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Curriculum Implementation Support Programme-II

This is to certify that Dr. Sandhya Gauram....., Department of
General Medicine....., L.L.R.M. Medical College, Meerut has participated in

the Curriculum Implementation Support Programme - II (Online) held from 29 Sept 2020 to 30 Sept 2020 at L.L.R.M. Medical College, Meerut under the aegis of the NMC, Regional Centre, Maulana Azad Medical College, New Delhi.


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NMC Regional Centre for Medical Education Technologies

Revised Basic Course Workshop in Medical Education Technologies

Certificate of Participation

This is to certify that Dr. Sandhya Gautam from Department
of General Medicine has participated in the Revised Basic Course Workshop

conducted by Medical Education Unit, LLRM Medical
College, CCS University, Meerut and NMC Regional Centre, MAMC, New Delhi from 22nd July-

24th July, 2021

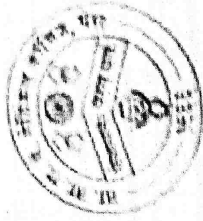

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NMC Regional Centre for Medical Education Technologies
MAULANA AZAD MEDICAL COLLEGE, NEW DELHI
Revised Basic Course Workshop in Medical Education Technologies



Certificate of Participation

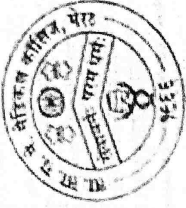
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of *General Medicine* has participated in the Revised Basic Course Workshop
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“Prevalence of dyslipidemia in retroviral patients on ART (TLE) –“At a tertiary care center”western UP

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Date of Acceptance: 08-06-2023

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Abstract:

Since the discovery of antiretroviral therapy (ART), it has significantly modified the prognosis of individuals infected by the Human Immunodeficiency Virus-1 (HIV), with marked improvement in morbidity and mortality rates worldwide¹. Although the clinical benefits are considerable, the protease inhibitors contained in these antiretroviral regimens produce a lipodystrophy syndrome characterized by changes in body fat distribution, dyslipidaemia, and insulin resistance.² The hyperlipidemia is attributable to increases in very low density lipoproteins (VLDL) and Low density lipoproteins (LDL). Total cholesterol, and decrease in HDL, it can produce serious cardiovascular complications including endothelial dysfunction and atherosclerosis.^{3,4}

Aims and objective:-

To see the prevalence of dyslipidemia in retroviral patient, who are on ART and its association with newly diagnosed HIV patient.

Methodology:-

The study was conducted at medicine department L.L.R.M Medical College Meerut. Patients were taken from ART PLUS centre L.L.R.M Medical College Meerut. We classified HIV patients who were on first line ART (TLE regime) for more than 1 year study duration as case and newly registered patient, on their first visit before starting any treatment, during the same period, as control. These patients were interviewed regarding their symptoms. Thorough general examination, anthropometric measurement, CD-4 count and systemic examination, and

all the relevant investigations were done. Information thus collected was retabulated.

Result:-

Out of 142 cases, 90 (63.3%) were male and 52 (36.6%) were female. In control group 48 (52.7%) were male 43 (47.2%). Maximum no of patient both in cases and control group fall in between the range of 18-40 years of age group. On comparing anthropometric parameter (weight, waist hip ratio, and BMI) between cases and control group there were no significant difference found ($p > .05$). On comparing biochemical parameter (total cholesterol, triglyceride, HDL, VLDL) between cases and control group no significant difference were found except in LDL level. Difference in CD4 count in cases and control (cases CD4 538.13 ± 308 , control CD4 856 ± 312.69 , $p < 0.0001$) were found significant.

Conclusion:-

We concluded from our study that patients on ART had high level lipid profile derangement than control group, and difference were statistically significant ($p < 0.014$). We advocate effective life style modification and pharmacological treatment for dyslipidemia in patient on ART.

Key words:- HIV, AIDS, ART, dyslipidemia, LDL, HDL, Total cholesterol.

I. Introduction:-

Since the identification of first cases of HIV/AIDS in June 1981 in Los Angeles, USA, there have been tremendous advances in the field of HIV prevention, diagnosis, care and treatment globally. This global progress is not only limited to identification of newer molecules

that are more robust and less toxic but also includes a significant reduction in the cost of therapy. Innovative approaches to service delivery that increase access to treatment, literally transforming the disease from a virtual death sentence, a few years ago, to a manageable chronic disease now.⁵

Nevertheless, several clinical aspects have been developed along with the longer longevity of HIV individuals, most of them related to other chronic conditions or to the antiretroviral treatment (ART).⁶ Metabolic abnormalities such as insulin resistance and disturbances in glucose homeostasis, modified adiposity physiology with lipid alterations might result in clinical complications including glucose intolerance or diabetes mellitus, dyslipidemia, altered body fat distribution, with lipodystrophy (loss of subcutaneous fat mostly in the face and periphery) and lipohypertrophy (localized fat gain mostly in central and visceral adiposity).²

Some of these perturbations can be associated with ART.⁷ Protease inhibitors (PI) show direct effect on human adipose tissue and specific effects on insulin resistance which may contribute to the overall adipose tissue imbalance and development of dyslipidemia, lipodystrophy, and metabolic syndrome in HIV-positive individuals.^{7,8} In addition, nucleoside reverse transcriptase inhibitors (NRTIs) may induce mitochondrial dysfunction, which could result in effects on adipose tissue, lactic acidosis, myopathy, peripheral neuropathy, hepatic steatosis and pancreatitis as well.⁸

Though many studies are present to show the effect ART on lipid profile but there is very less Indian data. So this study was conducted to assess the effect of ART Therapy on lipid profile and other biochemical markers.

Aim and Objectives:-

To see the prevalence of dyslipidemia in retroviral patient, who are on ART and its association with newly diagnosed HIV patient.

II. Methodology:-

This study was conducted in department of Medicine and ART Plus centre L.L.R.M Medical College, Meerut. We have taken all the patients enrolled in ART PLUS center from October 2018 to September 2019, who fulfilled the inclusion and exclusion criteria. The Ethical clearance was taken

from Institutional ethics committee LLRM Medical college (no /S-I/2019/9157 dated 11-12-2019). After taking informed consent we classified HIV patients who are on first line ART (TDF, 3TC and EFV), for more than one year as case and newly registered patients during their first visit of ART center, during same period, who have not on treatment yet as control. These patients were interviewed regarding their symptoms. Thorough general examination, anthropometric measurement, and systemic examination were done. All the relevant investigations like CBC with ESR, LFT, KFT, HBA1C, fasting lipid profile, blood sugar fasting and PP, were carried out. Information thus collected was tabulated in MS-Excel and analysed by applying appropriate statistical test by using IBM-SPSS version 21. For parametric quantitative data the results are depicted as mean and standard deviation, comparison were made by chi square test and unpaired t-test for quantitative variables between two groups.

We measured fasting lipid profile and study variables were defined. We defined dyslipidemia when total cholesterol levels were more than 200 mg/dl, triglyceride levels more than 150 mg/dl, HDL level less than 40 mg/dl for male less than 50 mg/dl female, LDL level more than 130 mg/dl, VLDL more than 30 mg/dl.

Anthropometric measurements like weight was taken in kg, WHR in meter, and BMI in kg/cm².

INCLUSION CRITERIA:

Selection of cases:-

1. All retroviral patients on ART (first line regimen TDF-Tenofovir, 3TC-Lamivudine and EFV-efavirenz) for more than 1 year
2. Age > 18 years.
3. Willing to give consent.

Selection of controls:

1. Newly diagnosed retroviral patients not on treatment at their first visit before starting any treatment, sample for lab investigations were collected.
2. Age > 18 years.
3. Willing to give consent.

EXCLUSION CRITERIA:

1. Age < 18 years.
2. Not willing to give consent.
3. Pregnant women.

Patients with hypothyroidism, DMT2,

CKD,CLD,CHF,CADpancreatitis:

1. Patient on drugs causing dyslipidemia-
Betablocker, Glucocorticoids, Amiodorone, Immunos
uppression drug (cyclosporine), Thiazide diuretics.
2. Obese patient (BMI > 30).

III. Observations and Results:-

Among 142 cases, 90 (63.3%) patients were male and 52 (36.6%) were female. In control group out of total 91 patients 48 (52.7%) were male and 43 (47.2%) were female. It was seen that in both cases and controls groups male were more than female in our study.

We divided patients in two groups, age between 18-40 years and age between 41-60 years. Among cases 95 (66.9%) patients were between the age of 18-40 years and 47 (33.09%) patients were between 41-60 years of age group. In control group 67 (73.6%) patients were in 18-40 years of age group whereas 24 (26.3%) patients were in 41-60 years of age group. It shows that maximum no. of patients were in age group between 18 to 40 years both in cases as well as in control group. So there is no variation in age and sex, in both cases and control.

Table 1:- Comparison of Anthropometric parameters between Case and Control

Anthropometric Parameters	Case	Control	p-value
Weight	62.07±12.97	60.24±6.80	0.22
WHR(m)	0.94±0.03	0.95±0.01	0.17
BMI	23.45±4.45	23.91±2.5	0.37

Table no 1 shows the comparison of anthropometric distribution between cases and control. Among cases mean weight was 62.07 with SD 12.97 and among control 60.24 with SD 6.80, with p value (0.22). The difference of weight both in cases and control was statistically not significant.

Among cases mean BMI (basic metabolic rate) was 23.45 with SD of 4.45 and among control mean BMI was 23.91 with SD of 2.5 with p value 0.37. We observed that relationship of BMI between two groups is statistically not significant ($p \geq 0.05$).

Among cases mean WHR (waist hip ratio) was 0.94 with SD of 0.03 and among control group

mean WHR (waist hip ratio) was 0.95 with SD of 0.01 and p value of 0.17. The difference of waist hip ratio both in cases and control is statistically not significant.

The Mean value of CD4 count among cases were 538.13 with SD (± 308.26) and among control were 856.47 with SD (± 44.80). CD4 count were found to be in lower range than newly diagnosed HIV Patients. We observed that relationship of CD4 count between case and control was statistically significant. There was significant difference in CD4 count both in cases and control group.

Table 2: Prevalence of dyslipidemia in study groups (cases and control)

GROUP	Case (n=142)	Control (n=91)	Statistics
Dyslipidemia	115 (81.60%)	60 (67%)	chi square 5.94 P value 0.014
Non-Dyslipidemic	27 (18.4%)	31 (33%)	

Table no 2 shows the distribution of dyslipidemia in both cases and controls. Dyslipidemia (any type of lipid abnormality) among cases were 81.6% and among control group, it was 67%. Chi square value between case and control was 5.84 and the relation between case and control was found to be statistically significant ($p < 0.05$).

Table-3: levels of lipid profile in cases and controls.

GROUP	Case(n=142)	Control(n=91)	Chi Square value	P value
HIGHTC* $\geq$ 150 mg/dl	88(61.9%)	51(56%)	0.58	0.44
HIGHTC* $\geq$ 200 mg/dl	44(30.9%)	28(30.7%)	0.001	0.97
LOWHDL* $\leq$ 40mg/dl	30(21.1%)	12(13.1%)	1.86	0.17
HIGHLDL* $\geq$ 130 mg dl	23(16.19%)	6(6.59%)	3.85	0.04*
HIGHVLDL* $\geq$ 30mg/dl	86(60.5%)	53(58.2%)	0.046	0.83

*(TG-triglyceride, TC-total cholesterol, HDL-high density lipoprotein, LDL-low density lipoprotein, VLDL-very low density lipoprotein)

When various values of lipid profile were assessed, it was observed that 61.9% cases had hypertriglyceridemia (triglyceride level >150) whereas in control group hypertriglyceridemia were present in 56% patients. Chi square value between case and control was 0.58 and we observed the relation between two were statistically nonsignificant ($p=0.44$). hypercholesterolemia were found in 30.9% cases and in control group hypercholesterolemia were present in 30.7%. Chi square value between case and control was 0.001 and p value was 0.97 and we observed the relation between two was statistically nonsignificant ($p>0.05$). Prevalence of low HDL in cases group were 21.1% and in control group were 13.1%. Chi square value between case and control was 1.86 and we observed the relation between case and control was statistically nonsignificant ($p=0.17$).

Prevalence of high LDL in cases were 16.19% and in control group were 6.59%. Chi square value between case and control was 3.85 and we observed the relation between two were statistically significant ($p=0.04$).

Prevalence of high VLDL in case was 60.5% and in control group was 58.2%. Chi square value between case and control was 0.046 and we observed the relation between these two was statistically nonsignificant ($p=0.83$).

IV. DISCUSSION

Patients receiving ART specially protease inhibitors develop hyperlipidemia and insulin resistance. Protease inhibitor have high affinity for the catalytic site of HIV protease and may bind and alter the function of an homologous human proteins

involved in lipid metabolism.² In addition, nucleoside reverse transcriptase inhibitor (NRTIs) may induce mitochondrial dysfunction, which could results in effect on adipose tissue.

The aim of this study was to assess the prevalence of dyslipidemia (lipid profile derangements) among HIV-infected patients receiving first-line ART, and their comparison with newly diagnosed HIV patients not on ART.

In our study males are more than females in both cases and controls. It shows that prevalence of HIV infection is more in males than females. It is opposite to Dave et al⁹ where they had took 551 case out of which 78% were female and 22% were male and among control group 406 patients were selected out of which 76% were female and 24% were male.

Maximum no of patients in both case and control group were in the age group 18 to 40 years, this difference of distribution among various age groups were statistically not significant ($P\geq 0.05$). In a study by Dave et al⁹ the median age of participants were 34 years which is similar to our study. Another study by Dickson et al¹⁰ which show median age of participants were 43.4 ± 11.0 years which was also like our study in which maximum no of patients fall between 18-40 years of age group.

We analyze the various parameters of obesity like weight, WHR and BMI between two groups. It shows that there were no significant difference in weight, waist hip ratio as well as in BMI in cases as well as control groups. A study by Dave et al⁹ showed that obesity ($BMI > 30 \text{ Kg/m}^2$) was more common in ART naive patient than ART treated participant. A similar study by Lucia et al¹¹ which found significant BMI rise after one year

followup on patient on ART.

The Mean values of CD4 count among cases were 538.13($\pm$ 308.26) and among control were 856.47 ($\pm$ 44.80). There were significant difference in cd4 count both in cases and control group. A study by Dave et al⁹ showed median CD4 count in ART naïve female patient was 278 (IQR 159,440) and in males 227 (IQR 134, 411), in patient ART median CD4 count in females was 371 (IQR242, 525) and in males 278 (IQR 199, 387) in their study triglyceride level correlates negatively with CD4 count.

On analyzing lipid profile we found that 81.6% among cases and 67% among control group had at least one parameter of lipid profile deranged.

There was an approximately 15% difference in the prevalence of dyslipidemia in patient on ART and in newly diagnose d patient (control group). The relationship between two groups were found statistically significant ($p < 0.05$). A similar study was done by Tadewos et al¹² which included 113 HIV infected patients treated for a minimum of one year with first-line ART regimens and others 113 who had never received ART (Pre-ART group). 82.5% of ART And 76.9% Pre ART patient had at least one laboratory abnormality¹².

There were no significant difference in the level of total cholesterol, triglyceride and HDL level between cases and controls in our study. These findings in cholesterol levels are opposite to a study by Dickson et al¹⁰, which shows the prevalence of total cholesterol (≥ 200 mg/dl) was 51.0% in patients on ART and 9.6% Pre-ART patients ($p < 0.0001$). On comparing HDL levels with Dickson et al¹⁰, which shows prevalence of HDL below 40 mg/dl are not statistically significant between pre ART and ART group. Finding of our study are not in accordance with the findings of Pujari et al¹³, in whose study 18 months treatment with first line ART were associated with significant increase in HDL level.

In our study prevalence of high LDL in cases were 16.19% and in control group were 6.59%. we observed the relation between two was statistically significant ($p < 0.05$). A similar study by Dickson et al¹⁰ which showed LDL-cholesterol ≥ 130 mg/dl occurred in 36.9% ART patients and in 7.7% pre ART patients respectively, with ($p = 0.0001$).

V. CONCLUSION

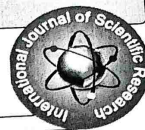
We can conclude from our study that HIV-infected patients receiving first-line ART have a high

prevalence of lipid profile derangements when compared to those non-treated HIV-infected patients. Uses of first-line ART regimens are significantly associated with atherogenic lipid profiles. Therefore, the findings indicate the need to assess lipid profiles at baseline before initiation of ART treatment and lipid profile monitoring during therapy to monitor any rising trends. Additionally, the results also recommend implementation of well-controlled cohort studies for the evaluation of long-term effects of ART treatment on lipid profiles. We advocate effective lifestyle and pharmacological intervention to prevent and treat dyslipidemia in patient on ART therapy.

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DYSLIPIDEMIA AND INCREASED WAIST CIRCUMFERENCE AS A RISK FACTOR FOR ACUTE CORONARY SYNDROME IN YOUNG PATIENTS

Medicine

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ABSTRACT

Introduction: Dyslipidemia and Obesity are components of metabolic syndrome placing subjects at risk for cardiovascular and cerebrovascular diseases. It is now considered as both a public health and a clinical problem. Their prevalence varies around the world depending on the age and ethnicity of the populations studied and the diagnostic criteria used in the evaluation. **Aims And Objectives :** To study profile of Dyslipidemia and waist circumference in Young Patients of Acute coronary Syndrome **Methods :** The study type is cross sectional study. The work was conducted in DEPARTMENT OF MEDICINE, L.L.R.M MEDICAL COLLEGE, MEERUT. A sample size of 120 patients attending medicine OPD/IPD and Cardiology OPD were selected as per criteria. **Results :** Among the study population 100 participants had deranged triglycerides, 47 participants had deranged HDL and 58 participants had deranged waist circumference. **Conclusion :** Among all the components of metabolic syndrome, triglyceride levels was the commonest component elevated (83%). The prevalence of low HDL cholesterol levels was 39% and increased waist hip ratio was 48%.

