

Relationship between Sedentary Time and physical activity in patients with Non-Alcoholic Fatty Liver Disease

Mehreen Zaman¹, Muhammad Salman Afzal², Yasir Abbas Zaidi³

¹Associate Professor Gastroenterology, Department of Gastroenterology and Hepatology, Ameeruddin Medical College/Lahore General Hospital, ²Senior Registrar Gastroenterology, Department of Gastroenterology Lahore General Hospital, Lahore, ³Associate Professor Gastroenterology, Nishtar Medical University Multan

Corresponding author: Mehreen Zaman, Email: drmehrynniazi@gmail.com

ABSTRACT

One of the most prevalent chronic liver diseases is nonalcoholic fatty liver disease (NAFLD). Public health is currently threatened by physical inactivity and the resulting health problems. The aim of this study was to investigate the relationship between sedentary behavior and physical activity level in NAFLD patients.

Methods: A cross-sectional study was carried at Allama Iqbal Medical College/Jinnah Hospital, Lahore. Purposive sampling was used to enroll 210 participants in the study. NAFLD patients aged between 18 and 80 years attending OPD were recruited after taking their informed consent. Data were entered into SPSS version 25.0 for analysis. Quantitative variables were reported as frequencies and percentages. Spearman rank correlation test was used to determine the relationship between sedentary time and physical activity level. Statistical significance was defined as a P value of 0.05 or less.

Results: Total 210 patients were enrolled in current study. Majority 147(70.0) of the patients were 20-50 years old, male 126(60.0%), married 186(88.6%). The most common sign and symptoms of non-alcoholic fatty liver disease were abdominal pain 169(80.5%), followed by change in weight 130(61.9%) and constipation 125(59.5%). Majority of the patients have low and moderate physical activities and have sedentary life style. Their sitting time is almost 6 to 10 hours a day. The current study results showed a negative strong correlation between sedentary time and physical activity of patients [$r = -0.650^{**}$, P-value <0.05].

Conclusion: It was concluded from the current study that sedentary time and physical activity are negatively correlated in NAFLD. The results of current research indicate that reducing inactive time and enhancing physical activity levels are beneficial for reducing the risk of developing NAFLD.

Keywords:

NAFLD, Physical activity, sedentary life style

INTRODUCTION

Any muscular movement performed by skeletal muscles that causes energy expenditure above baseline levels is called physical activity (PA).¹ Noncommunicable diseases (NCDs) are becoming increasingly common, affecting the economies of many countries. NCDs include coronary heart disease, type 2 diabetes (T2DM) and psychiatric disorders, which account for up to 45% of the burden of disease in adults. Public health is currently and increasingly threatened by physical inactivity and its associated health problems.² One of the top preventable causes of death has been identified as sedentary behaviours, and there is an inverse linear relationship between mortality and physical activity levels. Regular exercise also reduces the risk of developing heart disease, T2DM, obesity, depression,

breast and colon cancer, osteoporosis and fatty liver disease.³

The risk of developing chronic diseases must be reduced through lifestyle changes, and research demonstrates that patient counseling from doctors might encourage them to become more active.⁴ Blood pressure, cholesterol and lipoprotein profiles, weight management and body fat distribution, as well as mental health and psychological wellness are all improved by physical activity.⁵ Hepatic fat accumulation is a feature of NAFLD in individuals who don't consume excessive amounts of alcohol. It's one of the most common chronic liver diseases and affects between 10% and 40% of the adult population worldwide, depending on age, lifestyle, and race or ethnicity.^{6,7} Although the molecular processes behind these associations are unclear, there is strong evidence that NAFLD is related to metabolic syndrome, type 2 diabetes, and decreased glucose tolerance. This relationship varies according to race and ethnicity of patients.^{8,9}

Obesity, insulin resistance, and the metabolic syndrome are closely related to NAFLD and have all

Conflict of Interest: The authors declared no conflict of interest exists.

