

Association between Hyperlipidemia, Physical Activity, and Lifestyle Variables in Saharanpur, Uttar Pradesh

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Abstract

Hyperlipidemia is a metabolic disorder characterized by elevated cholesterol and triglyceride levels and is a major risk factor for cardiovascular diseases, obesity, diabetes mellitus, and metabolic syndrome. Rapid urbanization and lifestyle changes in Saharanpur, Uttar Pradesh, have contributed to increasing physical inactivity, sedentary behavior, unhealthy dietary habits, stress, poor sleep quality, and greater dependence on technology. These factors collectively influence lipid metabolism and increase the prevalence of hyperlipidemia and related metabolic disorders. Regular physical activity plays an important role in improving lipid profiles by increasing high-density lipoprotein (HDL) cholesterol and reducing low-density lipoprotein (LDL) cholesterol and triglycerides, whereas sedentary lifestyles contribute to obesity, insulin resistance, and cardiovascular risk. The study highlights the importance of healthy lifestyle modifications, including regular exercise, balanced nutrition, stress management, adequate sleep, and public health awareness, for the prevention and management of hyperlipidemia and associated non-communicable diseases in Saharanpur.

Keywords:

Hyperlipidemia, Physical Activity, Sedentary Lifestyle, Urbanization, Cardiovascular Diseases.

1. Introduction

Hyperlipidemia is a metabolic disorder characterized by elevated levels of cholesterol and triglycerides in the bloodstream (World Health Organization [WHO], 2023). Although lipids are essential for hormone synthesis, energy storage, and cell membrane structure, excessive lipid accumulation significantly increases the risk of cardiovascular diseases (CVDs), including coronary artery disease, hypertension, stroke, and atherosclerosis (Grundy, 2016; WHO, 2023). According to the World Health Organization, cardiovascular diseases are the leading cause of global mortality and are strongly associated with unhealthy diet, physical inactivity, obesity, smoking, and alcohol consumption. WHO Cardiovascular Diseases Factsheet

Hyperlipidemia may occur as a primary genetic disorder or as a secondary condition influenced by lifestyle-related factors such as sedentary behavior, obesity, diabetes mellitus, stress, and poor dietary habits (American Heart Association [AHA], 2022). Rapid urbanization and modernization have contributed to increased consumption of processed foods rich in saturated fats, trans fats, and refined carbohydrates, leading to elevated low-density lipoprotein (LDL) cholesterol and triglyceride levels (National Lipid Association [NLA], 2021; WHO, 2023). National Lipid Association emphasizes that

unhealthy dietary patterns and reduced physical activity are major contributors to dyslipidemia and cardiovascular risk.

Physical activity is considered one of the most effective non-pharmacological approaches for the prevention and management of hyperlipidemia (WHO, 2022). Regular exercise improves lipid metabolism by increasing high-density lipoprotein (HDL) cholesterol while reducing LDL cholesterol and triglycerides (Grundy, 2016). Physical activity also improves insulin sensitivity, body weight regulation, and cardiovascular efficiency. In contrast, sedentary lifestyles impair fat metabolism and increase the risk of obesity, metabolic syndrome, and dyslipidemia (WHO, 2022; AHA, 2022).

In India, rapid urbanization has significantly altered traditional lifestyles, resulting in reduced physical activity and increased sedentary behavior (Misra & Khurana, 2008). Saharanpur, a developing city in Uttar Pradesh, reflects these changing trends. Traditional occupations involving manual labor and agriculture are increasingly being replaced by office-based jobs, motorized transportation, and technology-dependent lifestyles. Increased screen time, limited outdoor activities, unhealthy dietary habits, and lack of recreational spaces have collectively contributed to obesity, diabetes, and hyperlipidemia among urban populations. Therefore, understanding the association between hyperlipidemia, physical activity, and lifestyle variables in Saharanpur is essential for improving public health outcomes. Promoting regular exercise, balanced nutrition, stress management, and healthy lifestyle practices can play a major role in reducing cardiovascular diseases and metabolic disorders in the region (WHO, 2022; NLA, 2021).

1.1 Physical Activity and Its Role in Lipid Metabolism

Physical activity plays an essential role in maintaining healthy lipid metabolism and cardiovascular health. Regular exercise improves the transport, utilization, and breakdown of lipids and is considered one of the most effective non-pharmacological methods for preventing hyperlipidemia (World Health Organization [WHO], 2022; American Heart Association [AHA], 2022). According to the World Health Organization, physical

inactivity is a major risk factor for obesity, diabetes, cardiovascular diseases, and metabolic disorders.

