Journal of Advanced Zoology
ISSN: 0253-7214
Volume 45 Issue S-3 Year 2024 Page 337-341

Role Of Lipid Profile Parameters As Predictor Of Type 2 Diabetes Risk In Bhiwadi, Rajasthan

Shilpa Sharma[1*], Rajesh Yadav[2], Rohit Grewal[1], Dinesh C. Sharma[1]

[1]*School of Life Sciences, Starex University, Gurugram (HR)*
[2]*Department of Orthopedics, S. S. Hospital, Bhiwadi (Rajasthan)*

[*]***Corresponding Author:*** *Shilpa Sharma*
shilpasharma141097@gmail.com

Received: 10/09/2023 Revised:10/01/2024 Accepted: 10/03/2024

Abstract

Type 2 diabetes mellitus (T2DM) and obesity are prevalent metabolic disorders in the Indian population, often linked to lifestyle changes leading to metabolic alterations. Elevated levels of circulating saccharides contribute to various metabolic disturbances, including T2DM and associated complications such as renal and retinal dysfunction. This study aimed to identify individuals at risk of T2DM through lipid profiling in Bhiwadi, Rajasthan. A total of 800 participants were enrolled, and parameters including lipid profiling levels (HDL, Cholesterol) were assessed. Among the participants, 400 males and 400 females exhibited lipid profiles indicative of T2DM risk. These findings underscore the significance of lipid profiling in identifying individuals at risk of T2DM and obesity-related complications. Lifestyle modifications and targeted interventions are crucial to mitigate the growing burden of these metabolic disorders, particularly in regions like Bhiwadi, Rajasthan, India.

Keywords: Type 2 diabetes mellitus, obesity, lipid profiling, Bhiwadi, HbA1c.

Introduction

Metabolic disorders, including Diabetes Mellitus, present significant challenges to public health worldwide, prompting a deeper exploration of their intricate dynamics. Diabetes, alongside cancer and obesity, stands out as a prominent metabolic disorder influenced by various factors, including lifestyle choices, dietary habits, and environmental conditions. The term "Diabetes," originating from the ancient Greek word, denotes "to pass through," while "mellitus," signifying "from honey," underscores its historical association with elevated blood sugar levels [(1)]. Chronic Diabetes Mellitus is characterized by defects in insulin secretion, action, or both, resulting in inefficient carbohydrate metabolism and persistent hyperglycemia [(2)]. The conventional classification of Diabetes into Type 1 (T1D) and Type 2 (T2D) outlines distinct etiologies, with T1D attributed to autoimmune destruction of pancreatic beta cells and T2D linked to insulin resistance and impaired insulin secretion. However, evolving research reveals complexities and overlaps in the pathophysiology of both types, emphasizing the role of genetic and environmental factors [(3)]. The liver's pivotal role in glucose metabolism, coupled with insulin's regulatory function and impaired glucose uptake by cells, contributes to the dysregulated blood glucose levels observed in diabetes [(4)]. This dysregulation, termed hyperglycemia, poses a significant risk of complications, including kidney damage, highlighting the

intricate interplay between insulin, glucose, and cellular energy metabolism [5]. Complications of diabetes extend beyond hyperglycemia, encompassing microvascular and macrovascular issues such as diabetic nephropathy and cardiovascular diseases [6-7]. Epidemiological trends indicate a rising prevalence of diabetes globally, with alarming figures reported in regions such as India [8]. Moreover, the field of precision medicine and personalized approaches to diabetes management show potential in optimizing treatment outcomes by tailoring therapies to individual genetic and metabolic profiles [9]. Furthermore, recent research has highlighted the role of gut microbiota dysbiosis in diabetes development and progression, emphasizing the intricate interplay between the gut microbiome, metabolic health, and immune function [10]. Socioeconomic factors, including access to healthcare, education, and income, also significantly impact diabetes prevalence and outcomes, underlining the need to address social determinants of health in disease management [11].

In recent years, lipid profiling has emerged as a valuable tool in the comprehensive assessment and management of Type 2 diabetes mellitus (T2DM) [12]. Lipid profiling encompasses the measurement of various lipid parameters such as high-density lipoprotein (HDL), low-density lipoprotein (LDL), total cholesterol, and triglycerides, which play crucial roles in metabolic homeostasis and cardiovascular health [13]. Dyslipidemia, characterized by abnormalities in lipid levels, is a common feature of T2DM and contributes significantly to the increased risk of cardiovascular complications in affected individuals [14]. Through lipid profiling, clinicians can evaluate lipid metabolism dysregulation, identify individuals at heightened risk for T2DM and cardiovascular disease, and tailor interventions to optimize patient outcomes [15]. This paper explores the role of lipid profiling parameters in the context of T2DM, shedding light on their importance in disease management and risk stratification.