KEYWORDS

Acute coronary syndrome, Dyslipidemia, Waist Circumference .

INTRODUCTION

Elevated levels of total- and low density lipoprotein cholesterol (TC and LDL-C), elevated levels of triglycerides (TG) and low levels of high density lipoprotein cholesterol (HDL-C) are important risk factors for CAD. Early treatment of hyperlipidemia following acute coronary syndrome (ACS) provides potential benefits. Treating dyslipidemia has clear benefits in the primary and secondary prevention of coronary heart disease (CHD) in both sexes. **Obesity** is a highly preventable cause of death and an independent risk factor for cardiovascular diseases (CVD). Premature atherosclerotic events have increased in younger individuals.

MATERIAL AND METHODS

The study type is cross sectional study. The work was conducted in DEPARTMENT OF MEDICINE, L.L.R.M MEDICAL COLLEGE, MEERUT. A sample size of 120 patients attending medicine OPD/IPD and Cardiology OPD were selected as per criteria.

A pre-structured Proforma was filled up for the study. Each subject was given a thorough work up for history and physical examination to fulfill the inclusion and exclusion criteria. Routine hematological and biochemical investigations was carried out. The following parameters were measured at the time of enrollment into the study:

Inclusion Criteria:

- Patients who will give consent
- Age between 18 to 45 years
- Patients having Acute Coronary Syndrome

Exclusion Criteria:

- Patients on Anti-lipidemic Drugs
- Patients with impaired renal function.
- Cardiomyopathies,
- Patients having thyroid dysfunction.
- Pregnancy

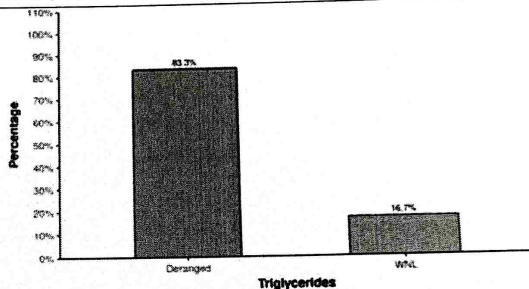
RESULTS

Distribution of the Participants in Terms of 'Triglycerides (mg/dL)'

Table 1: Distribution of Triglycerides

Triglycerides	Frequency	Percentage	95% CI
Deranged	100	83.3%	75.2% - 89.3%
WNL	20	16.7%	10.7% - 24.8%

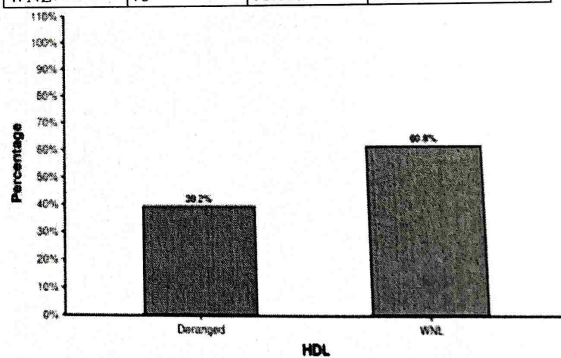
83.3% of the participants had Triglycerides: Deranged. 16.7% of the participants had Triglycerides: WNL.



Distribution of the Participants in Terms of 'HDL (mg/dL)'

Table 2: Distribution of HDL

HDL	Frequency	Percentage	95% CI
Deranged	47	39.2%	30.5% - 48.5%
WNL	73	60.8%	51.5% - 69.5%



39.2% of the participants had HDL: Deranged. 60.8% of the participants had HDL: WNL.

Distribution of the Participants in Terms of 'Waist Circumference (cm)'

Table 3: Distribution of Waist Circumference

Waist Circumference	Frequency	Percentage	95% CI
Deranged	58	48.3%	39.2% - 57.6%
WNL	62	51.7%	42.4% - 60.8%

48.3% of the participants had Waist Circumference: Deranged. 51.7% of the participants had Waist Circumference: WNL.

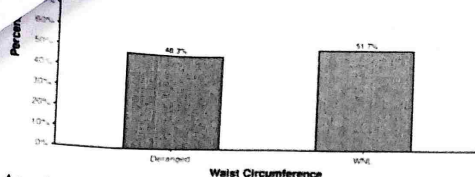
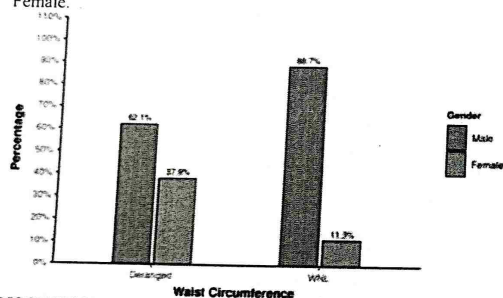


Table 4: Association between 'Waist Circumference' and 'Gender'

Gender	Waist Circumference		Chi-Squared Test	
	Deranged	WNL	χ^2	P Value
Male	36 (62.1%)	55 (88.7%)	11.605	<0.001
Female	22 (37.9%)	7 (11.3%)		
Total	58 (100.0%)	62 (100.0%)		

Chi-squared test was used to explore the association between 'Waist Circumference' and 'Gender'. There was a significant difference between the various groups in terms of distribution of Gender ($\chi^2 = 11.605$, $p = <0.001$). Strength of association between the two variables (Cramer's V) = 0.31 (Moderate Association). Strength of association between the two variables (Bias Corrected Cramer's V) = 0.3 (Low Association). 62.1% of the participants in the group [Waist Circumference: Deranged] had [Gender: Male]. 37.9% of the participants in the group [Waist Circumference: Deranged] had [Gender: Female]. 88.7% of the participants in the group [Waist Circumference: WNL] had [Gender: Male]. 11.3% of the participants in the group [Waist Circumference: WNL] had [Gender: Female].

Participants in the group Waist Circumference: WNL had the larger proportion of Gender: Male. Participants in the group Waist Circumference: Deranged had the larger proportion of Gender: Female.



DISCUSSION

This study, **Dyslipidemia and Increased Waist Circumference as a risk factor for Acute Coronary Syndrome in Young patients** is an observational study done on 120 patients of age < 45 years admitted with acute coronary syndrome in LLRM medical college and SVBP hospital. The study population included 120 patients presented with acute coronary syndrome out of which 91 patients were male and 29 patients were female. Several previous studies have shown that the overall prevalence of metabolic syndrome in Indian population is 31.4%. It was observed that females (48.2%) are more affected from metabolic syndrome than male (16.3%). In this study, The Triglyceride was the most common determinant elevated in patients with or without the metabolic syndrome and it was about 83%. The prevalence of other components were found to be raised i.e. low HDL cholesterol levels (39%) and increased waist hip ratio (58%).

Among the 120 patients, range of age was 50 patients were between the age of 31-40 years and 70 patients were between 41 to 45 years.

The risk factors associated with ACS were also assessed. History of Smoking was present in 75 patients (62.5%) in the study population and History of Alcohol intake was found in 66 patients (55%).

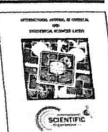
CONCLUSION

Among all the participants, triglyceride levels was the commonest component elevated (83%). The prevalence of other components were

low HDL cholesterol levels (39%) and increased waist hip ratio (48%). This high prevalence of dyslipidemia and obesity in youngs indicates the need for a comprehensive non communicable disease prevention and control program. Increasing awareness and early identification of these clusters of risk factors should be emphasized in designing population wide prevention strategies. The major aim is to emphasise on underlying cause of the syndrome, and also on other cardiovascular risk factors. Most of people lead a physically inactive lifestyle. Therefore, lifestyle modification to be done in these patients. Weight loss usually requires a multifaceted program that includes diet modification and physical exercise. Other factors of CVD should be considered, which are supposed to play an important role includes High Sensitivity C-reactive Protein (hsCRP), increased intima-media thickness of carotid arteries, and increased pulse wave velocity. When the whole spectrum of various causative and risk factors of cardiovascular disease risk is uncovered, we can more effectively execute the preventive strategies in population on a wide range.

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Role of oxidative stress and enzymatic antioxidants status in diabetic nephropathy (DN) patients- in western Uttar Pradesh

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Abstract

Metabolic abnormalities in type 2 diabetic patients can increase the generation of free radicals which leads to oxidative stress. This leads to disturbances in insulin secretion and action leading to diabetic complications like nephropathy etc. The free radical burden is normally detoxified by various endogenous and exogenous antioxidants. The study aims to find the relationship between oxidative stress and enzyme antioxidants in DN. This study was carried out at Lala Lajpat Rai Memorial Medical College, Meerut, U. P. from 2021-22. This was a type of case-control study. Total 150 subjects of age and sex matched were enrolled in 03 groups. Healthy control and the cases divided into 2 groups of diabetes without and with nephropathy. Malondialdehyde (MDA) in plasma, superoxide dismutase (SOD) and catalase (CAT) were analyzed in hemolysate. The results observed were presented in mean $\pm$ SD. Controls and cases were compared using "t-tests" and ANOVA. The correlations were determined by the Pearson's correlation "p" value < 0.05 considered significant. Comparison of various circulatory parameters found a significant difference between cases as compared to controls at $p < 0.05$. Correlation of eGFR with catalase in DN group $p = 0.01$ was found to be significant. A correlation of SOD with catalase was found to have a positive correlation in DN. We conclude that with the severity of disease oxidative stress was increased and enzyme antioxidants decreased. In patients of DN catalase were found a significant correlation with eGFR, UAE, SOD etc. but we did not find significant association between MDA and SOD or CAT in western U. P.

Keywords: Oxidative stress, enzyme antioxidants, diabetes mellitus, and diabetic nephropathy

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1. Introduction

Diabetes mellitus (DM) and its complications are the major cause of morbidity and mortality worldwide [1]. The global prevalence of diabetes in adults was reported 9% (463 million adults) and 77 million adults have diabetes in India as per data estimated in 2019. The prevalence of diabetes and its associated complications is gradually increasing with increasing of its risk factors such as sedentary lifestyle, eating fast food or packed food, working environment and mental stress which results in chronic hyperglycemia, hypertension, metabolic and genetic alterations [2]. DN is the major cause of kidney disease and affects ~30-40% of type 2 diabetes Rastogi et al., 2023

mellitus (T2DM) patients. It is defined by increased urinary excretion of albumin/protein without any other renal diseases and increases the risk of death. Chronic hyperglycemia and genetic alterations are the risk factors causing metabolic, biochemical, and vascular abnormalities in diabetic complications [3]. Metabolic disorders characterized by hyperglycemia which is the result of insulin resistance or beta cell dysfunction [4]. During glucose metabolism and energy production, generation of free radicals such as $\cdot O^{-2}$, $\cdot OH$, $\cdot NO$ etc., which are also known as reactive oxygen or nitrogen species (ROS or RNS) occurs in excess leading to oxidative stress. Endogenous or exogenous antioxidants reduce ROS and detoxify them by neutralization. In case of

hyperglycemia, excess production of ROS from energy generation pathway i.e., electron transport chain (ETC) imbalances antioxidant status in the body [5]. Oxidative stress causes morphological and functional changes in cell proteins, membrane lipids and nucleic acids by which metabolic signal transduction impairment occurs. This leads to disturbances in insulin secretion and action and ultimately leads to diabetic complications like retinopathy, neuropathy, and nephropathy etc. As mentioned above, lipids are damaged by ROS/RNS and produce hydroperoxides, e.g., malondialdehyde (MDA). It is used as a biomarker for oxidative stress [6]. Endogenous enzymes which act as antioxidants to protect against free radicals are *superoxide dismutase (SOD)*, and *catalase (CAT)*, etc. These are responsible for the detoxification of superoxide radicals to hydrogen peroxide and ultimately to water and molecular oxygen in the cell [7]. This study was focused on the metabolic generation of excess free radicals and detoxification by enzyme antioxidants. Furthermore, we can find out the relationship between oxidative stress and enzyme antioxidants in diabetes with or without nephropathy that will be helpful in the management as well as prevention of diabetic complications.

2. Materials and methods

This was a case-control study, a total of 150 subjects were registered in 3 groups (50 subjects in each group). Group I: Healthy control of age and sex matched, Group II: diabetes without nephropathy and Group III: diabetes with nephropathy. History, physical examination, and various routine biochemical investigations were done to rule out other causes of nephropathy.

Inclusion criteria: Male and female between 30-75 years of age for all groups, screening of T2DM and DN were done as per the guidelines of American Diabetes Association (ADA)⁷. T2DM subjects were negative for urinary protein. DN subjects were diagnosed based on the following criteria: normo-albuminuria (< 30 mg/24 h), microalbuminuria, (30 to 300 mg/24 h) and macroalbuminuria or nephropathy (> 300 mg/24 h) along with fasting blood sugar (≥ 126 mg/dL).

Exclusion criteria: Pregnant or lactating women, non-diabetic kidney disease, hypertension, polycystic ovarian syndrome, any drug-causing nephropathy, or any cause of nephropathy other than T2DM. The present study was done after ethical approval from the institutional committee of Lala Lajpat Rai Memorial Medical College, Meerut, Uttar Pradesh and written informed consent were taken from each subject. (Reference No. S-1/2019/9263 Dated: 16.12.2019)

Laboratory Investigation: A total of 3.0 mL of peripheral blood samples was collected from the patients as well as controls. From which 1.5 mL blood was collected in an EDTA vial for HbA1c and plasma/lysate preparation and 1.5 mL blood in a plain vial for biochemical parameters. Estimations of blood glucose, Liver (serum protein and serum ALT) & Kidney (serum urea and serum creatinine) function tests also Urinary albumin excretion (UAE) of a 24-hour Urine sample have been performed using Selectra Pro M/Selectra XL Autoanalyzer (ELITTECH Group). HbA1c was performed on a D-10 HbA1c Analyzer (Bio-Rad). Estimated Glomerular filtration rate (eGFR) was calculated

by CKD-EPI Creatinine equation (2021) given by National Kidney Foundation is as follows and classification shown in Table 1 [8]

Estimated GFR (creatinine) = $142 \cdot \min(\text{Scr}/K, 1)^{\alpha} \cdot \max(\text{Scr}/K, 1)^{-1.200} \cdot 0.9938^{\text{Age}} \cdot 1.012$ (if female)
Where: Scr = standardized serum creatinine in mg/dL, K = 0.7 (females) or 0.9 (males), $\alpha = -0.241$ (female) or -0.302 (male), $\min(\text{Scr}/K, 1)$ is the minimum of Scr/K or 1.0, $\max(\text{Scr}/K, 1)$ is the maximum of Scr/K or 1.0 and Age (years).

Plasma and Lysate separation: Whole blood was collected in an EDTA vial for plasma and lysate preparation. 1.0 mL of whole blood from EDTA vial is transferred to a 2.0 mL Eppendorf tube and centrifuged at 2,500 rpm for 15 minutes at 25-30 °C for plasma separation. Separated plasma after centrifugation was then transferred to a 2.0 mL Eppendorf tube for malondialdehyde (MDA) analysis. The RBC pellet which remained intact in the bottom of the tube was used for lysate preparation.

The activity of malondialdehyde (MDA) was analysed in plasma by the Ohkawa *et. al.* Method [9]. Endogenous enzyme antioxidant, *superoxide dismutase (SOD)* and *catalase (CAT)* were analysed in lysate by McCord, & Fridovich method [10] and Aebi method [11] respectively on MULTISCAN GO with SkanIt Software (Installation code: 73617) (Cat. No.51119300, Thermo Fisher Scientific, Japan).

Statistical Analysis: The statistical analysis was done employing online software Statistical Package for the Social Sciences (SPSS) 16.0 version (SPSS Inc., Chicago, Illinois, USA). The results observed were presented in mean $\pm$ SD. various circulatory parameters of controls and cases were compared using independent sample "t-tests" and ANOVA for continuous variables. The bivariate correlations between quantitative variables were determined by the Pearson's correlation. A "p" value less than 0.05 & 0.01 was considered statistically significant.

3. Results and Discussions

Results showed in Table 2 that there were no significant differences between mean ages of subjects among groups independently or combined. Sex difference was found significant only between diabetic group without nephropathy and healthy controls. Duration of diabetes between diabetic without and with nephropathy groups found significant at p-value = 0.00. The mean of blood sugar, glycated hemoglobin (HbA1c), serum urea, serum creatinine, eGFR and Urinary albumin excretion (UAE) was found significantly higher in Group III (diabetes with nephropathy) as compared to Group II (diabetes without nephropathy) and Group I (Healthy Controls) respectively p = 0.00. The mean of plasma MDA and enzymatic anti-oxidants such as *SOD* & *CAT* activities in lysate were found statistically significant ($p < 0.05$ & $p < 0.01$) among study groups, as shown in Table 1 S. No. 13, 14, 15. Screening for normal liver function test serum protein and serum *Alanine transaminase (ALT)* did not find significant difference among groups independently or combined except between Group I and Group III (Table 2 S. No. 7, 8). Duration of diabetes in patients of Diabetic Nephropathy has shown a significant positive correlation with urinary albumin excretion (UAE) and *Catalase (CAT)* as shown in Table 3 $r = 0.458^{**}$ and 0.296^{*} respectively. Serum Urea with *SOD* (r

290*) in Group II and serum Urea with eGFR, UAE and CAT ($r = -0.544^{**}$, 0.392^{**} , 0.310^{*} respectively) in diabetic nephropathy group were found a significant correlation as shown in Table 3 (S. No. 3). There was a strong negative correlation between serum creatinine and eGFR $r = -0.532^{**}$ & -0.819^{**} and a positive correlation between serum creatinine and UAE ($r = 0.460^{**}$ & 0.470^{*}) in both case groups diabetes without nephropathy as well as diabetic nephropathy as shown in Table 3(4). eGFR has shown a negative correlation with UAE (r - value = -0.385^{**}) in patients of diabetes without nephropathy and a significant negative correlation of eGFR with UAE ($r = -0.461^{**}$) and with SOD ($r = -0.32^{*}$) were found significant in patients of diabetic nephropathy. We have not found any significant correlation of plasma MDA either with SOD or Catalase in both case groups. But we have found a significant positive correlation of SOD with Catalase in diabetic nephropathy group $r = 0.297^{*}$ as shown in Table 3.

