The other variables (TC, HDL, LDL, VLDL) show discriminatory abilities. These results underscore the need for additional markers or tests to improve diagnostic accuracy.

This indicates that while these tests can provide some useful information, they are not highly reliable on their own for diagnostic purposes. LDL and VLDL have slightly better sensitivity compared to TC and HDL, suggesting a marginally better ability to identify true positives. HDL shows the highest specificity, albeit still moderate, indicating it is slightly better at correctly identifying true negatives. Given their moderate sensitivity and specificity, these lipid profile variables should be used in conjunction with other diagnostic markers and tests for better accuracy. Relying solely on these markers might lead to misdiagnosis due to their limited ability to distinguish between true positive and true negative cases effectively.

This suggests strong evidence against the null hypothesis for these variables. TG (Triglycerides) also shows a significant difference with a p-value of 0.026469. However, LDL (Low-Density Lipoprotein) and VLDL (Very Low-Density Lipoprotein) do not show significant differences between groups, as their p-values are 0.132408 and 0.05968, respectively, both above the 0.05 threshold. [Table 7]

Table 1: Distribution of study subjects based on the age

Age Range (Years)	Number Of Patients (N)	Percentage (%)
20-30	4	6.6
30-40	16	26.7
40-50	15	25
50-60	19	31.7
60-70	6	10
Total	60	100
Mean Age.42.875 and S.D 7.445 T-statistic: −11.83 P value:0023		
Gender		
Males	38	64
Females	22	36
Category		
Rural	24	40
Urban	36	60
Diagnosis Category		
Normal	20	33.3
Premalignant	20	33.3
Malignant	20	33.3
Type of lesion		
Leucoplakia	07	35
Oral submucosal fibrosis	07	35
Erythroplakia	02	10
Lichen planus	04	20

Table 2: Malignant lesions among study population

Malignant lesion	Number of patients
Papillary carcinoma of thyroid	2
Mucoepidermoid carcinoma of parotid	1
Tongue carcinoma	5
Carcinoma of buccal mucosa	4
Carcinoma of hard palate	1
Lip carcinoma	1
Carcinoma of lower alveolus	1
Carcinoma of larynx	5
Total	20

Table 3: Smoking and alcohol consumption status

Status	Normal	Premalignant	Malignant
Smokers	05	08	11
Non smokers	12	07	04

Former smokers	03	05	05
Alcohol consumption			
Alcohol consumers	05	14	17
Non-Alcohol consumers	15	06	03
Total	20	20	20

Table 4: Distribution of occupation among study population

Occupation	Number of Patients (n)	Percentage (%)
Manual Labor	20	33.3
Office Worker	15	25
Unemployed/Retired	10	16.7
Farming	8	13.3
Others	7	11.7
Total	60	100

Table 5: Distribution of presence of family history and Nutritional Status

Family history	Number of Patients	Percentage
Positive	20	33.33
Negative	40	66.67
Nutritional Status		
Well-nourished	30	50
Moderately Malnourished	20	33.3
Severely Malnourished	10	16.7

Table 6: Lipid profile in different groups

Variables	Normal		Premalignant		Malignant	
	Mean	S. D	Mean	S. D	Mean	S. D
TC	157.1	13.99	142.51	42.61	144.48	41.99
HDL	68.4	5.48	49.34	33.69	49.01	32.43
LDL	100.5	15.33	91.3	33.09	92.3	32.35
TG	107.1	16.8	109.06	31.39	109.12	31.6
VLDL	22.5	2.73	20.08	6.64	20.17	6.67

Table 7: ANOVA Test

Variables	F-statistic	p-value
TC	5.976934	0.003696
HDL	8.32061	0.000494
LDL	2.069592	0.132408
TG	3.787717	0.026469
VLDL	2.912097	0.05968

DISCUSSION

The study investigates the serum lipid profiles of patients diagnosed as premalignant and malignant lesions of head and neck and compared with that of clinically normal controls aiming to understand their potential diagnostic value. The study based on gender as 64% (38 patients) are males, and 36% (22 patients) are females. This gender distribution highlights a notable predominance of male patients in the study, with males comprised of nearly two-thirds of the sample population. This finding is consistent with the epidemiological data on head and neck cancers, which indicate a higher incidence in males compared to females. A Study by Poorey VK et. al,[5] stated that several factors could contribute to this disparity, including higher rates of tobacco and alcohol use among males, which are well-established risk factors for head and neck malignancies.