Regular physical activity increases high-density lipoprotein (HDL) cholesterol while reducing low-density lipoprotein (LDL) cholesterol and triglycerides (Grundy, 2016; National Lipid Association [NLA], 2021). Exercise enhances lipid oxidation, improves insulin sensitivity, and activates enzymes such as lipoprotein lipase, which help break down triglycerides and utilize fats efficiently (Durstine et al., 2013). Aerobic activities including walking, jogging, cycling, and swimming are particularly beneficial for improving lipid profiles and reducing cardiovascular risk (AHA, 2022).

Conversely, sedentary lifestyles and prolonged sitting impair fat metabolism, reduce calorie expenditure, and promote obesity, insulin resistance, and dyslipidemia (WHO, 2022; NLA, 2021). Excessive screen time, office-based work, and reduced physical movement are associated with elevated LDL cholesterol and triglyceride levels along with reduced HDL cholesterol (Durstine et al., 2013). Therefore, regular physical activity is essential for maintaining healthy lipid levels and preventing cardiovascular diseases (WHO, 2022; Grundy, 2016).

1.2 Decline in Physical Activity in Saharanpur

Saharanpur has undergone rapid urbanization and socio-economic transformation, resulting in major changes in occupational and lifestyle patterns. Traditional physically demanding activities such as agriculture and manual labor are increasingly being replaced by sedentary occupations including office work, teaching, retail business, and transportation services (Misra & Khurana, 2008). These changes have significantly reduced daily physical movement and increased sedentary behavior.

The increasing use of motorized transportation, smartphones, television, and digital entertainment has reduced walking, cycling, and outdoor activities among both adults and children (World Health Organization [WHO], 2022). According to the World Health Organization, physical inactivity is a major risk factor for obesity, diabetes, cardiovascular diseases, and metabolic disorders.

Urban housing with limited recreational spaces, academic pressure among students, and long working hours among adults have further discouraged participation in sports and exercise (American Heart Association [AHA], 2022). Consequently, declining physical activity levels in Saharanpur have contributed to rising cases of obesity, metabolic syndrome, diabetes mellitus, and hyperlipidemia (National Lipid Association [NLA], 2021; WHO, 2022). Sedentary lifestyles associated with modernization are now emerging as a significant public health concern in the region.

1.3 Impact of Sedentary Lifestyle on Hyperlipidemia

Sedentary lifestyle is a major risk factor for hyperlipidemia and cardiovascular diseases, particularly in rapidly urbanizing regions such as Saharanpur. Prolonged sitting during office work, television viewing, mobile phone use, and computer-based activities reduces energy expenditure and promotes obesity and metabolic disorders (World Health Organization [WHO], 2022; American Heart Association [AHA], 2022). According to the World Health Organization, physical inactivity is strongly associated with obesity, diabetes mellitus, hypertension, and cardiovascular diseases.

Physical inactivity leads to accumulation of abdominal fat and abnormal lipid metabolism, resulting in increased low-density lipoprotein (LDL) cholesterol and triglycerides along with reduced high-density lipoprotein (HDL) cholesterol (Grundy, 2016; National Lipid Association [NLA], 2021). These lipid abnormalities contribute to atherosclerosis and increase the risk of coronary artery disease and stroke (AHA, 2022).

Sedentary behavior also reduces the activity of lipoprotein lipase, an important enzyme involved in triglyceride breakdown and fat utilization (Durstine et al., 2013). Combined with unhealthy diet, stress, and excessive screen time, physical inactivity significantly increases the prevalence of obesity, insulin resistance, metabolic syndrome, and hyperlipidemia in urban populations (WHO, 2022; NLA, 2021). Therefore, regular physical activity is essential for maintaining healthy lipid profiles and reducing cardiovascular risk.

1.4 Lifestyle Variables Affecting Hyperlipidemia

1. Dietary Habits

Diet is one of the most important determinants of lipid metabolism and cardiovascular health. Diets rich in fruits, vegetables, whole grains, lean proteins, and unsaturated fats help maintain healthy cholesterol levels and reduce cardiovascular risk (World Health Organization [WHO], 2023; National Lipid Association [NLA], 2021). In contrast, frequent consumption of fast foods, fried foods, processed snacks, trans fats, and sugar-sweetened beverages increases low-density lipoprotein (LDL) cholesterol and triglyceride levels (American Heart Association [AHA], 2022). In Saharanpur, increasing urbanization and easy availability of processed foods have contributed to unhealthy dietary practices, especially among younger populations.