In this study, malondialdehyde (MDA) was found significantly higher in study groups as compared to control subjects independently and in between all groups. A Gujarat based study found that plasma MDA was higher in study groups as compared to controls [12]. Iranian study found no significant difference between study groups [13]. A Varanasi, Eastern U. P. based study found an increase in oxidative stress in ESRD patients and DN and T2DM with the progression of disease [14]. Sharma M. *et al.* (2016) Delhi based study found that MDA level was higher in DN subjects as compared to T2DM and healthy control [15]. Activities of SOD and Catalase have been found significantly lower in DN subjects as compared to T2DM subjects & healthy controls. A Gujarat based study found a decrease in SOD levels in the study group as compared to controls [12]. A study found that significant increase in MDA & catalase but a decreased

activity of SOD in T2DM subjects with or without nephropathy as compared to controls and in DN as compared to T2DM [16]. It was reported that SOD activity in T2DM was lower when compared to healthy individuals [7]. In the present study with the severity of disease oxidative stress was increased and enzyme antioxidants decreased. In patients of diabetic nephropathy, we have found a significant correlation of catalase with SOD but there was no significant correlation of MDA either with superoxide dismutase or catalase in western U. P. In a study, it was found that the excessive production of reactive oxygen species (ROS) results in lipid peroxidation with a corresponding decrease in the activities of antioxidant enzymes in diabetic nephropathy [16]. Antioxidant systems are essential in balancing redox homeostasis. A main part of the antioxidant defense is performed by enzymes e.g., superoxide dismutase (SOD) and catalase (CAT) etc. and other non-enzymatic structures, including vitamin E, vitamin C, and various biochemical mechanisms for ROS detoxification. For example, the disintegration of hydrogen peroxide by SOD and CAT, ultimately results in molecular oxygen and water [17]. Treatment that can stabilize oxygen metabolism and regulate oxidative stress can delay the development of diabetic complications. Therefore, antioxidant therapy might play a crucial role to reduce the risk of the progression of type 2 diabetes and its complications. Cochrane database systematic review showed that therapy with human recombinant superoxide dismutase, vitamin E, acetylcysteine and coenzyme Q was not very much satisfactory in decreasing the risk of diabetic nephropathy [18, 19]. There are some limited results found with disputes of antioxidant therapy, which could be useful in preventing diabetic complications.

Table 1: Classification of estimated Glomerular Filtration Rate (eGFR) as per National Kidney Foundation

S. No	Classification	Estimated GFR (mL/min/1.73 m ²)	Remark
1	Grade 1	≥ 90	Normal or high
2	Grade 2	60-89	Mildly decreased
3	Grade 3a	45-59	Mildly to moderately decreased
4	Grade 3b	30-44	Moderately to severely decreased
5	Grade 4	15-29	Severely decreased
6	Grade 5	< 15	Kidney failure

Table 2: Comparative analysis of Circulatory Parameters between 3 Study Groups

S. No.	Parameters	Controls (GROUP I) Mean $\pm$ SD	Diabetes without Nephropathy (GROUP II) Mean $\pm$ SD	Diabetes with Nephropathy (GROUP III) Mean $\pm$ SD	Comparison between groups (P-Value)			
					I & II##	I & III##	II & III##	I, II, & III #
1	Age (in years)	51.02 $\pm$ 9.04	52.14 $\pm$ 7.80	53.70 $\pm$ 9.55	0.25	0.07	0.18	0.31
2	Sex	(male) n	35	20	26	0.00*	0.06	0.22
3		(females) n	15	30	24	*		0.01*
4	Duration of Diabetes (in years)	Nil	3.05 $\pm$ 1.99	10.42 $\pm$ 3.66	-	-	0.00**	-
5	FPG/RBS (mg/dL)	88.87 $\pm$ 17.47	212.41 $\pm$ 98.97	256.93 $\pm$ 72.76	0.00*	0.00**	0.00**	0.00**
6	HbA1c (%)	5.06 $\pm$ 0.54	7.80 $\pm$ 1.07	9.09 $\pm$ 2.75	0.00*	0.00**	0.00**	0.00**
7	Serum Protein (g/dL)	6.81 $\pm$ 0.76	6.88 $\pm$ 0.69	7.17 $\pm$ 1.31	0.31	0.04*	0.08	0.13
8	Serum ALT (IU/L)	33.62 $\pm$ 13.88	36.40 $\pm$ 17.36	45.86 $\pm$ 42.71	0.18	0.02*	0.07	0.07
9	Serum Urea (mg/dL)	29.17 $\pm$ 8.08	32.63 $\pm$ 7.73	71.93 $\pm$ 39.21	0.01*	0.00**	0.00**	0.00**
10	Serum Creatinine (mg/dL)	0.82 $\pm$ 0.11	0.92 $\pm$ 0.11	1.94 $\pm$ 0.75	0.00*	0.00**	0.00**	0.00**
11	e GFR (CKD-EPI 2021) (mL/min/1.73m ²)	101.22 $\pm$ 10.69	85.32 $\pm$ 12.45	40.78 $\pm$ 15.45	0.01*	0.00**	0.00**	0.00**
12	Urine albumin excretion (UAE) (mg/24 h)	17.11 $\pm$ 2.76	20.13 $\pm$ 3.51	409.70 $\pm$ 201.16	0.00*	0.00**	0.00**	0.00**
13	Plasma MDA (nmol/mL)	21.26 $\pm$ 12.06	49.39 $\pm$ 37.21	62.38 $\pm$ 36.73	0.00*	0.00**	0.04*	0.00**
14	Lysate SOD (U/mg/mL Protein)	0.29 $\pm$ 0.15	0.23 $\pm$ 0.10	0.19 $\pm$ 0.08	0.00*	0.00**	0.02*	0.00**
15	Lysate CAT (U/min/mg/mL Protein)	16.32 $\pm$ 3.14	14.31 $\pm$ 3.99	9.94 $\pm$ 6.07	0.00*	0.00**	0.00**	0.00**

#ANOVA, ##Independent t-test, * $p < 0.05$, ** $p < 0.01$, considered statistically significant, HbA1c: Glycosylated Haemoglobin, ALT: Alanine transaminase, MDA: Malondialdehyde, SOD: Superoxide dismutase, CAT: Catalase. The significant p-values are represented in bold.

Table 3: Correlation analysis between Clinical Parameters among Diabetes Groups without And with Nephropathy

S. No.	Parameters		Diabetes without Nephropathy					Diabetes with Nephropathy				
			eGFR CKD EPI 2021	UAE	MDA	SOD	CAT	eGFR CKD EPI 2021	UAE	MDA	SOD	CAT
1	Duration of diabetes	r- value	-0.137	0.098	-0.069	0.074	0.238	-0.240	0.458**	0.068	0.017	0.296*
		p-value	0.34	0.49	0.63	0.60	0.09	0.09	0.00	0.63	0.90	0.03
2	HbA1c	r- value	0.178	-	-0.121	-0.115	0.177	0.113	0.042	-	-	0.174
		p-value	0.21	0.43	0.40	0.42	0.21	0.43	0.77	0.074	0.105	0.22
3	Serum Urea	r- value	-0.029	0.097	0.013	-0.290*	0.098	-	0.392**	-	-	0.310*
		p-value	0.84	0.50	0.92	0.04	0.49	0.00	0.00	0.166	0.030	0.02
4	Serum Creatinine	r- value	-0.532**	0.460**	-0.274	-0.074	0.127	-	0.470**	-	0.081	0.250
		p-value	0.00	0.00	0.054	0.60	0.37	0.00	0.00	0.128	0.57	0.07
5	eGFR CKD EPI 2021	r- value	1	-	0.099	-0.066	0.067	1	-	0.168	-	-
		p-value		0.385**					0.461**		0.169	0.32*
6	UAE	r- value		1	-0.113	-0.085	0.204		1	0.036	0.149	0.188
		p-value			0.43	0.55	0.15			0.80	0.29	0.191
7	MDA	r- value			1	-0.057	-			1	-	-
		p-value				0.69	0.69				0.50	0.41
8	SOD	r- value				1	0.016				1	0.297*
		p-value					0.90					0.03

* $p < 0.05$, and ** $p < 0.01$, considered statistically significant, HbA1c: Glycated Haemoglobin, ALT: Alanine transaminase, MDA: Malondialdehyde, SOD: Superoxide dismutase, CAT: Catalase. The significant r & p -values are represented in bold.

4. Conclusions

According to the obtained results on the Diabetes mellitus and diabetic nephropathy are the most common causes of morbidity and mortality worldwide. Hyperglycemia is the result of insulin resistance that causes an increased burden on the cellular and mitochondrial metabolism of glucose and increased production of free radicals (ROS). ROS results in oxidative stress which is a potent marker for damaging cell membrane components like lipids, proteins, and DNA. These could result in mutation and causes alteration in cell signaling or transport mechanisms. To overcome this oxidative stress burden, antioxidants play a crucial role in detoxification through various mechanisms. In the present study, we have found that the oxidative stress parameter MDA is found higher in T2DM and DN subjects as compared to controls with the simultaneous decrease in *catalase* and *superoxide dismutase* in both study groups. We conclude that decreasing oxidative stress by early detection of oxidative stress makers and accordingly antioxidant therapy for the management of diabetic nephropathy to end-stage renal disease could be helpful.

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There are some limitations that this study was performed after and during COVID-19 pandemic situation. Further, studies should be performed without the situation of epidemic, pandemic, and any type of chronic complications other than T2DM and DN.

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Heavy Metal Induced Toxicity and Glutathione Enzyme Antioxidants Status in Diabetic Nephropathy: A Case-Control Study in Western U. P., India

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Abstract

Heavy metals (e.g., lead, cadmium, arsenic, etc.) are the serious risk factors for impairment in pancreas and insulin resistant that can lead to hormonal imbalance and metabolism. While the enzyme antioxidants play a defense mechanism against heavy metal toxicity. Furthermore, heavy metals have binding capacity with essential elements (e.g., zinc, copper, selenium, etc.) which disturb their normal functioning. Total no of 120 subjects (40 subjects in 3 groups) were registered as controls and cases of matched age and sex. Cases were divided into two groups: diabetes mellitus and diabetic nephropathy. For screening of diabetes mellitus and diabetic nephropathy, history and biochemical investigations were carried out for control and cases to rule out the other causes of nephropathy. Males and females of age group 30-75 years were included in the study. Endogenous enzyme antioxidants, *glutathione peroxidase (GPx)* and *glutathione reductase (GR)* were analyzed in hemolysate. Heavy metal analysis was performed using whole blood on ICP-OES. The results observed were presented in mean $\pm$ SD format. Various circulatory parameters of controls and cases were compared using independent "t-tests" and ANOVA. Bivariate correlations were determined by Pearson's correlation. Heavy metals such as lead and Cadmium were found significant among the cases as compared to healthy controls ($p = 0.00$). The concentration of heavy metals and *GPx* were found higher in DN group (vis-à-vis DM and healthy control groups). There is a compensatory decrease in *GR* in DN group as compared to DM and healthy control groups.

Keywords: Heavy metals, Glutathione reductase, Glutathione peroxidase, and Diabetic nephropathy

Full-length article

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1. Introduction

Nephropathy or renal disease is a serious health concern that affects ~ 16% of the population worldwide. The prevalence of renal failure is correlated with diabetes and hypertension. As per International diabetes federation report-2022, the prevalence of T2DM worldwide in population of age group 20-79 year was estimated to be ~ 536.6 million cases (10.5%) - 0 which is expected to increase upto ~783.2 million (12.2% by 2045). The prevalence of T2DM was reported to be similar in men and women and highest in the population of the age-group of 75-79 years. [1]. Approximately 30% of T2DM cases progress to diabetic

nephropathy (DN) [2]. DM and DN are correlated to several factors such as heavy metals, essential elements, endogenous enzyme antioxidants, and so forth. In particular, heavy metals such as lead (Pb), cadmium (Cd), arsenic (As), are the serious risk factors for impairment in pancreas and insulin resistant that can lead to hormonal imbalance and metabolism [3]. While the enzyme antioxidant plays a defense mechanism against heavy metal toxicity. Furthermore, the heavy metals have binding capacity with essential elements (e.g., zinc, copper, selenium, etc.) which disturb their normal functioning.

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Estimated GFR (creatinine)

$$= 142 * \min(Scr/\kappa, 1)^\alpha$$

$$* \max(Scr/\kappa, 1)^{-1.200}$$

$$* 0.9938^{Age} \text{ (if female, } * 1.012)$$

Where, the terms *Scr* and *age* (written in superscript) stand for standardized serum creatinine measured in mg/dL and the age of the subjects in years, respectively. Further, the terms κ and α are the constants and correspond to a value of 0.7, and -0.241 for females, respectively. Whereas the value of κ and α for males are 0.9 and -0.302, respectively. The terms *min* (*Scr*/ κ , 1) and *max* (*Scr*/ κ , 1) correspond to minimum of *Scr*/ κ or 1.0 and maximum of *Scr*/ κ or 1.0, respectively. Classification of estimated Glomerular Filtration Rate (eGFR) as per National Kidney Foundation is in 5 groups, eGFR (mL/min/1.73 m²): Grade 1 ≥ 90 , Grade 2: 60-89, Grade 3: 30-59, Grade 4: 15-29 and Grade 5: < 15 ; interpreted as normal or high, mildly decreased, mildly to moderately decreased and severely decreased, respectively.

2.2. Plasma and Lysate separation

Whole blood was collected in an EDTA vial for plasma and lysate preparation. 1 mL of whole blood from EDTA vial is transferred to a 2 mL Eppendorf tube and centrifuged at 2,500 rpm for 15 minutes at 25-30 °C for plasma separation. The RBC pellet which remained intact in the bottom of the tube was used for lysate preparation. Endogenous enzyme antioxidant, glutathione peroxidase (GPx) and glutathione reductase (GR) were analyzed in lysate by Paglia & Valentine (1967) method [16] and Chang et. al. (1978) [13], respectively on MULTISCAN GO with SkanIt Software (Installation code: 73617) (Cat. No.51119300, Thermo-fisher Scientific, Japan). Heavy metal analysis was performed using whole blood using microwave digestion method. Initially, 0.5 mL whole blood sample is transferred in vessel followed by addition of 1.0 mL of Milli-Q-water, 1.0 mL of hydrogen peroxide, 1.5 mL nitric acid, 0.5 mL of perchloric acid, and digested in a Multiwave Reaction System equipped with the 16HF100 Rotor (100 mL PFA vessels, pressure 40 bar) and pressure/Temperature (p/T) sensor. The clear solution obtained after Microwave digestion was analyzed by Inductively coupled plasma optical emission spectroscopy (ICP-OES, Optima 8000, Perkin Elmer) for heavy metal analysis. The statistical analysis was done employing online software Statistical Package for the Social Sciences (SPSS) 16.0 version (SPSS Inc., Chicago, Illinois, USA). The results observed were presented in mean $\pm$ SD. various circulatory parameters of controls and cases were compared using independent sample "t-tests" and ANOVA for continuous variables. The bivariate correlations between quantitative variables were determined by the Pearson's correlation. A "p" value less than 0.05 & 0.01 was considered statistically significant.

3. Results and Discussion

For comparative analysis of various parameters such as age, sex, HbA1c, eGFR, urinary albumin excretion, heavy metals, glutathione enzymes for the subjects of non-diabetic healthy control, diabetes mellitus type 2, and diabetic nephropathy (DN) are shown in Table 1. The as-mentioned data suggest that there was a significant difference in the duration of diabetes between diabetes mellitus and diabetic nephropathy groups at **p-value < 0.001**. The mean of glycated haemoglobin (HbA1c), serum urea, serum creatinine, estimated glomerular filtration rate (eGFR), and Urinary

albumin excretion (UAE) were found significantly higher in diabetic nephropathy group (vis-à-vis DM and healthy control groups) at **p < 0.001**. Both Pb and Cd were separately found significant among the DN cases as compared to healthy controls (**p < 0.001**). Likewise, a significant difference was found for Pb and Cd between DM vs DN case groups for Pb (**p < 0.001**) and Cd (**p = 0.02**), respectively. No major differences were found between diabetic and non-diabetic healthy control groups for both GPx & GR enzymatic antioxidants. Furthermore, activities of GPx were found statistically significant between two groups viz., DN vs DM (**p = 0.02**) and DN vs non-diabetic healthy controls (**p < 0.001**), and in combination of all three groups (**p = 0.02**). Whereas activities of GR were not found significantly different between any comparison groups except diabetes mellitus vs non-diabetic healthy controls **p = 0.01**. Duration of diabetes in cases of DM has shown a negative association with HbA1c while a positive association in cases of DN for **r-values = -0.317* and 0.321***, respectively. It has been found that a significant negative association of eGFR with UAE in DM as well as in DN group for **r-values = -0.410** and -0.446****, respectively (Table 2). As shown in Table 3, duration of diabetes has shown a positive association with GPx in DM group (**r = 0.425****) only while for DN group (**r = -0.323***) it has a negative association with lead (Pb). We could not find any significant association of eGFR, UAE, and Pb with either of parameters like Pb, Cd, GPx, or GR. Additionally, we have found a significant negative association of Cd with GPx (**r = -0.367***) and a positive association of GPx with GR in diabetic nephropathy subjects (**r = 0.411****). In the present study age and sex-matched subjects were included in 3 groups such as diabetic nephropathy (DN), diabetes mellitus (DM) without nephropathy, and healthy control groups. Significant difference was found between the duration of diabetes between DN and DM. All clinical parameters such as glycated haemoglobin (HbA1c), estimated glomerular filtration rate (eGFR), serum urea, serum creatinine, and Urinary albumin excretion (UAE) were found to be higher in DN as compared to DM as well as healthy control. Similarly, the concentration of heavy metals (Pb and Cd), and antioxidant enzyme GPx were found higher in DN group (vis-à-vis DM and healthy control groups). There is a compensatory decrease in antioxidant enzyme GR in DN group as compared to DM and healthy control groups. Based on Pearson correlation analysis (r-value), there is a strong negative correlation with severity of diabetes (i.e., duration of diabetes) with HbA1c parameter in DM group without nephropathy and a positive association with HbA1c as well as urinary albumin excretion (UAE) in DN group. Estimated GFR has been found in strong negative association with UAE in patients of both the DN and DM without nephropathy group. In cases of DM patients without nephropathy, duration of diabetes with GPx and HbA1c with Cadmium has shown a positive association. On the other hand, for diabetic nephropathy cases, a negative correlation was found between the two set of parameters, i.e., (i) extent of diabetes with Pb and (ii) concentration of Cd with GPx. Whereas GPx with GR was found to be positively correlated.