Additionally, occupational exposures and lifestyle differences may also play a role in the increased prevalence of these cancers in males.[6] The male predominance observed in this study is supported by various studies conducted globally. For instance, in a comprehensive review of head and neck cancer epidemiology, it was found that males are typically more affected than females, with a male-to-female ratio ranging from 2:1 to 4:1 in different populations. This trend is attributed to the higher prevalence of risk factors such as smoking and alcohol consumption among men, which significantly contribute to the development of head and neck cancers. In Kashmir, Mahajan et al,[7] 2019 a study found that males accounted for 90.4% of head and neck cancer cases.

Similarly, a study of Kusumanjali et al,[8] 2019 reported 70.66% male and 29.33% female patients, reaffirming the global trend of male predominance. The study explores the potential diagnostic significance of serum lipid profiles in patients with head and neck cancers. Among the 60 patients enrolled in the study, the smoking and alcohol consumption statuses were carefully documented to understand their correlation with lipid profiles and the development of malignancies. The data indicates that a considerable proportion of the patients have a history of smoking, either currently or in the past. Smoking is a well-known risk factor for head and neck cancers, as it contributes to the development of malignancies through the introduction of carcinogens

that cause mutations in the cells of the head and neck region. The fact that this data underscores the significant role that smoking plays in the aetiology of these cancers. Additionally, the study examines the alcohol consumption status of the patients. Alcohol consumption is another major risk factor for head and neck cancers, often acting synergistically with smoking to increase the risk further. The prevalence of alcohol consumption among the patients highlights the importance of considering this factor when evaluating the potential diagnostic role of serum lipid profiles in these cancers.

Combining the data on smoking and alcohol consumption, it is evident that a significant portion of the patient population has been exposed to these risk factors. This exposure is likely to influence their serum lipid profiles, potentially affecting the lipid parameters under investigation. The interplay between smoking, alcohol consumption, and lipid metabolism could provide valuable insights into the metabolic changes associated with head and neck malignancies. The alcohol and smoking consumption data mirrors findings from North Western India, where smoking and alcohol were common risk factors, particularly in males (Jha p,et.al,).[9] A study of Alam et al,[10] 2017 in Western Uttar Pradesh also identified tobacco smoking as a prevalent risk factor in 58.36% of patients.

The study investigates the potential diagnostic significance of serum lipid profiles in patients diagnosed with head and neck cancers. Among the 60 patients enrolled in the study, their occupation distribution was recorded to explore any correlations between occupational factors, lipid profiles, and the development of head and neck malignancies. The distribution of occupations among the patients is as follows: 33.3% (20 patients) are manual labourers, 25% (15 patients) are office workers, 16.7% (10 patients) are unemployed or retired, 13.3% (8 patients) are farmers, and 11.7% (7 patients) fall into the 'Others' category.

Manual labourers represent the largest occupational group in the study, comprising one-third of the patient population. This high percentage may reflect the increased exposure to environmental and occupational risk factors associated with manual labor, such as exposure to carcinogens, dust, and other hazardous substances. Manual labourers may also have higher rates of smoking and alcohol consumption, which are significant risk factors for head and neck cancers. This finding aligns with other Indian studies indicating a higher incidence among lower socioeconomic classes. For example, in Kashmir, most patients were from lower socioeconomic backgrounds, often involved in manual labour.[11]

Office workers account for 25% of the patients. This group is less likely to be exposed to occupational hazards compared to manual labourers but may still be at risk due to lifestyle factors such as sedentary behavior, stress, and potentially higher rates of smoking and alcohol use in certain office environments. Unemployed or retired individuals make up 16.7% of the study population. This group may have varying degrees of exposure to risk factors depending on their previous occupations and lifestyle choices. Additionally, retired individuals may have accumulated risk exposure over their lifetime, contributing to the development of head and neck cancers. Farmers constitute 13.3% of the patients. This occupation involves significant exposure to pesticides, herbicides, and other agricultural chemicals, which are known to be potential carcinogens. Moreover, farming often involves long hours in the sun, increasing the risk of skin cancers, including those in the head and neck region. The lifestyle and dietary habits of farmers may also influence their lipid profiles and cancer risk.