Citation: Zaman M, Afzal MS, Zaidi YA. Relationship between Sedentary Time Physical Activity and in patients with Non-Alcoholic Fatty Liver Disease. J Fatima Jinnah Med Univ. 2023; 17(1):11-14.

DOI: <https://doi.org/10.37018/NLUA1421>

been associated with inadequate exercise and prolonged sitting.¹⁰ A unique paradigm of "inactivity physiology" is supported by experimental studies showing that if the lower limb muscles were not used during the prolonged sitting that can lead to metabolic abnormalities. Impaired lipoprotein lipase in skeletal muscle has also been linked to insulin resistance in the liver and other tissues.¹¹

From this, it can be hypothesized that prolonged sitting, independent of physical activity, may contribute to the development of NAFLD. The association between sedentary behavior and NAFLD that is not dependent on physical activity has remained largely unexplored. The aim of this study was to investigate the relationship between sedentary behavior and physical activity level in NAFLD patients.

PATIENTS AND METHODS

A cross-sectional study was carried at Allama Iqbal Medical College/Jinnah Hospital, Lahore. Purposive sampling was used to enroll 250 patients in the research. NAFLD patients who visited the OPD between the ages of 18 and 80 were included in the study after giving the informed consent. Patients who were terminally ill, hospitalized in an intensive care unit, had a comorbid condition such as uncontrolled diabetes, uncontrolled hypertension, known liver disease, or were taking medication for CLD, as well as those with a history of malignancy, were excluded. Patients' demographic and disease history was obtained on a predesigned questionnaire. The IPAQ (short), questionnaire was used to calculate physical activity of patients. Metabolic equivalents (MET-minutes per week) were determined by IPAQ evaluation, one of the simplest ways to measure the intensity level of PA intensity. Walking, moderate-intensity activities, and vigorous-intensity activities are three of the distinct

categories of activity included in IPAQ.¹² Data were entered into SPSS version 25.0 for analysis. Quantitative variables were displayed as frequencies and percentages. Spearman rank correlation test was used to determine the relationship between sedentary time and PA. Statistical significance was defined as a P-value of 0.05 or lower.

RESULTS:

Total 210 patients were enrolled in current study. Majority 147(70.0) of the patients were 20-50 years old, male 126(60.0%), married 186(88.6%) according to table 1.

Table 1: Demographic features of patients

Variables	Frequency(n=210)	Percentages
Age Categories		
20-50	147	70.0
51-80	63	30.0
Gender Of Patients(n=210)		
Male	126	60.0
Female	84	40.0
Marital Status(n=210)		
Married	186	88.6
Unmarried	21	9.5
Divorced	3	1.4

Table 2: Sign and Symptoms of patients

Sign and Symptoms		
Variables	Frequency	Percentages
Nausea	42	20.0
Anorexia	37	17.6
Vomiting	83	39.5
Constipation	125	59.5
Abdominal Pain	169	80.5
Change In Weight	130	61.9

Most common sign and symptoms of non-alcoholic fatty liver disease were abdominal pain 169(80.5%), followed by change in weight 130(61.9%), constipation 125(59.5%), vomiting 83(39.5%), nausea 42(20.0%) and anorexia 37(17.6%) according to table 2.

Table 3: Correlation between MET and sitting time

MET Category	Sitting Time		Total	Correlation coefficient	P-value
	Up to 5 Hours	6-10 Hours			
Low	10	70	80	-0.650**	0.000
Moderate	28	54	82		
High	39	9	48		
Total	67	143	210		

Correlation is significant at the 0.01 level (2-tailed).