Table 1: Comparative analysis of circulatory parameters between 3 study groups

S. No.	Parameters		Nondiabetic healthy Controls (Group I) Mean ± SD	Diabetes mellitus (Group II) Mean ± SD	Diabetic Nephropathy (Group III) Mean ± SD	Comparison between groups (P-Value)			
						I & II##	I & III ##	II & III ##	I, II, & III #
1	Age (in years)		50.13 ±9.55	52.60±7.27	53.05±10.11	0.09	0.09	0.40	0.30
2	Sex	(male) n	25	20	20	0.25	0.25	1.00	0.43
3		(females) n	15	20	20				
4	Duration of Diabetes (in years)		Nil	3.21±1.91	10.50±3.61	-	-	<0.001***	-
5	HbA1c (%)		5.01±0.50	7.98 ±0.96	9.59±2.83	<0.001***	<0.001***	0.001***	0.001**
6	Serum Urea	(mg/dL)	29.26±8.64	32.31±8.02	74.43±40.30	0.05*	<0.001**	<0.001**	<0.001**
7	Serum Creatinine (mg/dL)		0.81±0.10	0.94±0.11	1.95±0.81	<0.001***	<0.001***	<0.001***	<0.001***
8	e GFR (CKD-EPI 2021) (mL/min/1.73m ²)		100.85±11.42	85.43±12.18	41.05±16.38	<0.001***	<0.001***	<0.001***	<0.001***
9	Urine albumin excretion (UAE) (mg/24 h)		16.82±2.93	20.11±3.11	427.19±207.84	<0.001***	<0.001***	<0.001***	<0.001***
10	Pb (µg/dL)		3.57±0.49	9.26±3.90	18.95±4.63	<0.001***	<0.001***	0.001***	<0.001***
11	Cd (µg/dL)		0.09±0.04	0.07±0.03	0.22±0.11	0.02*	<0.001***	<0.001***	<0.001***
12	GPx (U/mg/mL protein)		1.72±0.90	1.55±1.00	2.13±0.92	0.20	0.02*	<0.001***	0.02*
13	GR (U/min/mg/mL protein)		0.18±0.12	0.15±0.12	0.12±0.12	0.09	0.01**	0.17	0.07

#ANOVA, ##Independent t-test, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, considered statistically significant, HbA1c: Glycosylated Haemoglobin, Pb: Lead, Cd: Cadmium, GPx: Glutathione peroxidase, GR: Glutathione reductase. The significant p-values are represented in bold.

Table 2: Association of Clinical Parameters among Diabetes mellitus and diabetic nephropathy groups (r- values given in the table)

S. No.	Parameters	Association of biochemical parameters					
		Diabetes mellitus			Diabetic nephropathy		
		HbA1c	eGFR CKD EPI 2021	UAE	HbA1c	eGFR CKD EPI 2021	UAE
1	Duration of diabetes	-0.317*	-0.159	0.211	0.321*	-0.169	0.453**
2	HbA1c	1	0.242	0.196	1	0.096	-0.012
3	eGFR CKD EPI 2021		1	-0.410**		1	-0.446**

* $p < 0.05$, and ** $p < 0.01$, considered statistically significant, HbA1c: Glycosylated Haemoglobin, eGFR: estimated glomerular filtration rate, UAE: Urinary albumin excretion. The significant r & p-values are represented in bold.

Table 3: Association of Clinical Parameters among Diabetes mellitus and diabetic nephropathy groups (r- values given in the table)

S. No.	Parameters	Association of toxic and non-toxic parameters									
		Diabetes mellitus					Diabetic nephropathy				
		MDA	Pb	Cd	GPx	GR	MDA	Pb	Cd	GPx	GR
1	Duration of diabetes	-0.038	-0.067	-0.213	0.425**	0.044	0.092	-0.323*	-0.160	0.216	-0.145
2	HbA1c	-0.062	-0.031	0.323*	-0.226	0.099	0.061	-0.140	-0.054	0.027	-0.034
3	eGFR CKD EPI 2021	0.028	-0.176	0.152	-0.063	0.278	0.208	0.011	0.082	-0.020	-0.289
4	UAE	-0.127	0.061	0.019	0.034	-0.150	0.076	-0.180	-0.24	0.199	0.170
5	Pb		1	0.180	0.082	0.138		1	0.107	0.112	0.148
6	Cd			1	-0.276	0.129			1	-0.367*	-0.069
7	GPx				1	-0.123				1	0.411**

* $p < 0.05$, and ** $p < 0.01$, considered statistically significant, HbA1c: Glycosylated Haemoglobin, Pb: Lead, Cd: Cadmium, GPx: Glutathione peroxidase, GR: Glutathione reductase. The significant r & p-values are represented in bold.

Lead (Pb) is usually ingested by drinking water or food

(Pb) is usually ingested by drinking water or food and absorbed by the intestines as well as inhaled from air by lungs through environmental exposure. Circulating lead in body fluid is transported into various tissues and organs including kidneys and liver. In particular, kidney cells which are particularly susceptible to lead-induced damage such as proximal tubular cells [17], [18]. Few studies observed a decline in functioning of kidneys in middle-aged and elderly peoples who depend upon both on lead stores and their circulation in blood among diabetic individuals. [19], [20]. Heavy metals get deposited in kidney tubules resulting in their higher localized concentrations in tubular cells as compared to that in other body tissues. Such a state of overloaded heavy metals causes deterioration of the tubular cells leading to tubular proteinuria [21].

In a cross-sectional study, it was found that high cadmium level in blood is associated with DM and its complications [22]. In an experimental study, severe consequences of cadmium (Cd) toxicity caused damage to the kidneys and its functions [23]. Cadmium forms a complex with metal transporting protein metallothionein and is transported to glomeruli and subsequent filtration. Due to excessive transport and release of free cadmium ions from metallothionein-Cd²⁺ complex tubular cells are overloaded, thereby inducing oxidative stress, and downregulating mitochondrial enzymes causing kidney damage [24], [25], [26]. Biomolecules, such as albumin, metallothionein, and glutathione (GSH) contains thiol (-SH) group that exhibit good affinity to cadmium and lead ions present in blood and are therefore intracellularly detoxified by GSH. [60], [17]. Although, heavy metal- SH molecules binding via intracellular pathways provide a protective mechanism, however, such a binding might contribute to intracellular retention of the heavy metals as well. that the above discussion clearly shows that GSH is utilized as a complexing and/or protecting agent during the exposure [27].

Using glutathione (GSH), GPx catalyzes the reduction of hydrogen peroxide or lipid peroxides to form water or lipid alcohols [28]. The role of GPx in cellular defense against oxidant attack has been discussed for many years. [29], [30] It is anticipated that the GPx protects the erythrocyte against peroxides that are generated intracellularly or exogenously. The relative importance of GPx in defending the cell has been debated since the discovery of glutathione peroxidase [31].

Chronic ingestion to toxic metals such as Pb and Cd can be hazardous to the kidneys. This will affect individuals GFR getting reduced. Patients with deranged kidney function, either associated to disease, aging, and/or a combination of both, are susceptible to these toxicants [27]. The heavy metals may be hastened out of the body by gastric lavage, activated charcoal, and skin decontamination. Supportive care can be in the form of intravenous fluids, oxygen, ventilatory, and circulatory support as needed. In severe cases, hemodialysis, and plasma exchanges. Specific therapy to remove the HM is by the administration of chelating agents, which are metal-binding ligands specific for each metal forming a ring-structure called a chelate. It is more effective when used in combination with antioxidants [32]. However, no such ideal chelator exists, and the search is on. Due to several drawbacks of chelating agents, research has focused on plant products to serve such functions. These naturally occurring phytochelators may offer a cheaper and safer alternative, especially in economically downtrodden nations where the

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problem is manifold [33]. In treating lead (Pb) toxicity, DMSA (meso-2,3-dimercaptosuccinic acid) was superior to dimercaprol, also called British anti-Lewisite (BAL) plus calcium ethylene diamine tetra acetic acid. This resulted in increased Pb accumulation in various organs, including the brain. BAL was ineffective, but a combination of deferasirox and deferiprone was extremely effective in Cd toxicity [34].

4. Conclusions

Diabetic nephropathy is one of the most common health problems worldwide. Taking this serious issue into consideration, we observed heavy metal exposure in individuals and derangement in glutathione enzyme antioxidant system. In the present study, we have found that heavy metals were comparatively higher in diabetic nephropathy subjects. Glutathione peroxidase activity is negatively associated with cadmium level in blood. As the cadmium toxicity progresses glutathione peroxidase activity increases which uses substrate glutathione. A positive correlation was found between glutathione peroxidase activity and glutathione reductase. The reduced glutathione (GSH) converts itself into oxidized glutathione (GSSG) by the enzyme glutathione peroxidase and oxidized glutathione reduces itself by the enzyme glutathione reductase. Heavy metal detoxification uses glutathione and glutathione peroxidase compensatory increase in oxidized glutathione, which is normally detoxified by glutathione reductase. In case of excess oxidized glutathione, glutathione reductase might be unable to reduce all the oxidized glutathione.

Note: Authors declare that no competing interests that influenced for doing the work reported here.

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General Medicine

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ITV, Diabetes mellitus, Anti-Hypertensive Therapy, Insulin, ...

Acquired Immune Deficiency Syndrome (AIDS), caused by the Human Immunodeficiency Virus (HIV), has been one of the largest pandemic and global health challenges in contemporary times. Approximately 38 million (38.4 million) 45.7 million people globally are living with HIV in 2022. Around 13 million (13 million)-17 million people were infected with HIV in 2022. Diabetes is a chronic metabolic disease characterized by elevated levels of blood glucose over time, which leads over time to severe damage to the heart, blood vessels, eyes, kidneys, and nerves. About 422 million individuals worldwide have diabetes, with the majority residing in low- and middle-income countries, and 3.4 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes have been steadily increasing in the past few decades.

An enzyme in glucose oxidizers has been observed in HIV patients affecting high active Antiretroviral Therapy (HAART). The effect of HAART on glucose metabolism resulting in Type 2 Diabetes Mellitus (DM2) is not clearly elucidated. However, the enzyme-based Nucleoside Reverse Transcriptase Inhibitors (NRTIs) and Protease Inhibitors (PIs) are of significant concern. Thymidine NRTIs such as AZT combined with PI's or NRTIs cause a direct metabolic outcome by up to 20% directly interfering to the glucose metabolism [14]. However, in [1] was observed when combined with NVP as a nucleoside. Poljanec et al. (2007) proposed that NRTIs induce cumulative effects leading to the development of DM2, while PIs induce a more variable effect.

The effect of PIs on lipid metabolism is also assessed by elevated levels of triglycerides (TG), low lipoproteins (LC) and HDL cholesterol, along with decreased levels of HDL cholesterol. The use of statins has been linked to significantly lowered serum TC and TG levels in both nonlipidemic and HIV-positive patients [1]. High rates of lipid abnormalities have been detected in patients receiving PIs. The global burden of HIV individuals is increasing day by day and diabetes remains the leading global disease, with its risk factors increasing. About HIV and Type 2 diabetes are increasing worldwide. Hence, our aim is to study the prevalence of the disease in HIV individuals and their management.

1 To study the prevalence of *Cytomegalovirus* in HIV patients
2 To study risk factors associated with *Cytomegalovirus* in HIV patients

The study was conducted at the Department of Medicine at ULSM Medical College and VAH Hospital, Denver, 1989-1990, during the period of 2019-2021. The study was a cross-sectional prevalence study that included patients with confirmed HIV status (ELISA) admitted to the Medicine ward, those attending the Medicine IDPO, and patients attending the AIDS Center. Around 120 participants were selected randomly, and all patients were interviewed, with a detailed history taken about the duration of HIV, ARV status and other comorbid conditions such as type 2 Diabetes mellitus or any other chronic illness. Participants underwent a detailed physical examination, and necessary blood investigations were performed. Statistical treatment was obtained from all patients for the study, and patient confidentiality will be maintained.

Persons authorized in the study were requested to select the following criteria:

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Persons meeting any of the following criteria were excluded from the study:

- Low red blood counts in lupus blood work levels, including hemoglobin, hematocrit, and red blood cells

Diabetes mellitus is one of the most common diseases affecting a large population. Diabetes mellitus complicating HIV was recognized as a therapy in an attempt to be treated. In this study, the prevalence of diabetes mellitus in HIV patients receiving antiretroviral therapy has been evaluated. The study was conducted in a cross-sectional population study in which a total of 120 HIV patients receiving antiretroviral therapy were included in the study. It includes 60% males and 40% females. In our study, 100% of 11-15 years of age, 80% of 16-20 years, 100% of 21-25 years, 80% of 26-30 years, 100% of 31-35 years, 100% of 36-40 years, 100% of 41-45 years, 100% of 46-50 years, 100% of 51-55 years, 100% of 56-60 years, 100% of 61-65 years, 100% of 66-70 years, 100% of 71-75 years, 100% of 76-80 years, 100% of 81-85 years, 100% of 86-90 years, 100% of 91-95 years, 100% of 96-100 years, 100% of 101-105 years, 100% of 106-110 years, 100% of 111-115 years, 100% of 116-120 years, 100% of 121-125 years, 100% of 126-130 years, 100% of 131-135 years, 100% of 136-140 years, 100% of 141-145 years, 100% of 146-150 years, 100% of 151-155 years, 100% of 156-160 years, 100% of 161-165 years, 100% of 166-170 years, 100% of 171-175 years, 100% of 176-180 years, 100% of 181-185 years, 100% of 186-190 years, 100% of 191-195 years, 100% of 196-200 years, 100% of 201-205 years, 100% of 206-210 years, 100% of 211-215 years, 100% of 216-220 years, 100% of 221-225 years, 100% of 226-230 years, 100% 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1091-1095 years, 100% of 1096-1100 years, 100% of 1101-1105 years, 100% of 1106-1110 years, 100% of 1111-1115 years, 100% of 1116-1120 years, 100% of 1121-1125 years, 100% of 1126-1130 years, 100% of 1131-1135 years, 100% of 1136-1140 years, 100% of 1141-1145 years, 100% of 1146-1150 years, 100% of 1151-1155 years, 100% of 1156-1160 years, 100% of 1161-1165 years, 100% of 1166-1170 years, 100% of 1171-1175 years, 100% of 1176-1180 years, 100% of 1181-1185 years, 100% of 1186-1190 years, 100% of 1191-1195 years, 100% of 1196-1200 years, 100% of 1201-1205 years, 100% of 1206-1210 years, 100% of 1211-1215 years, 100% of 1216-1220 years, 100% of 1221-1225 years, 100% of 1226-1230 years, 100% of 1231-1235 years, 100

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

TO STUDY PREVALENCE OF DIABETES MELLITIS AND ITS RISK FACTOR IN HIV PATIENTS



General Medicine

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ABSTRACT

Diabetes mellitus complicating HIV and its medical therapy is an area to be focused. An increase in glucose disorders has been observed in HIV patients receiving HAART. Aim of the study was to find out prevalence of diabetes mellitus and its risk factor in HIV patients. Study was conducted in Meerut. The study will be of cross-sectional prevalence study which patients of the confirmed status of HIV (+) T4 < 350/mm³ admitted in Medicine ward and attending clinic in HIV clinic and also attended at ART & VLRT. A total of 120 HIV patients receiving antiretroviral therapy were enrolled in the study. The prevalence of diabetes mellitus in our study population was found to be 33%. Histories of symptoms such as polyuria, polydipsia, blurred vision, weight loss, and other symptoms of diabetes mellitus were noted. The prevalence of diabetes mellitus in our study population was found to be 33%. Histories of symptoms such as polyuria, polydipsia, blurred vision, weight loss, and other symptoms of diabetes mellitus were noted. The prevalence of diabetes mellitus in our study population was found to be 33%. Histories of symptoms such as polyuria, polydipsia, blurred vision, weight loss, and other symptoms of diabetes mellitus were noted.

KEYWORDS

HIV, Diabetes mellitus, Anti Retroviral Therapy, Hyperglycemia

INTRODUCTION

Acquired immunodeficiency syndrome (AIDS), caused by the Human Immunodeficiency Virus (HIV), has been one of the largest pandemics and global health challenges in recent years. Approximately 38.4 million (33.4 million-45.3 million) people globally were living with HIV in 2020. Around 1.3 million (1 million-1.7 million) people were living with HIV in 2020 [1]. Diabetes is a chronic metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to severe damage to the heart, blood vessels, eyes, kidneys, and nerves. About 422 million individuals worldwide have diabetes, with the majority residing in low- and middle-income countries, and 2.3 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades [2].

An increase in glucose disorders has been observed in HIV patients receiving highly active antiretroviral therapy (HAART) [3]. The effect of HAART on glucose metabolism resulting in Type 2 Diabetes Mellitus (DM2) is not clearly elucidated. However, the nucleoside-based Nucleoside Reverse Transcriptase Inhibitors (NRTIs) and Protease Inhibitors (PIs) are of significant concern. Thymidine NRTIs such as AZT combined with 3TC were found to increase insulin resistance by up to 25% markedly increasing the risk of insulin resistance [4]. However, in HIV, we observed when combined with NVP as a backbone. Eshkol et al. (2007) proposed that NRTIs induce compensatory effects leading to the development of DM2, while PIs induce only metabolic effects.

