DOI: https://doi.org/10.54393/pjhs.v5i10.2144

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (P): 2790-9352, (E): 2790-9344
Volume 5, Issue 10 (October 2024)

Original Article

OPEN ACCESS

Prevalence of Metabolic Syndrome in Hepatitis B Virus Infection

Rana Zohaib Munawar[1], Tazeen Nazar[*], Bilal Aziz[1], Muhammad Kamran Yousaf[2], Nabeel Mohsin[1] and Kashif Nawaz[1]

[1]East Medical Ward, King Edward Medical University, Mayo Hospital, Lahore, Pakistan
[2]North Medical Ward, King Edward Medical University, Mayo Hospital, Lahore, Pakistan

ARTICLE INFO

Keywords:
Hepatitis B Virus, Metabolic Syndrome, Unhealthy Lifestyle, Prevalence

How to Cite:
Munawar, R. Z., Nazar, T., Aziz, B., Yousaf, M. K., Mohsin, N., & Nawaz, K. (2024). Prevalence of Metabolic Syndrome in Hepatitis B Virus Infection: Metabolic Syndrome in Hepatitis B Virus Infection. Pakistan Journal of Health Sciences, 5(10). https://doi.org/10.54393/pjhs.v5i10.2144

***Corresponding Author:**
Tazeen Nazar
East Medical Ward, King Edward Medical University, Mayo Hospital, Lahore, Pakistan
tazeennazar@gmail.com

Received Date: 12th September, 2024
Acceptance Date: 24th October, 2024
Published Date: 31st October, 2024

ABSTRACT

Hepatitis B virus infection is a universal healthcare concern leading to the development of decompensated liver disease, cirrhosis, liver cancer and premature mortality. Likewise, metabolic syndrome caused by unhealthy lifestyle and poor eating habits further increases this risk. **Objective:** To estimate the prevalence of metabolic syndrome in Hepatitis B virus patients. **Methods:** This cross-sectional study was executed in the Medical Department of King Edward Medical University, Mayo Hospital, Lahore from 1st August 2022 to 31st July 2023. A total of 200 patients with Hepatitis B virus infection were selected via a non-probability consecutive sampling technique. Waist circumference, blood pressure, serum triglycerides, high-density lipoprotein and blood glucose levels were measured. Patients fulfilling 3 out of 5 criteria were labelled as having metabolic syndrome (MetS). **Results:** Out of 200 patients of Hepatitis B virus, 153 (76.5%) were male and 47 (23.5%) were female, 136 (68.0%) belonged to the age bracket of 18-40 years and 64 (32.0 %) in the 41-75 years' age group. The mean age was calculated to be 38.79 ± 5.37 years, the mean BMI was 27.34 ± 5.49 kg/m2 and the duration of Hepatitis B virus infection was 8.84 ± 3.15 months. The prevalence of MetS was observed in 50 (25%) patients of Hepatitis B virus infection. **Conclusions:** It was concluded that there is a significant proportion of metabolic syndrome among Hepatitis B virus-infected individuals.