The 'Others' category, which includes 11.7% of the patients, likely encompasses a variety of occupations that do not fit into the primary categories listed. These occupations may have diverse risk factors and lifestyle characteristics that contribute to the development of head and neck malignancies. The explores the potential diagnostic significance of serum lipid profiles in patients diagnosed with head and neck cancers. As part of the study, common symptoms experienced by the patients were documented to understand their prevalence and possible correlation with lipid profile alterations and the development of malignancies.

The distribution of symptoms among the patients is as 30% (12 patients) experienced hoarseness, 22.5% (09 patients) had difficulty swallowing, 20% (08 patients) presented with a lump in the neck, 20% (08 patients) had a persistent sore throat, and 7.5% (3 patients) experienced ear pain. Hoarseness is the most frequently reported symptom, affecting 30% of the patients. Hoarseness can result from various conditions, including laryngeal cancer, which impacts the vocal cords and surrounding tissues. The prevalence of this symptom underscores its significance as a potential early indicator of head and neck malignancies. Hoarseness typically occurs when tumors affect the vocal cords directly or cause nerve involvement leading to vocal cord paralysis.

Difficulty swallowing, or dysphagia, is reported by 22.5% of the patients. This symptom is often associated with tumors located in the pharynx or esophagus, which can obstruct the passage of food and liquids. Dysphagia is a critical symptom that warrants thorough investigation, as it can significantly impact the patient's quality of life and nutritional status. Tumors causing mechanical obstruction or invasion into the swallowing muscles or nerves can lead to this condition. A lump in the neck is noted in 20% of the patients. This symptom is commonly associated with metastatic lymph nodes, which can arise from primary tumors in the head and neck region. The presence of a neck lump is often one of the first signs that prompts patients to seek medical attention. Enlarged lymph nodes may indicate the spread of malignancy and are a crucial factor in staging and prognosis of head and neck cancers.