Methodology

1) **Participant Recruitment:** Participants were recruited from local community centers and clinics in Bhiwadi through convenience sampling. Individuals aged 30 and above, residing in Bhiwadi for at least six months, were invited to participate in the study.
2) **Questionnaire Administration:** A structured questionnaire was administered to each participant to gather demographic information, medical history, lifestyle habits, and dietary patterns. The questionnaire was designed to collect data on potential risk factors for diabetes and cardiovascular diseases.
3) **Blood Sample Collection:** Venous blood samples were collected from participants using standard venipuncture techniques. Samples were collected in appropriate tubes for subsequent analysis, including serum separation, plasma separation, and whole blood analysis.
4) **Laboratory Analysis:** Blood samples were analyzed for various parameters using state-of-the-art laboratory equipment. This included tests for lipid profiles (cholesterol, and HDL) associated with diabetes and cardiovascular diseases.
5) **Data Analysis:** Statistical analysis was conducted utilizing SPSS software. Descriptive tests including independent sample t-tests and one-way ANOVA were used for carrying out the study.
6) **Ethical Considerations:** The study will commence following approval from the Institutional Ethical Committee at Starex University, Gurugram, aligning with the guidelines outlined by the Indian Council of Medical Research (ICMR).

Results and Discussion

The study conducted a comprehensive analysis of samples obtained from 800 patients, evenly distributed with 400 female and 400 male patients.The study primarily focused on individuals aged 30 to 75 years, emphasizing lipid profiling to delve into cholesterol and HDL levels. The findings regarding cholesterol levels in males revealed a range from 153mg/dL to 230mg/dL. The lowest value, recorded at 155 mg/dL, was observed in a patients aged 68, while the highest value, measured at 229 mg/dL, was noted in a partient aged 73 (Fig.1) . Conversely, among female patients, the lowest cholesterol level, recorded at age 49, was 162 mg/dL, while the highest, observed at age 40, reached 215 mg/dL (Fig.2). Statistical analysis via One-way ANOVA revealed significant gender-based disparities in cholesterol levels, with a significance level of $P < 0.01$. These results underscore the importance of considering gender-specific factors in cholesterol management and risk assessment for cardiovascular health.

Regarding HDL levels, males exhibited a range of 39 mg/dL to 58 mg/dL. The lowest value recorded was in a patient aged 41 (41 mg/dL), while the highest was in a patient aged 47 (56 mg/dL)(Fig.3). Similarly, among females, HDL levels ranged from 41 mg/dL to 56 mg/dL. The lowest value observed was at age 39 (41 mg/dL), and the highest was at age 56 (56 mg/dL) (Fig.4). One-way ANOVA analysis demonstrated

significant differences in HDL levels between male and female groups, with a significance level of $P < 0.01$. These results underscore the importance of gender-specific considerations in lipid profiling and highlight potential implications for preventive healthcare strategies tailored to individual patient demographics.

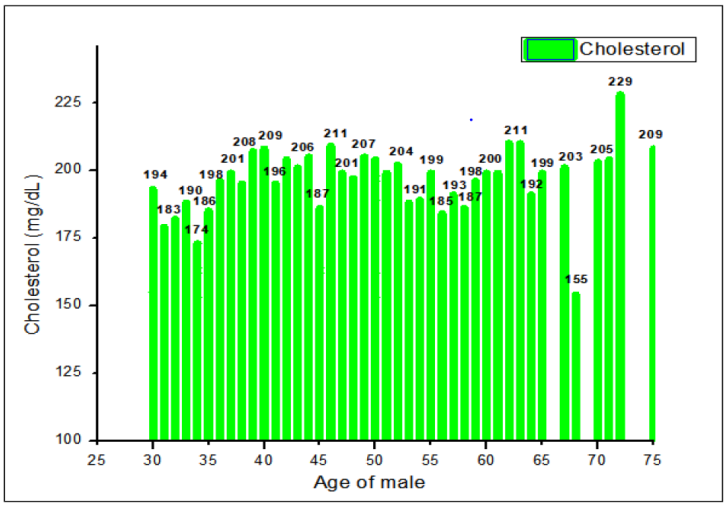

Fig. 1. Distribution of Cholesterol Levels in Male Individuals Aged 30 to 75 Years