INTRODUCTION

Chronic Hepatitis B virus (HBV) is one of the leading contributors to hepatic disease leading to cirrhosis and liver cancer. With an estimated prevalence of about 296 million people globally, it is labelled as the seventh significant contributor to mortality [1, 2]. For developing countries, this chronic infection imposes a substantial strain on the economy and healthcare system. In Pakistan, around 4.55 million people are affected by this virus. From 2015 to 2019, an 8% increase in HBV-related deaths was observed, with an estimated 563,000 people dying of HBV annually [3], owing to a lack of public awareness about the transmission of this virus and other communicable diseases, poor healthcare facilities and financial constraints. In Pakistan, a steady rise in HBV cases is observed and cohering to a study conducted by Ochani *et al.*, the estimated prevalence of HBV will be 3.25% by the year 2030 [4]. The clinical spectrum of HBV ranges from an asymptomatic silent or carrier state that may persist for years to an acute self-resolving infection, fulminant liver failure or chronic infection causing hepatitis, cirrhosis and ultimately hepatocellular carcinoma and death. One out of every fourth person infected with chronic HBV infection succumbs to premature death either due to cirrhosis or hepatocellular carcinoma. Metabolic syndrome (MetS), also referred to as Syndrome X, is a complex cardiometabolic disorder characterized by truncal obesity, high levels of blood glucose, high blood pressure, deranged levels of triglycerides and high-density lipoproteins (HDL). The presence of three out of these five criteria is enough to label the patient as having MetS [5]. A projected worldwide figure depicting the prevalence of MetS is approximately 12.5% to 31.4% [6]. A global prevalence of MetS was reported to be 25% by the International Diabetes Federation, with a 20-35% prevalence with an annual increase reported in China [7]. In Pakistan, the estimated pooled prevalence was reported to be 28.8% (95% CI: 17.8-

DOI: https://doi.org/10.54393/pjhs.v5i10.2144

39.7) according to a study conducted by Adil *et al.*, [8]. As the liver maintains glucose homeostasis and plays an integral part in the regulation of lipid metabolism, both of these mechanisms are significantly disturbed in MetS, so a possible connection between liver disease and MetS exists. A variable prevalence of combined HBV infection and MetS exists depending on the endemicity of either condition but the relationship between the two conditions remains inconclusive. An estimated combined prevalence of HBV and MetS is reported to be 0.99–1.74% according to studies conducted in China [9]. Studies carried out by Chen *et al.*, on 233 patients of HBV-related acute on chronic liver failure demonstrated that 67.8% of the patients who had metabolic risk factors like prediabetes/diabetes or hypertension, had a worse disease with poor survival rates [10]. A negative correlation between Mets and HBV was also shown by Yan and colleagues who reported 11.64% MetS prevalence in HBV-positive patients compared to 12.66% HBV-negative patients ($p<0.001$) [11]. A high body mass index (BMI) coupled with tobacco and alcohol consumption constituted more than one-third of patients with HBV in a study done by Wang and colleagues [12]. Patients having diabetes and concomitant chronic HBV were reported to have an increased risk (3.3%) of hepatocellular carcinoma compared to non-diabetics [13]. Another study also demonstrated that the presence of MetS in HBV not only increases the risk of liver fibrosis but also of hepatocellular carcinoma [14]. Considering the high prevalence of both of these conditions in Pakistan, it became imperative to carry out research that would estimate the prevalence of MetS in Chronic HBV-infected patients presenting to our hospital. This study aims to estimate the prevalence of metabolic syndrome in Hepatitis B virus patients.

METHODS

This cross-sectional study was conducted in the Medical Department of King Edward Medical University, Mayo Hospital, Lahore from 1st August 2022 to 31st July 2023. A total of 200 patients were selected keeping a 6.5% margin of error, and 95 % confidence level and taking the expected prevalence of MetS in hepatitis B virus-infected patients as 27.8% [15]. Patients of both genders within the age range of 18-75 years and having been diagnosed with chronic HBV infection were recruited via a non-probability consecutive sampling technique. Patients of active coronary artery disease, chronic kidney disease having estimated glomerular filtration rate (eGFR)<60 ml/ min/kg body weight, and those with unstable neurological or psychiatric disease as assessed by history, examination and clinical record were not taken into consideration. After getting acceptance from the College of Physicians and Surgeons Pakistan (CPSP) Research Evaluation Unit (REU), reference number CPSP/REU/MED-2020-066-16589, and ethical approval from the Institutional Review Board (IRB) of King Edward Medical University, Reference No 584/RC/KEMU, all patients conforming to the selection criteria were enrolled after taking informed written and verbal consent. Demographic characteristics like age, BMI, duration of HBV infection, waist circumference and blood pressure were recorded. If three out of these five parameters were present, the patient was labelled as a case of MetS. All the information was documented on a pre-designed proforma. The entire collected data were recorded and scrutinized using computer software SPSS version 22.0. Age, BMI and duration of HBV infection were calculated as mean and standard deviation (Mean ± S.D). Frequency and percentage were employed for the estimation of gender and the presence of metabolic syndrome. For stratification of data like age, gender and duration of disease, a chi-square test was used and a p-value<0.05 was taken as significant.