2. Sleep Patterns

Adequate sleep is essential for maintaining metabolic balance and lipid regulation. Poor sleep quality and insufficient sleep duration are associated with increased LDL cholesterol, reduced high-density lipoprotein (HDL) cholesterol, obesity, insulin resistance, and metabolic syndrome (WHO, 2022). Chronic sleep deprivation also disrupts hormonal regulation and energy metabolism, thereby increasing the risk of hyperlipidemia and cardiovascular diseases.

3. Stress

Chronic psychological stress negatively affects lipid metabolism through increased secretion of stress hormones such as cortisol (Grundy, 2016). Elevated cortisol levels contribute to fat accumulation, obesity, insulin resistance, and abnormal lipid profiles. Stress-related behaviors including overeating, smoking, alcohol consumption, and reduced physical activity further increase the risk of hyperlipidemia and cardiovascular disorders (AHA, 2022).

4. Smoking and Alcohol Consumption

Smoking is a major behavioral risk factor for cardiovascular diseases and dyslipidemia. It lowers HDL cholesterol while increasing LDL cholesterol and triglyceride levels, thereby accelerating atherosclerosis and coronary artery disease (WHO, 2023). Excessive alcohol consumption also elevates triglyceride concentrations, contributes to liver dysfunction, and impairs lipid metabolism

(NLA, 2021). Combined with sedentary lifestyles and unhealthy diet, smoking and alcohol consumption significantly increase metabolic and cardiovascular risk.

1.5 Urbanization and Lifestyle Changes in Saharanpur

Saharanpur, a rapidly developing city in Uttar Pradesh, has undergone significant socio-economic and lifestyle transformations during recent decades. Urbanization has considerably altered occupational patterns, transportation habits, dietary behavior, and recreational activities (Misra & Khurana, 2008). Traditional occupations involving agriculture, manual labor, and physically demanding activities are increasingly being replaced by sedentary jobs such as office work, retail business, transportation services, and computer-based employment.

Modern urban lifestyles are characterized by prolonged sitting, dependence on motorized transportation, reduced outdoor physical activity, and excessive screen exposure through smartphones, computers, and television (World Health Organization [WHO], 2022). According to the World Health Organization, physical inactivity and sedentary behavior are major contributors to obesity, diabetes mellitus, cardiovascular diseases, and metabolic disorders.

Urbanization has also influenced dietary habits in Saharanpur, where traditional home-cooked meals are increasingly being replaced by processed foods, fast foods, fried snacks, and sugar-sweetened beverages rich in saturated fats and calories (National Lipid Association [NLA], 2021). These unhealthy dietary transitions, combined with reduced physical activity, have significantly contributed to rising prevalence of obesity, hyperlipidemia,

metabolic syndrome, and cardiovascular diseases (American Heart Association [AHA], 2022).

The younger population is particularly vulnerable due to increasing academic pressure, digital dependence, reduced participation in outdoor sports, and unhealthy eating behaviors. Limited awareness regarding preventive healthcare, balanced nutrition, and regular physical activity further aggravates the burden of lifestyle-related disorders in the region (WHO, 2022). Therefore, promoting healthy lifestyle practices and public health awareness is essential for reducing metabolic and cardiovascular diseases in urban populations such as Saharanpur.

1.6 Global and National Burden of Hyperlipidemia

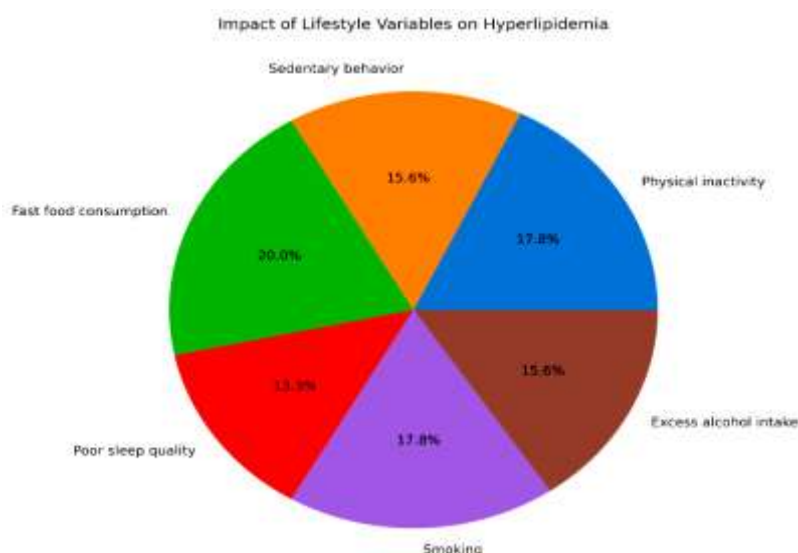
According to the World Health Organization, cardiovascular diseases account for nearly 17.9 million deaths annually worldwide, making them the leading cause of global mortality (WHO, 2023). Elevated cholesterol levels contribute significantly to heart disease and stroke. WHO Cardiovascular Diseases Factsheet