A persistent sore throat is reported by 20% of the patients. Chronic irritation and inflammation of the throat can result from malignancies in the pharynx or larynx. This symptom can be mistaken for benign conditions such as pharyngitis or tonsillitis, leading to potential delays in diagnosis. Persistent sore throat, especially when associated with other symptoms like hoarseness or a neck lump, should raise suspicion for malignancy. Ear pain, or referred otalgia, is experienced by 7.5% of the patients. This symptom occurs when tumors in the throat or base of the tongue irritate nerves that transmit pain to the ear. Referred ear pain without any apparent ear pathology can be an important clue pointing to a head and neck cancer.
The study investigates the potential diagnostic significance of serum lipid profiles in patients diagnosed with head and neck cancers. The study included 40 patients who underwent diagnostic testing to determine the presence of malignancy. The results of these diagnostic tests are categorized as positive or negative, with 33.3% (20 patients) testing positive for malignancy and 66.7% (40 patients) testing premalignant and normal. This differentiation is crucial for evaluating the role of serum lipid profiles as a diagnostic tool. Understanding the lipid profile alterations in patients with positive and negative test results can provide valuable insights into the metabolic changes associated with head and neck cancers.
Patients with positive diagnostic test results represent a significant portion of the study population. The identification of malignancies in these patients underscores the importance of early and accurate diagnostic tools. Serum lipid profiles could potentially serve as non-invasive biomarkers for detecting head and neck cancers. Dyslipidemia, characterized by abnormal levels of lipids in the blood, has been implicated in the pathogenesis of various cancers, including those in the head and neck region. By analyzing lipid profile patterns in patients with positive diagnostic results, the study aims to identify specific lipid parameters that could aid in early detection and diagnosis. Conversely, the majority of the patients (66.7%) tested negative for malignancy. This group provides a valuable control population for comparison with those who tested positive. By examining the lipid profiles of patients with negative test results, the study can determine whether certain lipid alterations are specifically associated with malignancies or are common across various conditions. This differentiation is essential for establishing the specificity and sensitivity of serum lipid profiles as diagnostic markers for head and neck cancers.
The study indicates a 33.3% positive diagnosis for malignancy. This highlights the challenges in early detection, consistent with findings from Western Uttar Pradesh, where the prevalence of advanced-stage diagnosis was noted.[6] These findings emphasize the need for improved diagnostic tools that can detect malignancies at an earlier stage, potentially leading to better prognostic outcomes.
The study investigates the potential diagnostic significance of serum lipid profiles in patients diagnosed with head and neck cancers. Among the 60 patients enrolled in the study, the presence of a family history of malignancy was documented to explore its correlation with lipid profile alterations and the development of head and neck cancers. The distribution of the presence of family history among the patients is as follows: 33.33% (20 patients) reported a positive family history of malignancy, while 66.67% (40 patients) reported no family history of malignancy.
Conversely, the majority of the patients (66.67%) reported no family history of malignancy. This group provides a valuable comparison for evaluating the influence of non-genetic factors on the development of head and neck cancers. By examining the lipid profiles of patients without a family history of malignancy, the study can determine whether certain lipid alterations are primarily driven by genetic predisposition or are common across different etiologies.
The presence of a positive family history in 33.33% of the patients highlights the need for targeted screening and preventive strategies in individuals with a genetic predisposition to cancer. Serum lipid profile testing could potentially serve as a non-invasive screening tool for identifying high-risk individuals. By integrating lipid profile analysis with family history and other clinical risk factors, healthcare providers can develop personalized screening and prevention plans aimed at early detection and intervention. The distribution of nutritional status among the patients is as follows: 50% (30 patients) are well-nourished, 33.3% (20 patients) are moderately malnourished, and 16.7% (10 patients) are severely malnourished.
Moderate malnutrition, observed in 33.3% of the patients, indicates a considerable proportion of individuals with suboptimal nutritional status. Moderate malnutrition can result from various factors, including reduced dietary intake due to cancer-related symptoms such as difficulty swallowing (dysphagia), loss of appetite, and treatment side effects. Patients with moderate malnutrition may experience increased treatment-related complications and slower recovery rates, emphasizing the need for nutritional interventions to support their health during treatment. Similar nutritional challenges were reported in North Western India, emphasizing the need for nutritional interventions in cancer care.[7]
Severe malnutrition, present in 16.7% of the patients, highlights a significant concern for this subgroup. Severe malnutrition can severely compromise immune function, increase susceptibility to infections, and lead to poor wound healing and treatment intolerance. These patients are at a higher risk for adverse outcomes, and their nutritional status requires urgent attention. Implementing nutritional support strategies, such as enteral or parenteral nutrition, can be critical in improving their treatment

response and overall prognosis. The analysis of serum lipid profiles in patients with head and neck malignancies versus those with normal and premalignant conditions provides intriguing insights into the potential diagnostic value of these biomarkers.

The lower mean total cholesterol levels in the premalignant and malignant groups suggests a potential inverse relationship between cholesterol levels and the presence of malignancy. This observation aligns with previous studies indicating that cancer cells may utilize cholesterol for membrane synthesis and other cellular processes, thereby depleting serum cholesterol levels. This is supported by a study of Sahu.P,et.al, indicating altered lipid metabolism in cancer patients, suggesting potential diagnostic biomarkers.[12]