The effect of PIs on lipid metabolism is characterized by elevated levels of triglycerides (TG), total cholesterol (TC), and LDL-cholesterol, along with decreased levels of HDL-cholesterol. The use of statins has been linked to significantly increased serum TC and TG levels in both antiretroviral and HIV-positive patients [5]. High rates of lipid abnormalities have been detected in patients receiving PIs. The global burden of HIV individuals is increasing day by day and diabetes remains the leading global disease, with its risk factors increasing. About HIV and Type 2 diabetes are immunosuppressed states, our aim is to study the prevalence of the disease in HIV individuals and their risk factors.

AIM AND OBJECTIVES

- 1 To study the prevalence of Diabetes Mellitus in HIV Patients
- 2 To study risk factors associated with Diabetes Mellitus in HIV Patients

MATERIALS AND METHODS

The study was conducted in the Department of Medicine at LLRM Medical College and SHIP Hospital, Meerut. Prior to the study, during the period of 2020-2021. The study was a cross-sectional prevalence study that included patients with confirmed HIV status (ELISA) admitted to the Medicine ward, those attending the Medicine OPD, and patients attending the ART Center. Around 120 participants were selected randomly, and all patients were interviewed, with a detailed history taken about the duration of HIV, ART status, and other comorbid conditions such as Type 2 Diabetes mellitus or any other chronic illness. Participants underwent a detailed physical examination, and necessary blood investigations were performed. Laboratory reports were obtained from all patients for the study, and patient confidentiality will be maintained.

Inclusion Criteria:

Patients included in the study were required to meet the following criteria:

- Age of more than 18 years.
- Confirmed HIV-positive status determined by ELISA testing.

Exclusion Criteria:

Patients meeting any of the following criteria were excluded from the study:

- Use of drugs known to impact blood sugar levels, including corticosteroids, thiazides, diuretics, and anti-psychotics.

RESULTS AND DISCUSSION

Diabetes mellitus is one of the most common diseases affecting a large population. Diabetes mellitus complicating HIV and its medical therapy is an area to be focused. In this study, the prevalence of diabetes mellitus in HIV patients receiving antiretroviral therapy has been evaluated. The study was conducted in a cross-sectional prevalence study in which a total of 120 HIV patients receiving antiretroviral therapy were enrolled in the study. It includes 66% males and 34% females. In our study, majority (110%) of all under the age group of 18-44 years were covered by 20% under 18 years, 14% under 18-44 years, 16% under 45-64 years, and 50% under 65 years and above. The age group of 45-64 years was not studied. 47% received protease inhibitors as antiretroviral therapy and 53% of the study population received nucleoside reverse transcriptase inhibitors as antiretroviral therapy. In our study, patients who had ART for 6 months to 2 years comprised the most (33%) followed by 2-4 years (14%), 4-6 years (13%), 6-8 years (10%), and more than 8 years comprised 17% of the study population.

General Medicine

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ABSTRACT

Diabetes mellitus complicating HIV and acquired dyslipidemia are seen by the liverward. An increase in lipoprotein disorders has been observed in AIDS patients receiving HAART. Aim of this study was to find out prevalence of diabetes mellitus and its risk factors in this patient population. Study design and methods: The study will be of cross-sectional type done at tertiary care hospital. A retrospective analysis of medical records of HIV + TB patients in Medicine ward and internal medicine ward (IPD) will also be attempted at ART + TB ward. Age and CD4 counts were noted in all cases. All cases were screened for the study. Results: The prevalence of diabetes mellitus in study population was found to be 8.3%. Metabolic ally significant changes were seen in blood sugar, fasting blood sugar and HbA1c, triglycerides and HDL cholesterol, lipoproteins and LDL cholesterol, C-peptide and sensitivity of HIV patients. There were no significant differences in anthropometry and therapy between groups. Conclusion: Diabetes mellitus complicating HIV and acquired dyslipidemia are seen by the liverward. An increase in lipoprotein disorders has been observed in AIDS patients receiving HAART. Aim of this study was to find out prevalence of diabetes mellitus and its risk factors in this patient population. Study design and methods: The study will be of cross-sectional type done at tertiary care hospital. A retrospective analysis of medical records of HIV + TB patients in Medicine ward and internal medicine ward (IPD) will also be attempted at ART + TB ward. Age and CD4 counts were noted in all cases. All cases were screened for the study. Results: The prevalence of diabetes mellitus in study population was found to be 8.3%. Metabolic ally significant changes were seen in blood sugar, fasting blood sugar and HbA1c, triglycerides and HDL cholesterol, lipoproteins and LDL cholesterol, C-peptide and sensitivity of HIV patients. There were no significant differences in anthropometry and therapy between groups. Conclusion: Diabetes mellitus complicating HIV and acquired dyslipidemia are seen by the liverward. An increase in lipoprotein disorders has been observed in AIDS patients receiving HAART.

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Acquired immunodeficiency Syndrome (AIDS), caused by the Human Immunodeficiency Virus (HIV), has been one of the largest pandemics and global health challenges in contemporary times. Approximately 39 million (33 million-45.7 million) people globally were living with HIV in 2022. Around 1.3 million (1 million-1.7 million) people were also infected with HIV in 2022¹. Diabetes is a chronic metabolic disease characterized by elevated levels of blood glucose or blood sugar. It leads to long-term damage to the heart, blood vessels, eyes, kidneys, and nerves. About 422 million individuals worldwide have diabetes, with the majority residing in low- and middle-income countries, and 3.5 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes has been steadily increasing over the past few decades².

An increase in plasma cholesterol has been observed in HIV patients receiving highly active antiretroviral therapy (HAART). The effect of HAART on plasma metabolism resulting in Type 2 Diabetes Mellitus (DM2) is not clearly elucidated, however, thyroxine-based Nucleoside Reverse Transcriptase Inhibitors (NRTIs) and Protease Inhibitors (PIs) are of significant concern. Thyroxine NRTIs such as AZT combined with PI's were shown to decrease insulin sensitivity by up to 25% markedly increasing the risk of insulin resistance (IR). However, in III was observed when combined with NVP as a backbone. Hellewell et al (2007) proposed that NRTIs induce oxidative effects leading to the development of DM2, while PI's induce acute metabolic effects.

The effect of HA on lipid metabolism is characterized by elevated levels of triglycerides (TG), low high-density lipoprotein (HDL) cholesterol, and low low-density lipoprotein (LDL) cholesterol. The use of HA has been linked to significantly increased serum TC and TG levels in both asymptomatic and HIV-positive patients. Lipid ratios of lipid abnormalities have been detected in patients receiving HA. The global burden of HIV individuals is increasing day by day and diabetes remains the leading global disease, with its risk factors increasing. Among HIV and type 2 diabetes are numerous commonalities, our aim is to study the prevalence of the disease in HIV individuals and their risk factors.

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2 to study risk factors associated with Hepatitis Mellitus in HBS
Exams

MATERIALS AND METHODS
The study was conducted at the Department of Medicine at ELSSA Medical Center and VA W11 Hospital, Meyers, Utah Pradesh, during the period of 2020-2021. The study was a cross-sectional prevalence study that included patients with confirmed HIV status (ELSSA) admitted to the Medicine ward, those attending the Medicine OPD, and patients attending the AET Center. Around 120 participants were selected randomly, and all patients were interviewed, with a detailed history taken about the duration of HIV, ART status, and other comorbid conditions such as type 2 Diabetes mellitus or any other chronic illness. Participants underwent a detailed physical examination, and necessary blood investigations were performed. Informed consent was obtained from all patients for the study, and national confidentiality will be maintained.

Persons included in the study were requested to meet the following criteria:

[illegible][illegible]

Exclusion Criteria:
Patients meeting any of the following criteria were excluded from the study:

• Liver of dogs blown in liquid blood organ brevis, including
6 pyramidal, 4 triangular, 4 circular, and 4 all pyramidal

Diabetes mellitus is one of the most common diseases affecting a large population. Diabetes mellitus complicating HIV was recognized therapy is in use to be focused. In this study, the persistence of diabetes mellitus in HIV patients receiving antiretroviral therapy has been evaluated. The study was conducted as a cross-sectional questionnaire study in which a total of 120 HIV patients receiving anti-retroviral therapy were included in the study. It includes 60 % males and 40 % females. In our study, majority (111%) at follow-up the age group of 11-40 years, 40% under 20%, under 41 years, 19%, under 10-40 years, 16%, under the age group of 41-60 years in our study, 41% received previous diabetes mellitus treatment and 59% of the study population received anti-diabetic diabetic treatment regimen. In our study, patients who had A1C for 6 months to 2 years comprised the most (30%), followed by 2-4 years (42%), 4-6 years (19%), less than 6 months (15%) and more than 6 years comprised 1% of the study population.



Heavy Metal Induced Toxicity and Glutathione Enzyme Antioxidants Status in Diabetic Nephropathy: A Case-Control Study in Western U. P., India

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Abstract

Heavy metals (e.g., lead, cadmium, arsenic, etc.) are the serious risk factors for impairment in pancreas and insulin resistance that can lead to hormonal imbalance and metabolism. While the enzyme antioxidants play a defense mechanism against heavy metal toxicity. Furthermore, heavy metals have binding capacity with essential elements (e.g., zinc, copper, selenium, etc.) which disturb their normal functioning. Total no. of 120 subjects (40 subjects in 3 groups) were recruited as controls and cases of matched age and sex. Cases were divided into two groups: diabetic mellitus and diabetic nephropathy. The screening of diabetes mellitus and diabetic nephropathy, fasting and biochemical investigations were carried out for control and cases to rule out the other causes of nephropathy. Males and females of age group 30-75 years were included in the study. Endogenous enzyme antioxidants, glutathione peroxidase (GPx) and glutathione reductase (GR) were analyzed in hemolyte. Heavy metal analysis was performed using whole blood on ICP-AES. The results observed were presented in mean $\pm$ SD format. Various circulating parameters of controls and cases were compared using independent "t-test" and ANOVA. Bivariate correlations were determined by Pearson's correlation. Heavy metals such as lead and cadmium were found significant among the cases as compared to healthy controls ($p = 0.00$). The concentration of heavy metals and GPx were found higher in DN group (vs. DM and healthy control group). There is a compensatory decrease in GR in DN group as compared to DM and healthy control groups.

Keywords: Heavy metals, Glutathione reductase, Glutathione peroxidase, and Diabetic nephropathy

Full-length article

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1. Introduction

Nephropathy or renal disease is a serious health concern that affects ~16% of the population worldwide. The prevalence of renal failure is correlated with diabetes and hypertension. As per International Diabetes Federation report-2022, the prevalence of T2DM worldwide in population of age group 20-79 year was estimated to be ~536 million cases (8.5%) [1] which is expected to increase upto ~783.2 million (12.2% by 2045). The prevalence of T2DM was reported to be similar in men and women and highest in the population of the age-group of 75-79 years [1]. Approximately 80% of T2DM cases progress to diabetic

nephropathy (DN) [2]. DM and DN are correlated to several factors such as heavy metals, essential elements, endogenous enzyme antioxidants, and so forth. In particular, heavy metals such as lead (Pb), cadmium (Cd), arsenic (As), are the serious risk factors for impairment in pancreas and insulin resistance that can lead to hormonal imbalance and metabolism [3]. While the enzyme antioxidants play a defense mechanism against heavy metal toxicity. Furthermore, the heavy metals have binding capacity with essential elements (e.g., zinc, copper, selenium, etc.) which disturb their normal functioning.



Role of oxidative stress and enzymatic antioxidants status in diabetic nephropathy (DN) patients in western Uttar Pradesh

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Abstract

Metabolic abnormalities in type 2 diabetic patients can increase the generation of free radicals which leads to oxidative stress. This leads to dysfunction in insulin secretion and action leading to diabetic complications like nephropathy etc. The free radical burden is normally countered by various endogenous and exogenous antioxidants. The study aims to find the relationship between oxidative stress and enzyme antioxidants in DN. This study was carried out at Lalit Lajpat Rai Memorial Medical College, Meerut, U. P. from 2021-22. This was a type of case-control study. Total 150 subjects of age and sex matched were enrolled in 03 groups. Healthy control and the cases divided into 2 groups of diabetes without and with nephropathy. Malondialdehyde (MDA) in plasma, superoxide dismutase (SOD) and catalase (CAT) were analyzed in hemolysate. The results observed were presented as mean $\pm$ SD. Controls and cases were compared using "t-test" and ANOVA. The correlations were determined by the Pearson's correlation "p" value. $p < 0.05$ considered significant. Comparison of various circulatory parameters found a significant difference between cases as compared to controls at $p < 0.05$. Correlation of MDA with oxidative in DN group $p < 0.01$ was found to be significant. A correlation of MDA with oxidative was found to have a positive correlation in DN. We conclude that with the severity of disease oxidative stress was increased and enzyme antioxidants decreased. In patients of DN oxidative were found a significant correlation with MDA, SOD, CAT etc, but we did not find significant association between MDA and SOD or CAT in western U. P.

Keywords: Oxidative stress, enzyme antioxidants, diabetes mellitus, and diabetic nephropathy

Full length article: <https://doi.org/10.22324/2424-4066.2207001>

1. Introduction

Diabetes mellitus (DM) and its complications are the major cause of morbidity and mortality worldwide [1]. The global prevalence of diabetes in adults was reported 46.3 million adults and 77 million adults have diabetes in India as per data estimated in 2019. The prevalence of diabetes and its associated complications is gradually increasing with increasing of its risk factors such as sedentary lifestyle, eating fast food or packed food, smoking consumption and mental stress which results in chronic hyperglycemia, hypertension, metabolic and genetic alterations [2]. DN is the major cause of kidney disease and affects ~30-40% of type 2 diabetes

mellitus (T2DM) patients. It is defined by increased urinary excretion of albumin protein within any other renal diseases and increases the risk of death. Chronic hyperglycemia and genetic alterations are the risk factors causing metabolic, haemodynamic, and vascular abnormalities in diabetic complications [3]. Metabolic disorders characterized by hyperglycemia which is the result of insulin resistance or beta cell dysfunction [4]. During glucose metabolism and energy production, generation of free radicals such as $\cdot O_2^-$, $\cdot OH$, $\cdot NO$ etc., which are also known as reactive oxygen or nitrogen species (ROS or RNS) occurs in excess leading to oxidative stress. Endogenous or exogenous antioxidants reduce ROS and detoxify them by neutralization. In case of



"Prevalence of dyslipidemia in retroviral patients on ART (TLE) -At a tertiary care center" western UP

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Abstract:

Since the discovery of antiretroviral therapy (ART), it has significantly reduced the progression of human immunodeficiency virus (HIV) to acquired immunodeficiency syndrome (AIDS). Although the clinical benefits are considerable, the adverse effects associated with these antiretroviral regimens, particularly a lipodystrophy syndrome characterized by changes in body fat distribution, dyslipidemia, and insulin resistance. The hyperlipidemia is attributable to increases in very low density lipoprotein (VLDL) and low density lipoproteins (LDL). Total cholesterol and increase in HDL. It can produce serious cardiovascular complications including atherosclerotic dysfunction and atherosclerosis.^{1,2}

Aims and objectives:-

To see the prevalence of dyslipidemia in retroviral patients who are on ART and its association with newly diagnosed HIV patients.

Methodology:-

The study was conducted in medicine department LLRM Medical College Meerut. Patients were taken from ART VLIS centre LLRM Medical College Meerut. We classified HIV patients as those on first line ART (TLE).

negative for HIV infection, who were not on any registered patients and their first visit before starting any treatment during the same period as control. These patients were interviewed regarding their symptoms, thorough physical examination, antihypertensive measurement, CD-4 count, and haemoglobin measurement, and

all these values were compared with medicine, laboratory values collected at established.

Results:-

Out of 142 cases, 90 (63.3%) were male and 52 (36.6%) were female. In control group 48 (32.7%) were male 43 (47.2%). Maximum no. of patients both in cases and control group fall in between the range of 18-40 years of age group. On comparing anthropometric parameter (weight, waist hip ratio, and BMI) between cases and control group there were no significant difference found ($p > 0.05$). On comparing biochemical parameters (total cholesterol, triglyceride, HDL, VLDL) between cases and control group no significant difference were found except in LDL level. Difference in CD4 count in cases and control (cases CD4 538.13±308, control CD4 456±312.67, $p < 0.0001$) were found significant.

Conclusion:-

We concluded from our study that patients on ART had high level lipid profile derangement than control group and difference were statistically significant ($p < 0.01$). We advocate effective life style modification and pharmacological treatment for dyslipidemia in patients on ART.

Key words:- HIV, AIDS, ART, dyslipidemia, LDL, HDL, Total cholesterol.

1. Introduction:-

Since the identification of first cases of HIV/AIDS in June 1981 in Los Angeles, USA, there have been tremendous advances in the field of HIV prevention, diagnosis, care and treatment globally. This global progress is not only limited to identification of newer molecules

Young Patients of Acute Coronary Syndrome

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Abstract: *Introduction:* Metabolic syndrome (MS) is a clinical and biological entity of lipid and nonlipid factors of metabolic origin, which places subjects at risk for cardiovascular and cerebrovascular diseases. *Aims and Objectives:* To study profile of Metabolic Syndrome in Young Patients of Acute Coronary Syndrome. *Methods:* The study type is cross sectional study. The work was conducted in DEPARTMENT OF MEDICINE, L. L. R. M. MEDICAL COLLEGE, MEERUT. A sample size of 120 patients attending medicine OPD/PPD and Cardiology OPD were selected as per criteria. *Results:* Among the study population 58 participants had Metabolic Syndrome and 62 participants did not have Metabolic Syndrome. *Conclusion:* The prevalence of metabolic syndrome in young patients presented with acute coronary syndrome was found to be around 48.3%. Among all the components of metabolic syndrome, triglyceride levels was the commonest component elevated (83%). The prevalence of other components were low HDL cholesterol levels (39%), increased waist hip ratio (48%) and elevated blood pressure (29%).