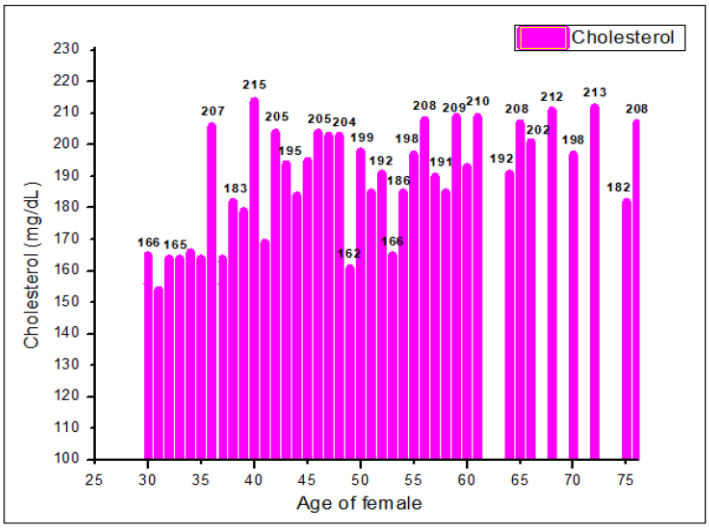

Fig. 2. Distribution of Cholesterol Levels in Female Individuals Aged 30 to 75 Year

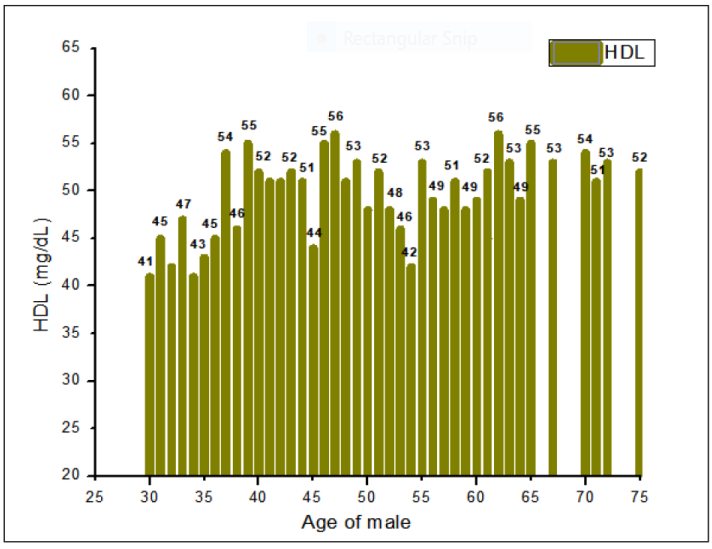

Fig.3. Distribution of HDL Levels in Male Patients Aged 30-75.

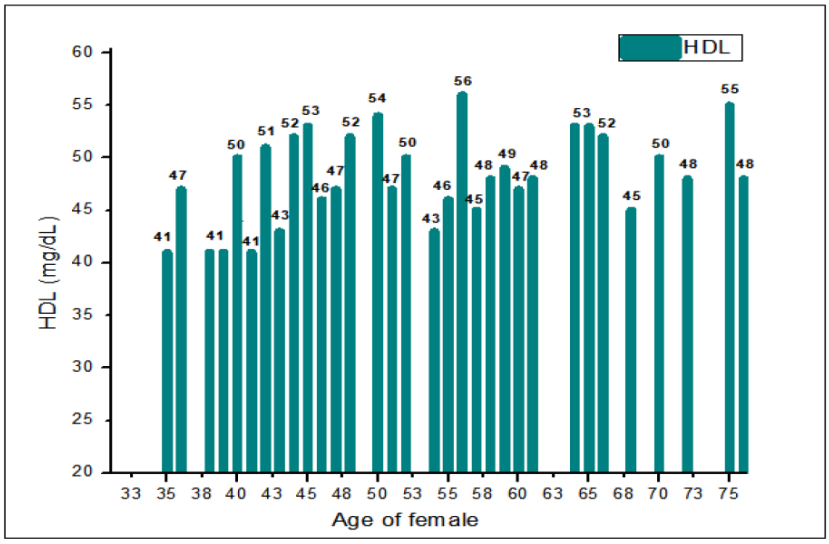

Fig.4. Distribution of HDL Levels in Female Patients Aged 30-75.