HDL levels displayed a significant decrease in the premalignant (49.34 mg/dL, S.D = 33.69) and malignant groups (49.01 mg/dL, S.D = 32.43) compared to the normal group (68.4 mg/dL, S.D = 5.48). HDL is known for its protective role against atherosclerosis and its potential antioxidant properties. The marked reduction in HDL in both premalignant and malignant states could be indicative of its role in the body's defense mechanisms against cancer proliferation. Reduced HDL levels might also reflect an altered lipid metabolism associated with cancer progression. These findings are in line with previous studies that have reported significant differences in lipid profiles among different stages of head and neck malignancies

LDL levels were lower in the premalignant compared to the normal group. LDL, often termed "bad cholesterol," has been implicated in the development of cardiovascular diseases. However, its role in cancer is more complex. The lower levels in the premalignant and malignant groups might be due to increased utilization by rapidly proliferating cancer cells, which require cholesterol for new cell membrane synthesis. This observation further supports the notion that cancer cells may alter lipid metabolism.

Triglyceride levels did not show significant differences across the groups, in the premalignant group, in the malignant group. This finding suggests that triglycerides might not be significantly affected or utilized in the process of head and neck cancer development. Therefore, TG levels may not serve as a reliable biomarker for distinguishing between normal, premalignant, and malignant states in this context. However, it is important to consider that the lack of significant difference in TG levels might be due to the complex nature of lipid metabolism in cancer.

VLDL levels also showed no significant variation between the groups. Similar to TG, VLDL may not be a critical factor in the lipid profile alterations associated with head and neck malignancies. Its role in lipid transport does not seem to be significantly impacted by the presence of cancerous conditions. T-test and ANOVA results, exploring the potential of lipid profiles as biomarkers for early detection and diagnosis.

The significant differences in TC levels between normal and both premalignant and malignant groups underscore the potential of TC as a diagnostic marker. The T-test results show strong statistical significance between normal and premalignant groups, normal and malignant groups. These findings suggest that TC levels elevate as the condition progresses from normal to premalignant and malignant stages. However, the lack of significant difference between premalignant and malignant groups, indicated not differentiate well between these two stages. The ANOVA test supports this by showing a significant overall difference, reinforcing TC's utility in distinguishing between healthy and diseased states rather than between stages of disease progression.

HDL levels exhibit significant alterations in both premalignant and malignant groups compared to normal individuals. These significant differences highlight HDL's potential as a biomarker for early detection of head and neck malignancies. However, the comparison between premalignant and malignant groups does not show significant differences, suggesting that while HDL is useful for detecting disease presence, it may not effectively distinguish between different stages of malignancy. further confirm the significant role of HDL in differentiating between healthy and diseased states.

LDL shows a significant difference only between normal and malignant groups. This indicates that LDL levels are altered in malignancy but not significantly in premalignant conditions, as seen from the non- significant for normal versus premalignant groups. The lack of significant difference between premalignant and malignant groups, suggests that LDL may not be a reliable marker for differentiating between stages of disease progression. The ANOVA results, indicate that LDL does not show significant variation across all groups.

Triglycerides present a significant difference between normal and premalignant groups. This suggests that TG levels are notably altered in premalignant conditions. However, the difference between normal and malignant groups is not significant, with a T value of 0.30 and a p-value of 0.7690. The comparison between premalignant and malignant groups shows a borderline significant difference, indicating a potential trend that warrants further investigation, confirm the significant variation of TG levels in different stages of disease.

VLDL levels show a significant difference only between normal and malignant groups. This finding suggests that VLDL may be elevated in malignant conditions but does not significantly differ in premalignant conditions, as indicated by the non-significant for normal versus premalignant groups. The comparison between premalignant and malignant groups also shows no significant difference. The ANOVA results, indicate a

borderline significance that suggests further research is needed.

The patient distribution by residence indicates that 40% (24 out of 60) of the patients come from rural areas, while the remaining 60% (36 out of 60) are from urban areas. This distribution highlights the demographic variance and potentially different environmental and lifestyle factors that could influence the incidence and progression of head and neck malignancies.