RESULTS

Out of a total of 200 patients with chronic HBV infection, 153 (76.5%) were male and 47 (23.5%) were female, 136 (68.0%) had an age range of 18-45 years and 64 (32.0 %) were of 46-75 years. The mean age was calculated to be 38.79 ± 5.37 years, the mean BMI was 27.34 ± 5.49 kg/m2 and the duration of HBV infection was 8.84 ± 3.15 months. Metabolic syndrome was observed in 50 (25%) patients of HBV infection. Stratification of MetS in HBV patients according to age, gender and duration of HBV infection is depicted in table 1.

Table 1: Stratification for Metabolic Syndrome in Patients with Hepatitis B Concerning Age, Gender and Duration of HBV Infection Using Chi-Square Test (n=200)

Variables		Metabolic Syndrome		Total	p-value
		Yes	No		
Age (Years)	18-30	9 (16.1%)	47 (83.9%)	56	0.489
	31-45	23 (28.75%)	57 (71.25%)	80	
	46-60	13 (27.1%)	35 (72.9%)	48	
	61-75	5 (31.25%)	11 (68.75%)	16	
All age Groups Total	18-75	50 (25%)	150 (75%)	200	-
Gender	Male	33 (21.6%)	120 (78.4%)	153	0.054
	Female	17 (36.2%)	30 (63.8%)	47	
Duration of HBV	1-12 Months	39 (23.2%)	129 (76.8%)	168	0.188
	>12 Months	11 (34.4%)	21(65.6%)	32	
Total		50 (25.0%)	150 (75.0%)	200	-

DISCUSSION

The global prevalence of HBV amounts to 254 million with an increase of 1.2 million each year. Despite the World Health Organization's (WHO) strategies to curtail and limit the spread of this disease, the figures are on a rising trend. Especially in developing countries, the healthcare sector is overburdened by the surge in HBV cases. The major disease burden is from the adult population of Africa (65 million) and Western Pacific Regions (97 million) [16]. Although there is

DOI: https://doi.org/10.54393/pjhs.v5i10.2144

no clearly defined prevalence of HBV in Pakistan owing to limited data, some pooled data and meta-analyses have generated statistics for the Pakistani population. Anwar *et al.*,collected samples from 6137 HBV-suspected individuals in District Buner, Khyber Pakhtunkhwa and reported a seropositivity of only 1.74% [2]. A high prevalence of >5% HBV infection was reported through multiple studies conducted in different provinces of Pakistan mainly the Southern area of Punjab, some areas of Lahore, Interior Sindh, District Tatta and Kurram agency. Similarly, Mets have become a major area of concern for healthcare workers. The intensifying menace of MetS attributed to poor dietary habits, sedentary lifestyle, and lack of physical activity combined with certain genetic, environmental factors and stress, needs to be addressed. This complex metabolic disorder poses a serious threat to cardiovascular, kidney and hepatic diseases comprising non-alcoholic fatty liver disease (NAFLD), diabetes and all-cause mortality. Various studies have been conducted worldwide showing the relationship between MetS and HBV infection but with conflicting results. Since MetS and non-alcoholic fatty liver disease (NAFLD) have the same clinical spectrum and metabolic abnormalities, several studies have shown the association between MetS, NAFLD and HBV infection [17]. A study conducted by Zhou and colleagues reported that the presence of MetS and liver fibrosis in patients with chronic HBV infection poses an increased risk of hepatocellular carcinoma [18]. Similarly, a retrospective cohort study conducted in China found a 12.6% incidence of cirrhosis in patients having HBV and Metabolic dysfunction associated with fatty liver disease (MAFLD) compared to patients without MAFLD [19]. Yan *et al.* reported a reverse relationship between chronic HBV infection and increased levels of TGs in both males and females and raised blood pressure in males [11]. MetS seemed to have an association with liver-related events in patients with HBV with the presence of concomitant co-morbidities further escalating the risk as shown by Patmore *et al.*, in a retrospective study conducted on patients in the Netherlands and Canada [20]. Although these studies were conducted on patients belonging to different ethnicities and geographical locations the results of our study were inconsistent with their results as we found a high prevalence (25.0%) in our cohort. The relationship between MetS and HBV infection and its prevalence remains a topic of debate owing to the contradictory outcomes reported by different studies.