Conclusion

In this study, we aimed to evaluate the prevalence of Type 2 Diabetes and Obesity in the population of Bhiwadi, an industrial hub in the National Capital Region (NCR) of India. Specifically focusing on individuals aged 30 to 75 years due to their heightened susceptibility to these conditions, we conducted comprehensive assessments. Our findings regarding lipid profiling for Type 2 Diabetes, underscores the importance of incorporating lipid parameters such as HDL and total cholesterol levels in assessing diabetes risk. Dyslipidemia, commonly associated with Type 2 Diabetes, significantly contributes to cardiovascular complications and metabolic disturbances in affected individuals. Therefore, integrating lipid profiling alongside traditional risk assessment methods provides a more comprehensive understanding of metabolic health and facilitates tailored interventions to optimize patient outcomes. Future research should further explore the relationship between lipid profiles and Type 2 Diabetes risk to inform targeted prevention and management strategies.

Acknowledgement

I would like to express my gratitude to Dr. Rajesh Yadav, MD, from S. S. Hospital, Bhiwadi, for generously providing access to their laboratory resources, which were instrumental in conducting the research presented in this study.

Refrences

1. Zimmet, P., Alberti, K. G., & Magliano, D. J. (2014). Diabetes mellitus statistics on prevalence and mortality: facts and fallacies. Nature Reviews Endocrinology, 10(9), 616-622.
2. American Diabetes Association. "Diagnosis and classification of diabetes mellitus." *Diabetes care* 33.Supplement_1 (2010): S62-S69.
3. Bommer, C., Heesemann, E., Sagalova, V., Manne-Goehler, J., Atun, R., Bärnighausen, T., & Vollmer, S. (2018). The global economic burden of diabetes in adults aged 20-79 years: a cost-of-illness study. The Lancet Diabetes & Endocrinology, 6(6), 423-430.
4. Petersen, Max C., Daniel F. Vatner, and Gerald I. Shulman. "Regulation of hepatic glucose metabolism in health and disease." *Nature reviews endocrinology* 13.10 (2017): 572-587.
5. Cho, N. H., Shaw, J. E., Karuranga, S., Huang, Y., da Rocha Fernandes, J. D., Ohlrogge, A. W., & Malanda, B. (2018). IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. Diabetes Research and Clinical Practice, 138, 271-281.
6. Balaji, R., Revathi Duraisamy, and M. P. Kumar. "Complications of diabetes mellitus: A review." *Drug Invention Today* 12.1 (2019).
7. MacIsaac, Richard J., Elif I. Ekinci, and George Jerums. "Markers of and risk factors for the development and progression of diabetic kidney disease." *American journal of kidney diseases* 63.2 (2014): S39-S62.

8. Mohan, Viswanathan, Siddharth Shah, and Banshi Saboo. "Current glycemic status and diabetes related complications among type 2 diabetes patients in India: data from the A1chieve study." *The Journal of the Association of Physicians of India* 61.1 Suppl (2013): 12-5.
9. Sugandh, F. N. U., et al. "Advances in the management of diabetes mellitus: a focus on personalized medicine." *Cureus* 15.8 (2023).
10. Fernandes, Rosa, et al. "Diabetic gut microbiota dysbiosis as an inflammaging and immunosenescence condition that fosters progression of retinopathy and nephropathy." *Biochimica Et Biophysica Acta (BBA)-Molecular Basis of Disease* 1865.7 (2019): 1876-1897.
11. White-Williams, Connie, et al. "Addressing social determinants of health in the care of patients with heart failure: a scientific statement from the American Heart Association." *Circulation* 141.22 (2020): e841-e863.
12. American Diabetes Association. Classification and diagnosis of diabetes: standards of medical care in diabetes-2021. Diabetes Care. 2021;44(Suppl 1):S15-S33.
13. Emerging Risk Factors Collaboration, Sarwar N, Gao P, et al. Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. Lancet. 2010;375(9733):2215-22.
14. International Diabetes Federation. IDF Diabetes Atlas, 9th edn. Brussels, Belgium: International Diabetes Federation, 2019.
15. Molitch ME, DeFronzo RA, Franz MJ, et al. Nephropathy in diabetes. Diabetes Care. 2004;27 Suppl 1:S79-83.