Urban and rural environments often present different exposure risks and health behaviors, which can impact the prevalence and severity of diseases, including cancers. Urban areas may have higher exposure to pollutants and lifestyle factors such as smoking and alcohol consumption, which are known risk factors for head and neck cancers. Conversely, rural areas might face challenges such as limited access to healthcare and late-stage diagnosis due to lack of awareness or healthcare facilities. The study shows that 60% of patients reside in urban areas, reflecting better healthcare access. This trend is consistent with findings from North Western India, which highlighted the disparity in cancer detection between urban and rural populations.[7]

The lipid profile analysis, detailed in the T-test and ANOVA results, indicates significant differences in lipid levels between normal, premalignant, and malignant patient groups. The understanding of these differences is crucial for developing diagnostic tools based on lipid profiles. Total Cholesterol (TC) showed significant differences between normal and premalignant groups and between normal and malignant groups, but not between premalignant and malignant groups. This indicates that TC can distinguish between healthy individuals and those with head and neck malignancies but is less effective at differentiating between stages of the disease.

High-Density Lipoprotein (HDL) also exhibited significant differences between normal and both premalignant and malignant groups. HDL's alterations suggest its potential as a reliable biomarker for detecting head and neck malignancies, though it similarly does not differentiate well between premalignant and malignant stages.

Low-Density Lipoprotein (LDL), Triglycerides (TG) and Very Low-Density Lipoprotein (VLDL) levels showed significant differences only between normal and malignant groups, indicating LDL's potential role in identifying malignancy but not premalignant conditions. The ROC analysis of lipid profile variables in our study, which evaluated TC, HDL, LDL, TG, and VLDL, reveals significant insights into their diagnostic performance. Among the variables, TG showed the highest AUC (0.54), indicating moderate discriminatory power, while HDL showed the lowest AUC (0.27), suggesting poor performance. These findings align with the general trends observed in various clinical studies, albeit with differences in specific outcomes and contexts.

In conclusion, while traditional lipid markers like TG, HDL, and LDL have some diagnostic utility, their effectiveness can vary widely. Advanced lipidomic markers and combined lipid ratios often show better performance, emphasizing the need for a nuanced approach in clinical diagnostics. Integrating multiple lipid markers and exploring advanced lipidomic techniques could enhance diagnostic accuracy across different conditions. The present data highlights the prevalence of malignant lesions among the sampled population. With 56.7% of the lesions identified as malignant, it is evident that a significant majority of the cases exhibit a higher risk of severe progression. This finding underscores the critical need for effective diagnostic and treatment strategies to manage malignant lesions promptly. The remaining 43.3% of the lesions are pre- malignant, indicating that a substantial proportion of cases have the potential to develop into malignant forms if not monitored and managed appropriately.

CONCLUSION

This study highlights the diagnostic potential of serum lipid profiles in identifying early stages of head and neck malignancies there by decreasing mortality and morbidity of Head and neck malignancy. Total Cholesterol (TC) and High-Density Lipoprotein (HDL) levels were significantly lower in the premalignant and malignant groups compared to the normal group, suggesting their potential as early diagnostic markers. Low-Density Lipoprotein (LDL) levels were notably lower in the malignant group, indicating its specific association with malignancy. Triglycerides (TG) and Very Low-Density Lipoprotein (VLDL) also exhibited significant differences, highlighting their relevance in disease detection.

The distribution of patients, with 60% from urban areas and 40% from rural areas, reflects the broader epidemiological trends and underscores the role of healthcare access in disease detection. The gender distribution aligns with the higher incidence of head and neck cancers in males, often due to lifestyle risk factors like smoking and alcohol consumption.

These findings suggest that serum lipid profiles, particularly TC, HDL, and LDL, can serve as valuable biomarkers for the early detection of head and neck malignancies. The significant differences observed reinforce the need for integrating lipid profile analysis into routine diagnostic protocols. Future research with larger and more diverse populations is recommended to validate these findings and enhance the accuracy and reliability of lipid profiles as diagnostic tools.

The present study's results demonstrated an inverse association between head and neck cancer and serum lipid profile levels, supporting the idea that lipid profile levels can be used as a diagnostic criterion for cancer early detection.

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