The patient's physical activity was correlated with their sitting time. The patients who fall into the low score of MET showed that there were 10 participants who sit almost 5 hours a day and 80 sit for 6-10 hours. In moderate MET category there were 28 participants who sit almost 5 hours a day and 54 sit for 6-10 hours and high MET category represents 39 participants

sitting time was 5 hours a day and 9 sit for 6-10 hours. Majority of the patients have low and moderate physical activities and have sedentary life style. Their sitting time is almost 6 to 10 hours a day. The current study results showed a negative strong correlation between Physical activity and sitting time of patients [$r = -0.650^{**}$, P-value <0.05]

DISCUSSION

Obesity and insulin resistance are rapidly increasing, so NAFLD has rapidly overtaken other causes of abnormal liver biochemistry in many developed countries. Physical activity, which is an important factor in metabolic control, is often recommended to individuals with NAFLD by controlling their weight loss and changing their diet.¹³ moreover the rationale of current study is that the prolonged sitting, independent of physical activity, may contribute to the development of NAFLD. The aim of this study was to investigate the relationship between sedentary behavior and physical activity level in NAFLD patients.. The results of current study showed that the most common sign and symptoms of non-alcoholic fatty liver disease were abdominal pain 169(80.5%), followed by change in weight 130(61.9%), constipation 125(59.5%), vomiting 83(39.5%), nausea 42(20.0%) and anorexia 37(17.6%) Majority of the patients have low and moderate physical activities and have sedentary life style. Their sitting time is almost 6 to 10 hours a day. The current study results showed a negative strong correlation between Physical activity and sitting time of patients [$r = -0.650^{**}$, P -value <0.05].

Despite the fact that physical activity and exercise are advised as a part of NAFLD treatment, there are no relevant research to help doctors recommend exercise regimens or create recommendations for how to manage these patients' physical activity.¹⁴ Prospective studies demonstrate that persons who live physically active lifestyles are less likely to acquire IR, impaired glucose tolerance, or T2DM, which supports the health advantages of physical activity.¹⁵

Low physical activity is caused by increasing physical inactivity, and sedentary behavior is becoming an increasing problem in the general population. Sedentary behavior, especially sedentary behavior, is reported to be more prevalent in individuals who are susceptible to T2DM and the metabolic syndrome. Moreover both the total amount of sedentary time and the intervals between sedentary times are important for metabolic risk.¹⁶ Therefore, when implementing lifestyle interventions, it is important to consider the potential impact that an increase in sedentary time may have on the development of or predisposition to NAFLD, independent of physical activity or exercise. In addition to following recommendations for physical activity and exercise, reversing sedentary behaviour may be another treatment approach.¹⁷

Adults with NAFLD spend more time sitting than adults without fatty liver, which is a surprising finding.

Physical inactivity or sedentary behaviours is an evolving health problem that inconspicuously increases the risk for a variety of chronic diseases in individuals. The negative health effects of inactivity may be exacerbated by increases in physical inactivity. In a coross-sectional survey on seventy four citizen of UK also reported a negative relationship between sedentary life style and physical activity levels among NAFLD.¹⁸ In another study conducted ion Korean population also reported negative association between various forms of physical activity and NAFLD. However these findings were according to the current study results¹⁹

CONCLUSION

It was concluded from the current study that physical activity and sedentary life style were negatively correlated in NAFLD. The results of current research indicate that reducing inactive time and enhancing physical activity levels are beneficial for reducing the risk of developing NAFLD. People with NAFLD are less active and spend more time sitting. Clinical care should consider the therapeutic goal of a high sedentary lifestyle and low levels of physical activity, which may prevent the progression of metabolic disorders and weight gain in patients with NAFLD.