Keywords: Metabolic syndrome, Acute coronary syndrome, Coronary Artery Disease

1. Introduction

ACS leads to significant effects on patient's psychology, morbidity, and increased financial burden when it occurs at this young age (1, 2). Young patients with ACS on coronary angiography (CAG) show a relatively increased incidence of single-vessel disease and nonobstructive stenosis. The risk as well as the clinical factor profile and the arterial involvement pattern differ between young and elderly CAD patients (3, 4). Metabolic, genetic, and conventional causes may result in CAD occurring at a younger age in India. ACS in very young adults with age ≤ 30 years is rare (5). In India, the prevalence of acute myocardial infarction (AMI) in this population is between 2 - 10% (6).

Coronary artery disease (CAD) is the single most frequent cause of death. The atherosclerotic cardiovascular disease is a chronic disorder developing insidiously, and it remains as the major cause of premature death. Importantly, evidence revealing that increased cardiovascular risk starts to develop at a very young age has accumulated over the past decades.

Metabolic syndrome (MS) is a clinical and biological entity of lipid and nonlipid factors of metabolic origin, which places subjects at risk for cardiovascular and cerebrovascular diseases.

2. Material and Methods

The study type is cross sectional study. The work was conducted in Department of Medicine, L. L. R. M. Medical College, Meerut. A sample size of 120 patients attending medicine OPD/PPD and Cardiology OPD were selected as per criteria.

A pre-structured Proforma was filled up for the study. Each subject was given a thorough work up for history and physical examination to fulfill the inclusion and exclusion criteria. Routine hematological and biochemical investigations were carried out. The following parameters were measured at the time of enrollment into the study:

Inclusion Criteria:

- Patients who will give consent
- Age between 18 to 45 years
- Patients having Acute Coronary Syndrome

Exclusion Criteria:

- Patients on Anti-lipidemic Drugs
- Patients with impaired renal function.
- Cardiomyopathies,
- Patients having thyroid dysfunction.
- Pregnancy

3. Results

Distribution of the Participants in Terms of 'BP (mmHg)'

Table 1: Distribution of BP

BP	Frequency	Percentage	95% CI
Deranged	35	29.2%	21.4% - 38.3%
WNL	85	70.8%	61.7% - 78.6%

- 29.2% of the participants had BP: Deranged.
- 70.8% of the participants had BP: WNL.

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Association of HbA1c with HRCT Thorax among Diabetic and Non-Diabetic COVID Patients

Sandhya Goutam^{*}, Vinod Madan^{**}, Chhaya Mishra^{***}, Snehalata Verma^{***}, Kusuman Chandra^{****}

Abstract

Introduction and objectives: Diabetes mellitus is a multifactorial disease which is slowly growing as a major disease burden on world health. COVID-19 is an active deadly pandemic that is still threatening human lives. It has been observed that the interaction of these two slow and rapid pandemics together leads to severe morbidity and mortality. The study was done to assess the severity of COVID disease in diabetic and non-diabetic patients according to HRCT severity score and duration of hospital stay.

Methods: This retrospective single-centred case-control study was conducted in SVSP Hospital and LAM Medical College, Meerut in patients of COVID-19 during September 2020 to May 2021 of COVID-19 disease. The calculated sample size came out to be 51. So, 51 COVID positive diabetic patients were recruited and an equal number of non-diabetic COVID patients were taken as control. In our study, association of HbA1c with CT severity score and their duration of hospital stay was studied.

Results: It was observed that the HRCT severity score was more in the uncontrolled than in controlled diabetic group of COVID patients. The association of HRCT severity score with various HbA1c levels among diabetic and non-diabetic patients was significant with a value of 0.028. Similarly, the duration of hospital stay was associated with HRCT severity score significantly. HRCT severity score was raised in both the groups diabetic and non-diabetic with significant p values of 0.001 and 0.008 respectively.

Conclusions: COVID-19 disease with diabetes is a lethal combination. Association of HRCT severity score is significantly associated with increasing HbA1c levels rather than diabetes status. Poor glycaemic control can lead to severe disease related complications. Duration of hospital stay was significantly associated with HRCT severity score among both diabetic and non-diabetic COVID patients. Thus, in diabetic patients with strict glycaemic control, early CT imaging of the disease severity can have better outcomes in COVID pandemic.

Keywords: COVID-19 disease, diabetes mellitus (DM), HRCT severity score.

Introduction

COVID-19 disease was a pandemic caused by the novel SARS-CoV-2 discovered in December 2019 in Wuhan, China. COVID-19 infection was highly contagious and communicable which had spread around the world, within weeks. Amongst COVID-19 infected patients, majority of the patients had mild symptoms, but few patients had severe illness including respiratory distress as major feature. COVID-19 disease caused huge death tolls in elderly and co-morbid patients. In India, from 3 January 2020 to 07 pm CEST, 31 May 2021, there have been 44,990,278 confirmed cases of COVID-19 with 5,11,867 deaths reported to WHO. Diabetes mellitus is a chronic multi-system disease, which is caused by inadequate or inappropriate insulin synthesis and metabolism in the body. The resultant hyperglycaemia causes serious damage to various organ systems of the body and results in dysfunction of the immune system. This leads to failure of protection from pathogenic invasions and infections. Diabetes mellitus forms a major portion

of non-communicable disease and causes large mortality and morbidity worldwide. Diabetic people are more likely to develop serious complications with COVID-19 infection. Therefore, this study was done to see the association of HRCT severity score in COVID-19 patients with HbA1c. HRCT thorax is one of the main diagnostic tools for COVID-19 severity grading as well as prognosis. On HRCT thorax scan, infected individuals generally showed a multifocal or mono-focal involvement of ground-glass opacity (GGO). HRCT thorax had been widely accepted for prognostication of COVID-19 pneumonia. Several remarkable chest CT findings had been reported in more than 70% of RT-PCR test-proven COVID-19 cases, including ground-glass opacities, vascular enlargement, bilateral abnormalities, lower lobe involvement, and posterior predilection. The severity of the lung involvement on the CT correlates with the severity of the disease. HRCT thorax imaging severity scores of >18 have been linked to higher risks of death and have been found to be better predictor of death among diabetic COVID-19

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DYSLIPIDEMIA AND INCREASED WAIST CIRCUMFERENCE AS A RISK FACTOR FOR ACUTE CORONARY SYNDROME IN YOUNG PATIENTS

Medicine

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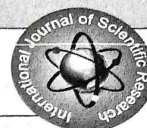
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ABSTRACT

Introduction: Dyslipidemia and Obesity are components of metabolic syndrome placing subjects at risk for cardiovascular and cerebrovascular diseases. It is now considered as both a public health and a clinical problem. Their prevalence varies around the world depending on the age and ethnicity of the populations studied and the diagnostic criteria used in the evaluation. **Aims And Objectives :** To study profile of Dyslipidemia and waist circumference in Young Patients of Acute coronary Syndrome **Methods :** The study type is cross sectional study. The work was conducted in DEPARTMENT OF MEDICINE, L.L.R.M MEDICAL COLLEGE, MEERUT. A sample size of 120 patients attending medicine OPD/IPD and Cardiology OPD were selected as per criteria. **Results :** Among the study population 100 participants had deranged triglycerides, 47 participants had deranged HDL and 58 participants had deranged waist circumference. **Conclusion :** Among all the components of metabolic syndrome, triglyceride levels was the commonest component elevated (83.3%). The prevalence of low HDL cholesterol levels was 39.2% and increased waist hip ratio was 48.3%.

KEYWORDS

Acute coronary syndrome, Dyslipidemia, Waist Circumference .

INTRODUCTION

Elevated levels of total- and low density lipoprotein cholesterol (TC and LDL-C), elevated levels of triglycerides (TG) and low levels of high density lipoprotein cholesterol (HDL-C) are important risk factors for CAD. Early treatment of hyperlipidemia following acute coronary syndrome (ACS) provides potential benefits. Treating dyslipidemia has clear benefits in the primary and secondary prevention of coronary heart disease (CHD) in both sexes. **Obesity** is a highly preventable cause of death and an independent risk factor for cardiovascular diseases (CVD). Premature atherosclerotic events have increased in younger individuals.

MATERIAL AND METHODS

The study type is cross sectional study. The work was conducted in DEPARTMENT OF MEDICINE, L.L.R.M MEDICAL COLLEGE, MEERUT. A sample size of 120 patients attending medicine OPD/IPD and Cardiology OPD were selected as per criteria.

A pre-structured Proforma was filled up for the study. Each subject was given a thorough work up for history and physical examination to fulfill the inclusion and exclusion criteria. Routine hematological and biochemical investigations was carried out. The following parameters were measured at the time of enrollment into the study:

Inclusion Criteria:

- Patients who will give consent
- Age between 18 to 45 years
- Patients having Acute Coronary Syndrome

Exclusion Criteria:

- Patients on Anti-lipidemic Drugs
- Patients with impaired renal function.
- Cardiomyopathies,
- Patients having thyroid dysfunction.
- Pregnancy

RESULTS

Distribution of the Participants in Terms of 'Triglycerides (mg/dL)'

Table 1: Distribution of Triglycerides

Triglycerides	Frequency	Percentage	95% CI
Deranged	100	83.3%	75.2% - 89.3%
WNL	20	16.7%	10.7% - 24.8%

83.3% of the participants had Triglycerides: Deranged. 16.7% of the participants had Triglycerides: WNL.

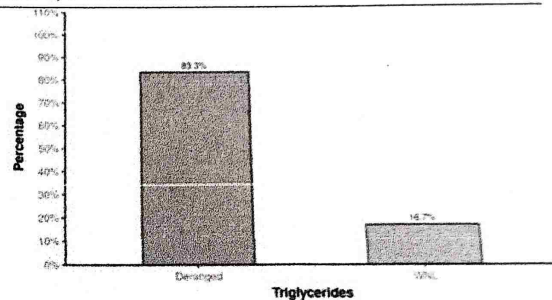
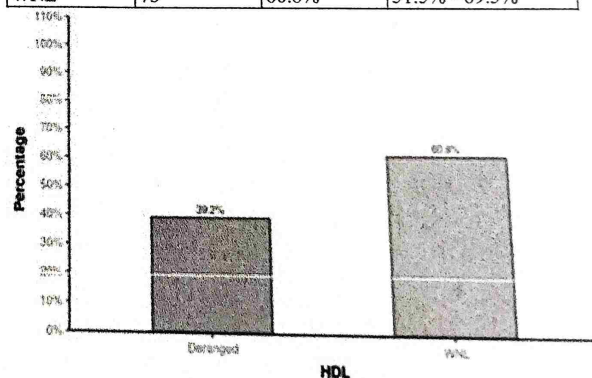


Table 2: Distribution of HDL

HDL	Frequency	Percentage	95% CI
Deranged	47	39.2%	30.5% - 48.5%
WNL	73	60.8%	51.5% - 69.5%



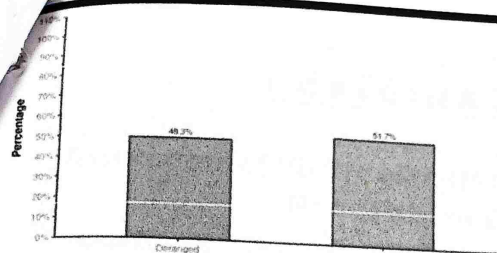
39.2% of the participants had HDL: Deranged. 60.8% of the participants had HDL: WNL.

Distribution of the Participants in Terms of 'Waist Circumference (cm)

Table 3: Distribution of Waist Circumference

Waist Circumference	Frequency	Percentage	95% CI
Deranged	58	48.3%	39.2% - 57.6%
WNL	62	51.7%	42.4% - 60.8%

48.3% of the participants had Waist Circumference: Deranged. 51.7% of the participants had Waist Circumference: WNL.

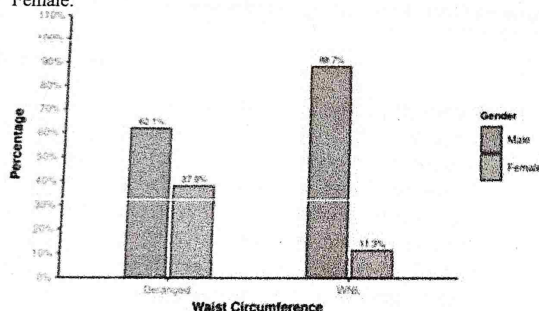


Association Between 'Waist Circumference' and 'Gender'
Table 4: Association between Waist Circumference and Gender

Gender	Waist Circumference		Chi-Squared Test	
	Deranged	WNL	χ^2	P Value
Male	36 (62.1%)	55 (88.7%)	11.605	<0.001
Female	22 (37.9%)	7 (11.3%)		
Total	58 (100.0%)	62 (100.0%)		

Chi-squared test was used to explore the association between 'Waist Circumference' and 'Gender'. There was a significant difference between the various groups in terms of distribution of Gender ($\chi^2 = 11.605$, $p = <0.001$). Strength of association between the two variables (Cramer's $V = 0.31$) (Moderate Association). Strength of association between the two variables (Bias Corrected Cramer's $V = 0.3$) (Low Association). 62.1% of the participants in the group [Waist Circumference: Deranged] had [Gender: Male]. 37.9% of the participants in the group [Waist Circumference: Deranged] had [Gender: Female]. 88.7% of the participants in the group [Waist Circumference: WNL] had [Gender: Male]. 11.3% of the participants in the group [Waist Circumference: WNL] had [Gender: Female].

Participants in the group Waist Circumference: WNL had the larger proportion of Gender: Male. Participants in the group Waist Circumference: Deranged had the larger proportion of Gender: Female.



DISCUSSION

This study, **Dyslipidemia and Increased Waist Circumference as a risk factor for Acute Coronary Syndrome in Young patients** is an observational study done on 120 patients of age < 45 years admitted with acute coronary syndrome in LLRM medical college and SVBP hospital. The study population included 120 patients presented with acute coronary syndrome out of which 91 patients were male and 29 patients were female. Several previous studies have shown that the overall prevalence of metabolic syndrome in Indian population is 31.4%. It was observed that females (48.2%) are more affected from metabolic syndrome than male (16.3%). In this study, The Triglyceride was the most common determinant elevated in patients with or without the metabolic syndrome and it was about 83%. The prevalence of other components were found to be raised i.e. low HDL cholesterol levels (39%) and increased waist hip ratio (58%).

Among the 120 patients, range of age was 50 patients were between the age of 31-40 years and 70 patients were between 41 to 45 years.

The risk factors associated with ACS were also assessed. History of Smoking was present in 75 patients (62.5%) in the study population and History of Alcohol intake was found in 66 patients (55%).

CONCLUSION

Among all the participants, triglyceride levels was the commonest component elevated (83%). The prevalence of other components were

low HDL cholesterol levels (39%) and increased waist hip ratio (48%). This high prevalence of dyslipidemia and obesity in youngs indicates the need for a comprehensive non communicable disease prevention and control program. Increasing awareness and early identification of these clusters of risk factors should be emphasized in designing population wide prevention strategies. The major aim is to emphasise on underlying cause of the syndrome, and also on other cardiovascular risk factors. Most of people lead a physically inactive lifestyle. Therefore, lifestyle modification to be done in these patients. Weight loss usually requires a multifaceted program that includes diet modification and physical exercise. Other factors of CVD should be considered, which are supposed to play an important role includes High Sensitivity C-reactive Protein (hsCRP), increased intima-media thickness of carotid arteries, and increased pulse wave velocity. When the whole spectrum of various causative and risk factors of cardiovascular disease risk is uncovered, we can more effectively execute the preventive strategies in population on a wide range.

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Association of HbA1c with HRCT Thorax among Diabetic and Non-Diabetic COVID Patients

Sandhya Gautam*, Vivek Yadav**, Chhaya Mittal****, Snehlata Verma***, Yasmeen Usmani*****

Abstract

Introduction and objectives: Diabetes mellitus is a multiorgan disease which is slowly growing as a major disease burden on world health. COVID-19 is an active deadly pandemic that is still threatening human lives. It has been observed that the interaction of these two slow and rapid pandemics together leads to severe mortality and morbidity. The study was done to assess the severity of COVID disease in diabetic and non-diabetic patients according to HRCT severity score and duration of hospital stay.

Methods: This retrospective single centred case control study was conducted in SVBP hospital and LLRM Medical College, Meerut in admitted patients during September 2020 to May 2021 of COVID-19 disease. The calculated sample size came out to be 81. So, 81 COVID positive diabetic patients were enrolled and an equal number of non-diabetic Covid patients were taken as control. In our study, association of HbA1c with CT severity score and their duration of hospital stay was studied.

Results: It was observed that the HRCT severity score was more in the uncontrolled than in controlled diabetic group of Covid patients. The association of HRCT severity score with various HbA1c levels among diabetic and non-diabetic patients was significant with p value of 0.029. Similarly, the duration of hospital stay was associated with HRCT severity score significantly. HRCT severity score was raised in both the groups diabetic and non-diabetic with significant p value of 0.001 and 0.008 respectively.

Conclusion: COVID-19 disease with diabetes is a lethal combination. Association of HRCT severity score is significantly associated with increasing HbA1c levels rather than diabetes status. Poor glycaemic control can lead to severe disease related complications. Duration of hospital stay was significantly associated with HRCT severity score among both diabetic and non-diabetic Covid patients. Thus, in known diabetic patients with strict glycaemic control, early CT-imaging of the disease severity can have better outcomes in COVID pandemics.

Key words: COVID-19 disease, diabetes mellitus (DM), HRCT severity score.