The World Health Organization also reports that approximately 27.5% of adults globally are insufficiently physically active, with physical inactivity being more common in urban populations (WHO, 2022).

In India, non-communicable diseases account for nearly 63% of total deaths, and increasing prevalence of obesity, diabetes, and hyperlipidemia has become a major public health challenge (Indian Council of Medical Research [ICMR], 2023).

Table: 1. Data Related to Lifestyle Factors and Hyperlipidemia

Lifestyle Variable	Reported Effect on Health	Supporting Source
Physical inactivity	Increased LDL cholesterol and triglycerides	WHO, 2022
Sedentary behavior	Higher obesity and metabolic syndrome risk	AHA, 2022
Fast food consumption	Increased cardiovascular disease risk	NLA, 2021
Poor sleep quality	Increased obesity and insulin resistance	WHO, 2022
Smoking	Reduced HDL cholesterol and increased LDL cholesterol	WHO, 2023
Excess alcohol intake	Elevated triglyceride levels and liver dysfunction	NLA, 2021



Graph: 1. Impact of Lifestyle Variables on Hyperlipidemia

1.7 Urbanization and Lifestyle Changes in Saharanpur

Rapid urbanization in cities such as Saharanpur has contributed to reduced physical activity and increased sedentary lifestyles. Studies in Indian urban populations indicate that: Nearly 35–45% of urban adults engage in insufficient physical activity (WHO, 2022). Screen time among adolescents has increased significantly due to smartphones, online education, and social media use. Urban dietary transitions have resulted in increased consumption of processed foods and sugar-sweetened beverages. Obesity prevalence in urban Indian populations has risen to approximately 20–30% among adults (ICMR, 2023).

These factors collectively increase the prevalence of hyperlipidemia, diabetes mellitus, and cardiovascular diseases in developing urban regions including Saharanpur.

2. Conclusion

The present study demonstrates a strong association between hyperlipidemia, physical inactivity, and changing lifestyle variables in Saharanpur, Uttar Pradesh. Rapid urbanization and modernization have significantly altered traditional lifestyles, resulting in reduced physical activity, increased sedentary

behavior, unhealthy dietary habits, stress, inadequate sleep, and greater dependence on technology. These lifestyle changes have collectively contributed to the increasing prevalence of obesity, diabetes mellitus, metabolic syndrome, and hyperlipidemia among urban populations. Regular physical activity plays a vital role in maintaining healthy lipid metabolism by increasing high-density lipoprotein (HDL) cholesterol and reducing low-density lipoprotein (LDL) cholesterol and triglyceride levels, whereas sedentary lifestyles characterized by prolonged sitting, excessive screen time, and limited outdoor activities impair fat metabolism and elevate cardiovascular risk. Additionally, unhealthy dietary practices, smoking, alcohol consumption, chronic stress, and poor sleep quality further aggravate lipid abnormalities and metabolic disorders. Therefore, adopting healthy lifestyle modifications such as regular physical activity, balanced nutrition, stress management, adequate sleep, smoking cessation, and reduced alcohol consumption is essential for the prevention and management of hyperlipidemia and related cardiovascular diseases. Public health awareness programs, school-based health education, and community-level preventive strategies should be promoted in Saharanpur to reduce the growing burden of non-communicable diseases and improve overall public health outcomes.

3. Authors' Contributions

MC and SK conceived, designed, and supervised the study. WN conducted literature review, data compilation, and manuscript drafting. NT contributed to data analysis and verification of scientific information. PK assisted in manuscript formatting, editing, correspondence, and final preparation of the manuscript. All authors reviewed and approved the final manuscript.

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