CONCLUSIONS

It was concluded that a high prevalence (25%) of MetS was reported in our cohort of HBV-infected individuals. Lack of awareness, limited access to healthcare, poor dietary habits, social and environmental factors and stress all contribute to the continuous escalating figures of MetS in HBV patients.

Authors Contribution

Conceptualization: RZM
Methodology: RZM, TN, BA, NM
Formal analysis: KN
Writing review and editing: TN, BA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Chiang CH and Huang KC. Association Between Metabolic Factors and Chronic Hepatitis B Virus Infection. World Journal of Gastroenterology: World Journal of Gastroenterology. 2014 Jun; 20(23):7213. doi: 10.3748/wjg.v20.i23.7213.

[2] Anwar F, Khan M, Salman M, Ahmad S, Ullah F, Khan J *et al*. Seroprevalence of Hepatitis B Virus in Human Population of District Buner Khyber Pakhtunkhwa Pakistan. Clinical Epidemiology and Global Health. 2021 Apr; 10: 100688. doi: 10.1016/j.cegh.2020.100688

[3] Shaikh OA, Aaqil SI, Kumar P, Basit J. Pakistan's Struggle to Tame Hepatitis: An Ongoing Threat. International Journal of Surgery: Global Health. 2023 Mar; 6(2): e123. doi: 10.1097/GH9.0000000000000123

[4] Ochani S, Ochani K, Ochani A, Vohra LI, Ochani S, Al Hasibuzzaman M *et al*. Hepatitis Is Still A Major Health Concern in Pakistan. Annals of Medicine and Surgery. 2023 Nov; 85(11): 5820-2. doi: 10.1097/MS9.0000000000001280.

[5] Wang CC,Tseng TC, Kao JH. Hepatitis B Virus Infection and Metabolic Syndrome: Fact or Fiction? Journal of Gastroenterology and Hepatology.2015Jan; 30(1): 14-20.doi: 10.1111/jgh.12700.

[6] Jarčuška P, Janičko M, Kružliak P, Novák M, Veselíny E, Fedačko J *et al*. Hepatitis B Virus Infection in Patients With Metabolic Syndrome: A Complicated Relationship. Results of A Population-Based Study. European Journal of Internal Medicine.2014 Mar;25(3):286-91. doi: 10.1016/j.ejim.2014.01.006.

[7] Saklayen MG. The Global Epidemic of the Metabolic Syndrome. Current Hypertension Reports.2018 Feb; 20(2): 1-8. doi: 10.1007/s11906-018-0812-z.

[8] Adil SO, Islam MA, Musa KI, Shafique K. Prevalence of Metabolic Syndrome among Apparently Healthy Adult Population in Pakistan: A Systematic Review and Meta-Analysis. In Healthcare. 2023 Feb; 11(4): 531.

DOI: https://doi.org/10.54393/pjhs.v5i10.2144

doi: 10.3390/healthcare11040531.