Introduction

COVID-19 disease was a pandemic caused by the novel SARS-CoV-2 discovered in December 2019 in Wuhan, China. COVID-19 infection was highly contagious and communicable which had spread around the world, within weeks. Amongst COVID-19 infected patients, majority of the patients had milder symptoms, but few patients had severe illness including respiratory distress as major killer. COVID-19 disease caused huge death tolls¹ in elderly and co-morbid patients. In India, from 3 January 2020 to 6:07 pm CEST, 31 May 2023, there have been 44,990,278 confirmed cases of COVID-19 with 5,31,867 deaths, reported to WHO². Diabetes mellitus is a chronic multi-system disease, which is caused by inadequate or inappropriate insulin synthesis and metabolism in the body. The resultant hyperglycaemia causes serious damage to various organ systems of the body and results in dysfunction of the immune system. This leads to failure of protection from pathogenic invasions and infections³. Diabetes mellitus forms a major portion

of non-communicable disease and causes large mortality and morbidity worldwide. Diabetic people are more likely to develop serious complications with COVID-19 infection⁴. Therefore, this study was done to see the association of HRCT severity score in COVID-19 patients with HbA1c. HRCT thorax is one of the main diagnostic tools for COVID-19 severity grading as well as prognosis. On HRCT thorax scan, infected individuals generally showed a multifocal or mono-focal involvement of ground-glass opacity (GGO)⁵. HRCT thorax had been widely accepted for prognostication of COVID-19 pneumonia⁶. Several remarkable chest CT findings had been reported in more than 70% of RT-PCR test-proven COVID-19 cases, including ground-glass opacities, vascular enlargement, bilateral abnormalities, lower lobe involvement, and posterior predilection⁷. The severity of the lung involvement on the CT correlates with the severity of the disease. HRCT thorax imaging severity scores of >18 have been linked to higher risks of death and have been found to be better predictor of death among diabetic COVID-19

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patients⁹. HRCT thorax is sensitive in identifying the lung involvement in the early stages of Corona virus disease. It is used for the screening and diagnosis of clinically suspicious COVID-19 patients^{9,10}. Though, chest CT scans have been found normal sometimes¹¹. This pictorial essay aims to overview the various spectrums of HRCT patterns in COVID-19 pneumonia. Therefore, an important diagnostic tool like HRCT thorax was undertaken to study the correlation of such ongoing long COVID disease symptoms with its severity at initial and acute phase along with various parameters. HRCT severity score was classified as mild with CT severity score (CTSS) < 8, moderate (CTSS 9 - 16) and severe (CTSS 16 - 25) grading on the basis of the scale 0 - 25.

Aims and objectives

1. To evaluate the correlation of HbA1c with HRCT thorax severity score among diabetic and non-diabetic COVID patients.
2. To study the correlation of HRCT severity score with duration of hospital stay of COVID patients with or without diabetes.

Material and Methods

This retrospective case and control single-centered study was done with 162 admitted COVID patients in the tertiary COVID care SVBP hospital during March 2020 to June 2021. The ethical clearance was taken from Ethical committee of the institution LLRM Medical College, Meerut with no./sc-1/2022/7830. The Sample size was calculated as per the formula sample size = $z^2 p(1-p)/d^2$, where z is the level of confidence taken as 95%. According to a published study, Prevalence (p) of positive HRCT findings in COVID positive patients was taken as 70% and respectively (1-p) as 30%. Considering absolute precision (d) as 10%, sample size was calculated to 80.67^{12,13}.

After considering the exclusion criteria, 81 COVID positive diabetic patients were taken as the cases and 81 COVID positive non-diabetic patients as the control. Patients admitted in this hospital during this COVID phase were selected and taken as cases and control. Their demographic, clinical details, laboratory investigations were recorded and radiological imaging was done. Patients were divided into four groups based on HbA1c values. Various blood investigations including ESR, CRP, LFT, KFT, HbA1c and radiological investigations HRCT severity score, CXR PA views were done. The data was collected with the help of questionnaire and was entered in Microsoft Excel Spreadsheets. Statistical tests were applied using SPSS software and chi square value (with confidence interval of

95% and p value < 0.05) was calculated to assess the associations of this study.

Inclusion criteria:

CASE

- Patients who are known cases of diabetes mellitus who had COVID-19 infection
- Age more than >18 yrs

CONTROL

- Patients who are not a known case of diabetes mellitus and had COVID-19 infection
- Age more than >18 yrs

Exclusion criteria:

- Non COVID-19 patients
- ARDS cause other than COVID-19 infection
- Pregnant female
- Active immunological disease
- Evidence of clinical cardiovascular disease (cardiac, cerebral or peripheral vascular disease).
- Immuno-compromised group.
- People with known malignancies.
- Age less than < 18 years and more than > 65 years.

Results

A total of 162 laboratory confirmed COVID-19 patients were enrolled in this study, out of which 81 were diabetic (cases) and 81 were non diabetic (control).

In the cases, i.e., diabetic COVID group 4 cases (4.9%) of the total 81 cases belonged to the age group of (18 - 25 years), 41 cases (50.6%) belonged to the age group of (26 - 50 years) and the remaining 36 cases (44.4%) belonged to the age group of (51 - 65 years).

In the controls, i.e., non diabetic COVID group, 18 cases (22.2%) of total 81 controls belonged to the age group of (18 - 25 years), 35 cases (43.2%) belonged to the age group (26 - 50 years) and 28 cases (34.6%) belonged to the age group (51 - 65 years).

This difference between age groups was significant (with p value of 0.006), i.e., our study had more people of the age above 26 years.

There are 31 (38.3%) females and 50 (61.7%) males in the diabetic group. Non-diabetic group comprised 28 (34.6%) females and 53 (65.4%) males. Males are more than females

This difference between genders was non-significant with p value of 0.624).

Table I: HRCT severity score according to HbA1c of the diabetic COVID patients and non-diabetic COVID patients.

	HRCT SEVERITY GRADING								
	Mild score		Moderate score		Severe score		Total		p-value
	No.	%	No.	%	No	%	No	%	
COVID patients									
Non-diabetic (HbA1c < 5.4%)	25	49.02%	22	43.14%	4	7.84%	51	100%	0.029
Pre-diabetic (HbA1c 5.4 - 6.7%)	20	66.67%	8	26.67%	2	6.67%	30	100%	
Controlled diabetic (HbA1c 6.7 - 8%)	7	35.00%	12	60.00%	1	5.00%	20	100%	
Uncontrolled diabetic (HbA1c > 8%)	23	37.70%	25	40.98%	13	21.31%	61	100%	
Total	75		67		20		162		

Table I shows that, out of 81 diabetic COVID cases 20 patients, i.e., 24.69% patients had controlled diabetes that is HbA1c between 6.7 - 8% and 61 patients (75.31%) had uncontrolled diabetes with HbA1c more than 8%.

Out of 20 controlled diabetic COVID patients, 7 patients (35%) had mild HRCT score, 12 patients (60%) had moderate HRCT score and 1 patient (5%) had severe HRCT score.

Out of 61 uncontrolled diabetic COVID patients, 23 (37.7%) patients had mild HRCT severity score, 25 (40.98%) patients had moderate severity score and 13 (21.31%) patients had severe severity score.

It also shows out of 81 non-diabetic COVID control patients 51 (62.96%) patients were non-diabetic that is HbA1c < 5.4% and 30 patients (37.04%) were pre-diabetic with HbA1c 5.4 - 6.7%.

Out of 51 non-diabetic COVID patients, 25 (49.02%) patients had mild HRCT score, 22 (43.14%) patients had moderate HRCT score and 4 (7.84%) patients had severe HRCT score.

Out of 30 pre-diabetic COVID patients, 20 (66.67%) patients had mild HRCT severity score, 8 (26.67%) patients had moderate severity score and 2 (6.67%) patients had severe severity score.

The association of the HRCT severity score with various HbA1c level patient groups came out as statistically significant with p value of 0.029.

Table II shows that, out of 81 diabetic COVID cases, 30 (37.04%) patients had a Mild HRCT severity score that is less than 8/25, 37 patients (45.67%) had moderate HRCT severity score with score 9 - 16/25, 14 (17.28%) patients

had severe HRCT severity scores.

Table II: Shows association of duration of hospital stay with HRCT severity score in diabetic and non-diabetic COVID patients.

Duration of hospital stay in COVID patients	HRCT Severity grading							
	Mild		Moderate		Severe		Total	
	No	%	No	%	No	%	No	% p-value
Diabetics								
1 week	21	80.77%	3	11.54%	2	7.69%	26	100% 0.001
2 weeks	8	23.53%	23	67.65%	3	8.82%	34	100%
>3 weeks	1	4.76%	11	52.38%	9	42.86%	21	100%
Total	30		37		14		81	
Non-diabetics								
1 week	17	80.95%	4	19.05%	0	0.00%	21	100% 0.008
2 weeks	26	54.17%	19	39.58%	3	6.25%	48	100%
>3 weeks	2	16.67%	7	58.33%	3	25.00%	12	100%
Total	45		30		20		162	

Out of 26 diabetic COVID patients, who had 1 week hospital stay, 21 (80.77%) patients had mild HRCT score, 3 (11.54%) patients had moderate HRCT score, 2 (7.69%) patients had severe HRCT score.

Out of 34 diabetic COVID patients, who had 2 weeks hospital stay, 8 (23.53%) patients had mild HRCT score, 23 (67.65%) patients had moderate HRCT score and 3 (8.82%) patients had severe HRCT score.

Out of 21 diabetic COVID patients, who had more than 3 weeks hospital stay, 1 (4.76%) patient had mild HRCT score, 11 (52.38%) patients had moderate HRCT score and 9 (42.86%) patients had severe HRCT score. There is an increase in duration of hospital stay as per increasing grade of HRCT severity scores in diabetic COVID patients. The association of this HRCT severity score with duration of hospital stay in diabetic COVID group is highly significant with p value of 0.001.

It also shows that out of 81 non-diabetic COVID control patients, 45 (55.56%) patients had a Mild HRCT severity score that is less than 8/25, 30 patients (37.04%) had moderate HRCT severity score with score 9 - 16/25, 6 (7.40%) patients had severe HRCT severity scores.

Out of 21 non-diabetic COVID patients, who had 1 week hospital stay, 17 (80.95%) patients had mild HRCT score, 4 (19.05%) patients had moderate HRCT score, 0 (0.0%) patients had severe HRCT score.

Out of 48 non-diabetic COVID patients who had 2 weeks hospital stay, 26 (54.17%) patients had mild HRCT score, 19 (39.58%) patients had moderate HRCT score and 3 (6.25%) patients had severe HRCT score.

Out of 12 non-diabetic COVID patients, who had more than

weeks hospital stay, 2 (16.67%) patients had mild HRCT score, 7 (58.33%) patients had moderate HRCT score and 3 (25.0%) patients had severe HRCT score. There is an increase in duration of hospital stay as per increasing grade of HRCT severity scores in non-diabetic COVID patients. The association of this HRCT severity score with duration of hospital stay in non-diabetic COVID group is highly significant with p value of 0.008.

Discussion

Compared with the non-diabetic patients with COVID-19, the diabetic patients with COVID-19 had poorer prognosis and higher mortality. The Study of clinical and imaging characteristics of these patients is helpful to deepen our understanding of the mechanism of critical conditions of the COVID patients with diabetes. It also helps to promote, its early clinical diagnosis and better treatment.

The objective of this case control study was to assess the severity of COVID-19 disease in diabetic patients based on HRCT severity score and HbA1c levels. Most of the patients in diabetic group belonged to the age group of (26 - 50 years), i.e., 41 cases (50.6%) and in non-diabetic group most of the patients also belonged to the age group (26 - 50 years) 35 (43.2%) cases. This difference between age groups in this study was significant (with p value of 0.006), i.e., our study had more people of the age above 26 years. Statsenko *et al* stated with univariate analysis, that the risk of the non-mild COVID-19 was significantly higher ($p < 0.05$) in midlife adults and older adults compared to young adults¹⁴.

In our study, males are more than females in both diabetic and non-diabetic group.

This difference between genders was non-significant (with p value of 0.624). Similar study by Tabassum *et al* 2022 had an increased number of males (85.8%) and lesser number of females (14.2%)¹³. Further studies are needed involving an equal number of females and explore the outcomes in females. Statsenko *et al* showed increased severity in male¹⁴. Similar findings were seen in our study however more studies needed to be done before coming to any conclusion.

Among 81 patients of the diabetic group, (24.7%) 20 patients were controlled diabetic, i.e., with hbA1c level 6.7 - 8% and (75.3%) 61 cases were uncontrolled diabetic with hbA1c level > 8%.

Among 61 uncontrolled diabetic COVID patients, 13 (21.31%) patients were found to be having severe HRCT findings (i.e., score 16 - 25). Whereas 1 (5%) patient out of 20 controlled COVID diabetic patients had severe HRCT finding.

Among the control group, 2 (6.67%) patients out of 30 pre-diabetic COVID patients and 4 (7.84%) patients out of 51 non-diabetic COVID patients. This shows that poor glycemic control status increases the risk and severity of COVID disease as compared to well controlled diabetics. Thus, it is an imperative to have strict glycemic control during COVID pandemics.

A similar finding was seen by Rangankar *et al*, who had HRCT severity score of 220 patients, 41 patients had diabetes and 179 patients were non-diabetics. Out of 41 diabetics, severe form of COVID disease on HRCT severity score was found in 12 patients (29.3%), moderate disease in 16 patients (39%) and milder disease in 13 patients (31.7%). COVID disease was severe in 12 diabetic patients (29.3%) as compared to 20 non-diabetic patients (11.7%)¹⁵.

SARS COV-2 has shown to down regulate the ACE2 protein in diabetics and this might be the cause of poor clinical outcome in diabetes patients¹⁶.

In our study, out of 14 diabetic COVID patients, 9 patients having severe HRCT score stayed for more than 3 weeks, 3 (50%) patients with moderate HRCT score stayed for up to 2 weeks, 2 patients with mild CT score stayed for up to 1 week. Whereas out of 6 non-diabetic COVID patients 3 patients having severe HRCT score stayed for more than 3 weeks, 3 (50%) patients having moderate CT score stayed for up to 2 weeks. This difference was significant with p value 0.001 and 0.008 respectively.

A similar study by Saeed *et al*, which showed 3.9% and 4.7% COVID patients with severe and moderate HRCT score respectively, had a hospital stay of more than 16 days¹⁷.

Conclusion

COVID-19 is a lethal viral disease that infects and damages the lung parenchyma. The HRCT severity score of COVID-19 patient increases with poor diabetic control, i.e., HbA1c more than 8%. The association of HRCT severity scores with HbA1c level was very significant. It was found that the poor glycemic control was significantly associated with the disease severity as well as hospital stay. So, strict glycemic control should be observed during such COVID pandemics. The duration of hospital stay of diabetic COVID-19 patient increases with rising HRCT scores and this association was statistically significant. Thus, early HRCT imaging and scoring can prove useful in prognosticating, triaging and determining duration of hospital stay.

Limitations of this study: Small sample size is the limitation of this study. It should be done on larger sample size too.

Conflict of interest: The author has no conflict of interest

close with respect to this study.

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MEDICAL COUNCIL OF INDIA (MCI) GUIDELINES FOR AUTHORS

As per MCI guidelines updated on 12th February 2020, credit for publication(s) is given to the first three authors or the corresponding author. Henceforth, it will now be mandatory to indicate the name of the corresponding author in every submission to the JIACM.

The name of the corresponding author with his/her affiliation, address, telephone number, and E-mail ID must be indicated separately in the title page of the submitted manuscript.

To Study the Profile of Metabolic Syndrome in Young Patients of Acute Coronary Syndrome

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Abstract: Introduction: Metabolic syndrome (MS) is a clinical and biological entity of lipid and nonlipid factors of metabolic origin, which places subjects at risk for cardiovascular and cerebrovascular diseases. Aims and Objectives: To study profile of Metabolic Syndrome in Young Patients of Acute coronary Syndrome. Methods: The study type is cross sectional study. The work was conducted in DEPARTMENT OF MEDICINE, L. L. R. M MEDICAL COLLEGE, MEERUT. A sample size of 120 patients attending medicine OPD/IPD and Cardiology OPD were selected as per criteria. Results: Among the study population 58 participants had Metabolic Syndrome and 62 participants did not have Metabolic Syndrome. Conclusion: The prevalence of metabolic syndrome in young patients presented with acute coronary syndrome was found to be around 48.3%. Among all the components of metabolic syndrome, triglyceride levels was the commonest component elevated (83%). The prevalence of other components were low HDL cholesterol levels (39%), increased waist hip ratio (48%) and elevated blood pressure (29%).

Keywords: Metabolic syndrome, Acute coronary syndrome, Coronary Artery Disease

1. Introduction

ACS leads to significant effects on patient's psychology, morbidity, and increased financial burden when it occurs at this young age (1, 2). Young patients with ACS on coronary angiography (CAG) show a relatively increased incidence of single - vessel disease and nonobstructive stenosis. The risk as well as the clinical factor profile and the arterial involvement pattern differ between young and elderly CAD patients (3, 4). Metabolic, genetic, and conventional causes may result in CAD occurring at a younger age in India. ACS in very young adults with age ≤ 30 years is rare (5). In India, the prevalence of acute myocardial infarction (AMI) in this population is between 2 - 10%. (6)

Coronary artery disease (CAD) is the single most frequent cause of death. The atherosclerotic cardiovascular disease is a chronic disorder developing insidiously, and it remains as the major cause of premature death. Importantly, evidence revealing that increased cardiovascular risk starts to develop at a very young age has accumulated over the past decades.

Metabolic syndrome (MS) is a clinical and biological entity of lipid and nonlipid factors of metabolic origin, which places subjects at risk for cardiovascular and cerebrovascular diseases.

2. Material and Methods

The study type is cross sectional study. The work was conducted in Department of Medicine, L. L. R. M Medical College, Meerut. A sample size of 120 patients attending medicine OPD/IPD and Cardiology OPD were selected as per criteria.