REFERENCES

1. Ashok P, Kharche JS, Raju R, Godbole G. Metabolic equivalent task assessment for physical activity in medical students. *National Journal of Physiology, Pharmacy and Pharmacology*. 2017;7(3):236.
2. Ekelund U, Sepp H, Brage S, Becker W, Jakes R, Hennings M, Wareham NJ. Criterion-related validity of the last 7-day, short form of the International Physical Activity Questionnaire in Swedish adults. *Public health nutrition*. 2006;9(2):258-65.
3. Lobelo F, Rohm Young D, Sallis R, Garber MD, Billinger SA, Duperly J, Hutber A, Pate RR, Thomas RJ, Widlansky ME, McConnell MV. Routine assessment and promotion of physical activity in healthcare settings: a scientific statement from the American Heart Association. *Circulation*. 2018 May 1;137(18):e495-522.
4. Lobelo F, Duperly J, Frank E. Physical activity habits of doctors and medical students influence their counselling practices. *British journal of sports medicine*. 2009 1;43(2):89-92.
5. Brown DW, Balluz LS, Heath GW, Moriarty DG, Ford ES, Giles WH, Mokdad AH. Associations between recommended levels of physical activity and health-related quality of life Findings from the 2001 Behavioral Risk Factor Surveillance System (BRFSS) survey. *Preventive medicine*. 2003 1;37(5):520-8.
6. Rossignol JF, EL-GOHARY YM. Nitazoxanide in the treatment of viral gastroenteritis: a randomized double-blind placebo-controlled clinical trial. *Alimentary pharmacology & therapeutics*. 2006 Nov;24(10):1423-30.
7. Loomba R, Sanyal AJ. The global NAFLD epidemic. *Nature reviews Gastroenterology & hepatology*. 2013 Nov;10(11):686-90.

8. Adams LA, Anstee QM, Tilg H, Targher G. Non-alcoholic fatty liver disease and its relationship with cardiovascular disease and other extrahepatic diseases. *Gut*. 2017 Jun 1;66(6):1138-53.
9. Watt MJ, Miotto PM, De Nardo W, Montgomery MK. The liver as an endocrine organ—linking NAFLD and insulin resistance. *Endocrine reviews*. 2019 Oct;40(5):1367-93
10. Reidy PT, Monnig JM, Pickering CE, Funai K, Drummond MJ. Preclinical rodent models of physical inactivity-induced muscle insulin resistance: challenges and solutions. *Journal of Applied Physiology*. 2021 Mar 1;130(3):537-44.
11. Sylow L, Tokarz VL, Richter EA, Klip A. The many actions of insulin in skeletal muscle, the paramount tissue determining glycemia. *Cell Metabolism*. 2021 Apr 6;33(4):758-80.
12. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, Pratt M, Ekelund UL, Yngve A, Sallis JF, Oja P. International physical activity questionnaire: 12-country reliability and validity. *Medicine and science in sports and exercise*. 2003 Aug 1;35(8):1381-95.
13. Finelli C, Tarantino G. Have guidelines addressing physical activity been established in nonalcoholic fatty liver disease?. *World journal of gastroenterology: WJG*. 2012 Dec 12;18(46):6790.
14. Colberg SR, Sigal RJ, Fernhall B, Regensteiner JG, Blissmer BJ, Rubin RR, Chasan-Taber L, Albright AL, Braun B. Exercise and type 2 diabetes: the American College of Sports Medicine and the American Diabetes Association: joint position statement. *Diabetes care*. 2010 Dec 1;33(12):e147-67.
15. Thomas D, Elliott EJ, Naughton GA. Exercise for type 2 diabetes mellitus. *Cochrane database of systematic reviews*. 2006(3).
16. Pratt M, Norris J, Lobelo F, Roux L, Wang G. The cost of physical inactivity: moving into the 21st century. *British journal of sports medicine*. 2014 Feb 1;48(3):171-3.
17. Healy GN, Dunstan DW, Salmon J, Cerin E, Shaw JE, Zimmet PZ, Owen N. Breaks in sedentary time: beneficial associations with metabolic risk. *Diabetes care*. 2008 Apr 1;31(4):661-6.
18. Hallsworth K, Thoma C, Moore S, Ploetz T, Anstee QM, Taylor R, Day CP, Trenell MI. Non-alcoholic fatty liver disease is associated with higher levels of objectively measured sedentary behaviour and lower levels of physical activity than matched healthy controls. *Frontline gastroenterology*. 2015 Jan 1;6(1):44-51.
19. Kwak MS, Kim D, Chung GE, Kim W, Kim YJ, Yoon JH. Role of physical activity in nonalcoholic fatty liver disease in terms of visceral obesity and insulin resistance. *Liver International*. 2015 Mar;35(3):944-52.