[9] Li WenCheng LW, Lee YiYen LY, Chen IChuan CI, Sun Cheng SC, Chiu FengHsiang CF, Chuang ChungHsun CC. Association Between the Hepatitis B and C Viruses and Metabolic Diseases in Patients Stratified by Age. 2013 Sep; 33(8): 1194-1202. doi:10.1111/liv.12224.

[10] Chen L, Dai J, Xie Q, Wang X, Cai W. Metabolic Risk Factors Are Associated with the Disease Severity and Prognosis of Hepatitis B Virus-Related Acute on Chronic Liver Failure. Gut and Liver. 2022 May;16(3):456.doi: 10.5009/gnl210449.

[11] Yan LB, Liao J, Han N, Zhou LY, Wang XE, Wang YJ *et al*. Association Between Hepatitis B Virus Infection and Metabolic Syndrome in Southwest China: A Cross-Sectional Study. Scientific Reports.2020 Apr; 10(1): 6738. doi: 10.1038/s41598-020-62609-4.

[12] Wang M, Yan L, Wang J, Jin Y, Zheng ZJ. Global Burden of Hepatitis B Attributable to Modifiable Risk Factors from 1990 to 2019:A Growing Contribution and Its Association with Socioeconomic Status.Globalization and Health.2023Mar;19(1): 23.doi: 10.1186/s12992-023-00922-z.

[13] Shyu YC, Huang TS, Chien CH, Yeh CT, Lin CL, Chien RN. Diabetes Poses a Higher Risk of Hepatocellular Carcinoma and Mortality in Patients with Chronic Hepatitis B: A Population-Based Cohort Study. Journal of Viral Hepatitis. 2019 Jun; 26(6): 718-26.doi: 10.1111/jvh.13077.

[14] Yip TC, Lee HW, Chan WK, Wong GL, Wong VW. Asian Perspective on NAFLD-Associated HCC. Journal of Hepatology.2022 Mar; 76(3): 726-34. doi:10.1016/j.jhep.2021.09.024.

[15] Janičko M, Senajová G, Dražilová S, Veselíny E, Fedačko J, Siegfried L *et al*. Association Between Metabolic Syndrome and Hepatitis B Virus Infection in the Roma Population in Eastern Slovakia: A Population-Based Study. Central European Journal of Public Health.2014 Mar;22(Supplement): S37-42. doi: 10.21101/cejph.a3900.

[16] Chaudhari R, Fouda S, Sainu A, Pappachan JM. Metabolic Complications of Hepatitis C Virus Infection. World Journal of Gastroenterology.2021 Apr; 27(13): 1267. doi: 10.3748/wjg.v27.i13.1267.

[17] Diao Y, Tang J, Wang X, Deng W, Tang J, You C. Metabolic Syndrome, Nonalcoholic Fatty Liver Disease, and Chronic Hepatitis B: A Narrative Review. Infectious Diseases and Therapy. 2023 Jan; 12(1):536 6. doi: 10.1007/s40121-022-00725-6.

[18] Zhou Y, Cui Y, Deng H, Yu J. Association Between Hepatitis B Virus Infection and Metabolic Syndrome: A Retrospective Cohort Study in Shanghai, China. BioMed Central Public Health. 2014 Dec; 14: 1-6. doi: 10.1186/1471-2458-14-516.

[19] Wang QX, Xue J, Shi MJ, Xie YB, Xiao HM, Li S *et al*. Association Between Metabolic Dysfunction-Associated Fatty Liver Disease and the Risk of Cirrhosis in Patients With Chronic Hepatitis B—A Retrospective Cohort Study. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy.2022Jan; 15: 2311-22. doi: 10.2147/DMSO.S369824.

[20] Patmore LA, Katwaroe WK, van der Spek D, Choi HS, Patel K, Brakenhoff S *et al*. Association Between the Presence of Metabolic Comorbidities and Liver-Related Events in Patients With Chronic Hepatitis B. Clinical Gastroenterology and Hepatology.2023Nov;21(12): 3089-96. doi: 10.1016/j.cgh.2023.03.024.