A pre - structured Proforma was filled up for the study. Each subject was given a thorough work up for history and physical examination to fulfill the inclusion and exclusion criteria. Routine hematological and biochemical investigations were carried out. The following parameters were measured at the time of enrollment into the study:

Inclusion Criteria:

- Patients who will give consent
- Age between 18 to 45 years
- Patients having Acute Coronary Syndrome

Exclusion Criteria:

- Patients on Anti - lipidemic Drugs
- Patients with impaired renal function.
- Cardiomyopathies.
- Patients having thyroid dysfunction.
- Pregnancy

3. Results

Distribution of the Participants in Terms of 'BP (mmHg)'

Table 1: Distribution of BP

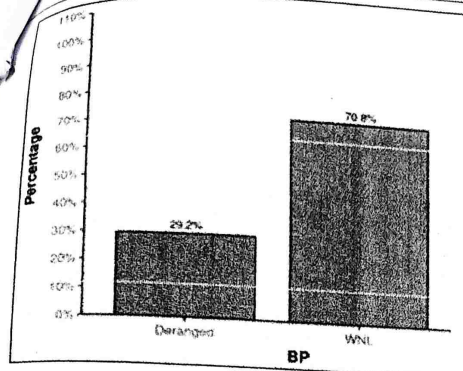
BP	Frequency	Percentage	95% CI
Deranged	35	29.2%	21.4% - 38.3%
WNL	85	70.8%	61.7% - 78.6%

- 29.2% of the participants had BP: Deranged.
- 70.8% of the participants had BP: WNL.

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Out of 35 patients having deranged BP, 8 has only raised systolic BP and 27 had raised both SBP and DBP. None of them had isolated raised diastolic BP.

Association of BP in Pt. with and without 'Metabolic Syndrome'

Table 2: Association of BP and Metabolic Syndrome

BP	Metabolic Syndrome			Chi - Squared Test	
	Present	Absent	Total	χ^2	P Value
Deranged	30 (51.7%)	5 (8.1%)	35 (29.2%)	27.649	<0.001
WNL	28 (48.3%)	57 (91.9%)	85 (70.8%)		
Total	58 (100.0%)	62 (100.0%)	120 (100.0%)		

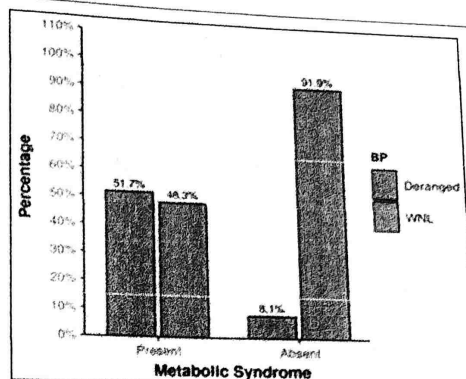
Chi - squared test was used to explore the association between 'Metabolic Syndrome' and 'BP'.

There was a significant difference between the various groups in terms of distribution of BP ($\chi^2 = 27.649$, $p = <0.001$).

Strength of association between the two variables (Cramer's V) = 0.48 (Moderate Association)

Strength of association between the two variables (Bias Corrected Cramer's V) = 0.47 (Moderate Association) 51.7% of the participants in the group [Metabolic Syndrome: Present] had [BP: Deranged]. 48.3% of the participants in the group [Metabolic Syndrome: Present] had [BP: WNL]. 8.1% of the participants in the group [Metabolic Syndrome: Absent] had [BP: Deranged]. 91.9% of the participants in the group [Metabolic Syndrome: Absent] had [BP: WNL].

Participants in the group Metabolic Syndrome: Present had the larger proportion of BP: Deranged. Participants in the group Metabolic Syndrome: Absent had the larger proportion of BP: WNL.

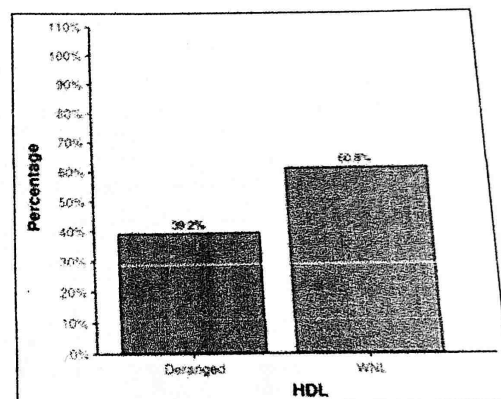


Distribution of the Participants in Terms of 'HDL (mg/dL)'

Table 3: Distribution of HDL

HDL	Frequency	Percentage	95% CI
Deranged	47	39.2%	30.5% - 48.5%
WNL	73	60.8%	51.5% - 69.5%

39.2% of the participants had HDL: Deranged. 60.8% of the participants had HDL: WNL.



Association of HDL and Patients with and without 'Metabolic Syndrome'

Table 4: Association between Metabolic Syndrome and HDL

HDL	Metabolic Syndrome			Chi - Squared Test	
	Present	Absent	Total	χ^2	P Value
Deranged	42 (72.4%)	5 (8.1%)	47 (39.2%)	52.080	<0.001
WNL	16 (27.6%)	57 (91.9%)	73 (60.8%)		
Total	58 (100.0%)	62 (100.0%)	120 (100.0%)		

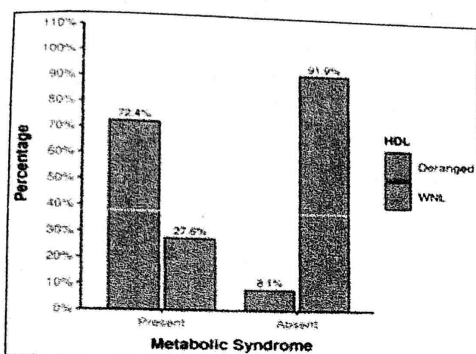
Chi - squared test was used to explore the association between 'Metabolic Syndrome' and 'HDL'.

There was a significant difference between the various groups in terms of distribution of HDL ($\chi^2 = 52.080$, $p = <0.001$).

Strength of association between the two variables (Cramer's V) = 0.66 (High Association)

Strength of association between the two variables (Bias Corrected Cramer's V) = 0.66 (High Association)

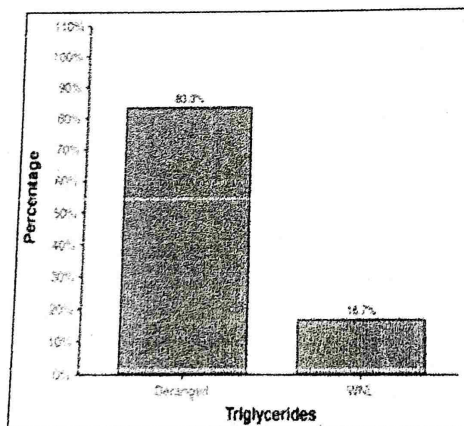
72.4% of the participants in the group [Metabolic Syndrome: Present] had [HDL: Deranged]. 27.6% of the participants in the group [Metabolic Syndrome: Present] had [HDL: WNL]. 8.1% of the participants in the group [Metabolic Syndrome: Absent] had [HDL: Deranged]. 91.9% of the participants in the group [Metabolic Syndrome: Absent] had [HDL: WNL]. Participants in the group Metabolic Syndrome: Present had the larger proportion of HDL: Deranged. Participants in the group Metabolic Syndrome: Absent had the larger proportion of HDL: WNL.



Distribution of the Participants in Terms of 'Triglycerides (mg/dL)'

Triglycerides	Frequency	Percentage	95% CI
Deranged	100	83.3%	75.2% - 89.3%
WNL	20	16.7%	10.7% - 24.8%

83.3% of the participants had Triglycerides: Deranged. 16.7% of the participants had Triglycerides: WNL.



Association of 'Triglycerides' in patients with and without Metabolic Syndrome'

Table 6: Association between Metabolic Syndrome and Triglycerides

Triglycerides	Metabolic Syndrome			Chi - Squared Test	
	Present	Absent	Total	χ^2	P Value
Deranged	54 (93.1%)	46 (74.2%)	100 (83.3%)	7.715	0.005
WNL	4 (6.9%)	16 (25.8%)	20 (16.7%)		
Total	58 (100.0%)	62 (100.0%)	120 (100.0%)		

Chi - squared test was used to explore the association between 'Metabolic Syndrome' and 'Triglycerides'.

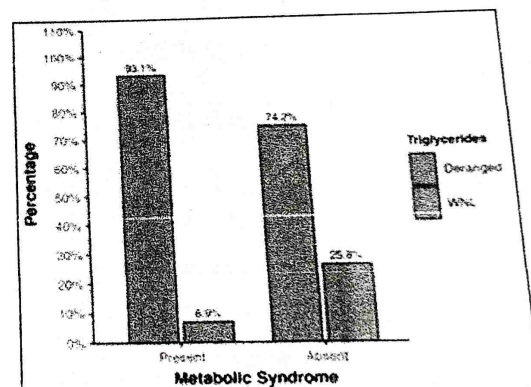
There was a significant difference between the various groups in terms of distribution of Triglycerides ($\chi^2 = 7.715$, $p = 0.005$).

Strength of association between the two variables (Cramer's V) = 0.25 (Low Association)

Strength of association between the two variables (Bias Corrected Cramer's V) = 0.24 (Low Association)

93.1% of the participants in the group [Metabolic Syndrome: Present] had [Triglycerides: Deranged]. 6.9% of the participants in the group [Metabolic Syndrome: Present] had [Triglycerides: WNL]. 74.2% of the participants in the group [Metabolic Syndrome: Absent] had [Triglycerides: Deranged]. 25.8% of the participants in the group [Metabolic Syndrome: Absent] had [Triglycerides: WNL].

Participants in the group Metabolic Syndrome: Present had the larger proportion of Triglycerides: Deranged. Participants in the group Metabolic Syndrome: Absent had the larger proportion of Triglycerides: WNL.



Distribution of the Participants in Terms of 'Waist Circumference (cm)'

Waist Circumference	Frequency	Percentage	95% CI
Deranged	58	48.3%	39.2% - 57.6%
WNL	62	51.7%	42.4% - 60.8%

48.3% of the participants had Waist Circumference: Deranged. 51.7% of the participants had Waist Circumference: WNL.

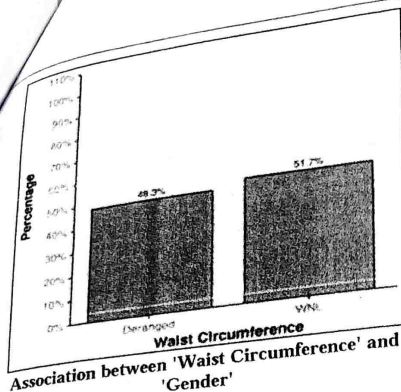


Table 8: Association between Waist Circumference and Gender

Gender	Waist Circumference			Chi - Squared Test	
	Deranged	WNL	Total	χ^2	P Value
Male	36 (62.1%)	55 (88.7%)	91 (75.8%)	11.605	<0.001
Female	22 (37.9%)	7 (11.3%)	29 (24.2%)		
Total	58 (100.0%)	62 (100.0%)	120 (100.0%)		

Chi - squared test was used to explore the association between 'Waist Circumference' and 'Gender'.

There was a significant difference between the various groups in terms of distribution of Gender ($\chi^2 = 11.605$, $p = <0.001$).

Strength of association between the two variables (Cramer's V) = 0.31 (Moderate Association)

Strength of association between the two variables (Bias Corrected Cramer's V) = 0.3 (Low Association) 62.1% of the participants in the group [Waist Circumference: Deranged] had [Gender: Male]. 37.9% of the participants in the group [Waist Circumference: Deranged] had [Gender: Female]. 88.7% of the participants in the group [Waist Circumference: WNL] had [Gender: Male]. 11.3% of the participants in the group [Waist Circumference: WNL] had [Gender: Female].

Participants in the group Waist Circumference: WNL had the larger proportion of Gender: Male. Participants in the group Waist Circumference: Deranged had the larger proportion of Gender: Female.

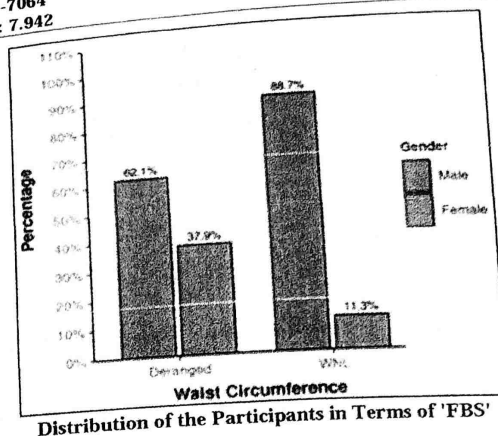


Table 9: Distribution of FBS

FBS	Frequency	Percentage	95% CI
Deranged	34	28.3%	20.7% - 37.4%
WNL	86	71.7%	62.6% - 79.3%

28.3% of the participants had FBS: Deranged. 71.7% of the participants had FBS: WNL.

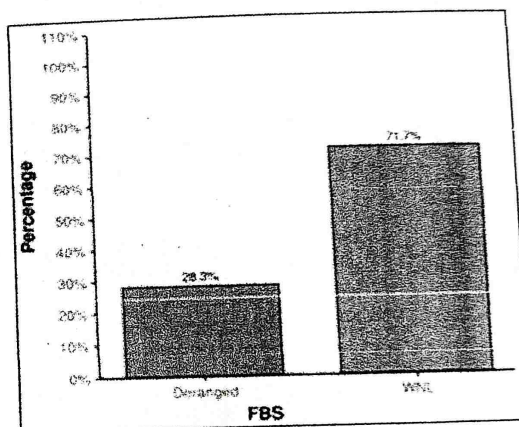


Table 10: Association between Metabolic Syndrome and FBS

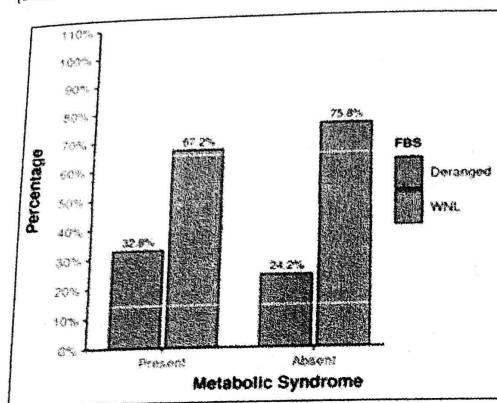
FBS	Metabolic Syndrome			Chi - Squared Test	
	Present	Absent	Total	χ^2	P Value
Deranged	19 (32.8%)	15 (24.2%)	34 (28.3%)	1.083	0.298
WNL	39 (67.2%)	47 (75.8%)	86 (71.7%)		
Total	58 (100.0%)	62 (100.0%)	120 (100.0%)		

Chi - squared test was used to explore the association between 'Metabolic Syndrome' and 'FBS'.

There was no significant difference between the various groups in terms of distribution of FBS ($\chi^2 = 1.083$, $p = 0.298$).

Strength of association between the two variables (Cramer's $V = 0.09$ (Little/No Association))

Strength of association between the two variables (Bias Corrected Cramer's $V = 0.02$ (Little/No Association) 32.8% of the participants in the group [Metabolic Syndrome: Present] had [FBS: Deranged]. 67.2% of the participants in the group [Metabolic Syndrome: Present] had [FBS: WNL]. 24.2% of the participants in the group [Metabolic Syndrome: Absent] had [FBS: Deranged]. 75.8% of the participants in the group [Metabolic Syndrome: Absent] had [FBS: WNL].



4. Discussion

This study, "To Study the Profile of Metabolic Syndrome in Young patients of Acute Coronary Syndrome" is an observational study done on 120 patients of age < 45 years admitted with acute coronary syndrome in LLRM medical college and SVBP hospital. The study population included 120 patients presented with acute coronary syndrome out of which 91 patients were male and 29 patients were female. Among the 120 patients 58 were diagnosed for metabolic syndrome according to the NCEP ATP III guidelines. Several previous studies have shown that the overall prevalence of metabolic syndrome in Indian population is 31.4%. It was observed that females (48.2%) are more affected from metabolic syndrome than male (16.3%). While evaluating on the basis of age prevalence was found to be 2.9% in aged 18-30 years and it was increased to 31.0% in aged 60-69 years in Asians.

In this study, the metabolic syndrome, defined according to NCEP ATP III criteria, was found in 58 patients (48.3%) of the study population. The Triglyceride was the most common determinant elevated in patients with or without the metabolic syndrome and it was about 83%.

The prevalence of other components were found to be raised i. e. Fasting blood sugar (28%), low HDL cholesterol levels (39%), increased waist hip ratio (58%) and elevated blood pressure (29%).

Among the 120 patients, range of age was 50 patients were between the age of 31 - 40 years and 70 patients were between 41 to 45 years.

The risk factors associated with ACS were also assessed. History of Smoking was present in 75 patients (62.5%) in the study population and History of Alcohol intake was found in 66 patients (55%). Among the 58 patients with metabolic syndrome, 54 patients had elevated Triglyceride level and 4 had normal level. The correlation found between elevated Triglyceride level levels and metabolic syndrome was statistically significant. The mean Triglyceride level levels was found to be 173.02mg/dl in patients with metabolic syndrome and 163.79 mg/dl in patients without metabolic syndrome. This difference was statistically significant.

5. Conclusion

The prevalence of metabolic syndrome in young patients with acute coronary syndrome was around 48.3%. Among all the components of metabolic syndrome, triglyceride levels was the commonest component elevated (83%). The prevalence of other components were low HDL cholesterol levels (39%), increased waist hip ratio (48%) and elevated blood pressure (29%). This high prevalence of metabolic syndrome in young indicates the need for a comprehensive non communicable disease prevention and control program. Increasing awareness and early identification of these clusters of risk factors should be emphasized in designing population wide prevention strategies. The major aim is to emphasise on underlying cause of the syndrome, and also on other cardiovascular risk factors. Most of people with metabolic syndrome are obese and lead a physically inactive lifestyle. Therefore, lifestyle modification to be done in these patients. Weight loss usually requires a multifaceted program that includes diet modification and physical exercise. Other factors of CVD should be considered, which are supposed to play an important role includes High Sensitivity C - reactive Protein (hsCRP), increased intima - media thickness of carotid arteries, and increased pulse wave velocity. When the whole spectrum of various causative and risk factors of cardio vascular disease risk in metabolic syndrome is uncovered, we can more effectively execute the preventive strategies in population on a wide range.

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