ASSESSMENT OF RISK AND PREVALENCE OF NON ALCOHOLIC FATTY LIVER DISEASE AMONG URBAN POPULATION – A CROSS SECTIONAL STUDY

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ABSTRACT

Nonalcoholic fatty liver disease (NAFLD) is currently the most common form of liver disease and abnormal liver function tests and its prevalence is increasing due to the rise in obesity. Progression of NAFLD may lead to nonalcoholic steatohepatitis, marked by inflammation of the liver, and can further progress to fibrosis and eventual cirrhosis. Although simple NAFLD is usually benign and does not frequently progress to more advanced stages of liver disease, because of its high prevalence it is an increasing public health concern and a leading cause of cirrhosis. The main objective of the present study is to investigate the factors influencing NAFLD among the urban population. Observational study comprises of 500 patients of which 299 were presented with the compliant of NAFLD was chosen for the individualized in-depth evaluation and subjected to survey. Results of the study indicates that the predicted risk of risk for male was 40 % and female was 60 % of having NAFLD. Male having the waist measurement of 30 – 34.9 inches (50.8%) and Female having the waist measurement of 33–36.9 inch (56.4%) are more prevalent to NAFLD risk. Further investigation collectively suggested that individuals with co-morbidity like diabetes and cholesterol are at increased risk of having NAFLD. Till date there is no standard recommended guideline available for treating the NAFLD in this context proper understating about the influencing factors greatly helps in disease prevention and effective management in near future.

KEY WORDS: *Nonalcoholic fatty liver disease, Cirrhosis, Diabetes, BMI, Cholesterol*

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1. Introduction

Non-alcoholic fatty liver disease (NAFLD) is a broad term used to cover a spectrum of conditions which are characterized by evidence of hepatic steatosis on imaging or histology (macro-vesicular steatosis), and absence of secondary causes of hepatic steatosis such as significant alcohol consumption, chronic use of medications that can cause hepatic steatosis or hereditary disorders [1].

The disease spectrum ranges from simple steatosis to nonalcoholic steatohepatitis (NASH), cirrhosis, and even hepatocellular carcinoma (HCC). Patients with steatosis have only a very low risk of liver-related and non-liver-related adverse outcomes, whereas the presence of NASH substantially increases the risk of advanced comorbidity, accounting for increasing liver-related mortality and liver transplantation [2]. Therefore, early intervention in NAFLD assures termination of progression and even reversal of the disease along with its advanced complications [3,4].

NAFLD pathogenesis is widely believed to result from a series of liver insults, commonly referred to as the 'multi-hit' hypothesis [5]. The first hit involves the development of hepatic steatosis due to insulin resistance. Insulin resistance leads to increased serum levels of nonesterified or free fatty acids (FFAs). Subsequently, increased FFA transport into hepatocytes and increased hepatic de novo lipogenesis exceed hepatic FFA β-oxidation and very low-density lipoprotein (VLDL) export, leading to increased hepatic steatosis [6]. Several studies suggest that hepatic steatosis is largely due to the increase in lipogenesis and decreases in lipid export [7].

Statins appeared to have some good effect in NAFLD in many open-label studies [8] particularly atorvastatin[9], which has been extensively studied in the literature. Given the lack of evidence to show that patients with NAFLD and NASH are at increased risk for serious drug-induced liver injury from statins, statins can be used to treat dyslipidemia in patients with NAFLD and NASH.

Angiotensin Receptor Blockers (ARBs) are also in the focus of investigation as a possible treatment for NAFLD.It is believed that ARBs by targeting the pancreatic effects of angiotensin should be able to preserve an adequate insulin secretion and acquire a better metabolic balance [10].

No pharmacological agents have been approved for the treatment of NAFLD or NASH. Therefore, most clinical efforts have been directed at treating the components of metabolic syndrome, namely obesity, diabetes, hypertension, and dyslipidemia. Other interventions are directed at specific pathways potentially involved in the pathogenesis of NAFLD, such as insulin resistance, oxidative stress, pro-inflammatory cytokines, apoptosis, bacterial overgrowth, and the angiotensin pathway [11]. The main objective of the present study is to investigate the factors influencing NAFLD among the urban population.

2.Materials and Methods

2.1. Study design

Observation study comprises of 500 patients of which 299 were presented with the compliant of nonalcoholic fatty liver disease (NAFLD) was chosen for the individualized in-depth evaluation and subjected to survey during July 2019 to September 2019. cross-Sectional observation study was conducted among the outpatients attending out-patient department of Aringnar Anna Government Hospital of Indian Medicine-Chennai-106. Participants were also explained that completion and submission of the questionnaire would be taken as consent to participate in this study. Data were dealt with the high level of anonymity and confidentiality.

2.2. Study Approval

This study was approved by institutional ethical committee of government siddha medical college of Indian medicine, Chennai, Tamil Nadu, India and also registered in Clinical Trial Registry India.

2.3. Questioner Pattern

The questionnaire was divided accordingly to cover the entire purpose of the study such as general demography, BMI, life style habituation, family history and average probability of having NAFLD.

2.4. Data variables and Study tools

Information on demographic characteristics like age, gender, marital status, occupation data on behavioral factors such as alcohol consumption, physical activity, medical history such as diabetes and dyslipidemia and anthropometrics were collected from the participants by using questionnaire. The questionnaire is based on Non – laboratory based self-assessment screening score [23].

2.5. Statistical Analysis

All these data entered in Microsoft excel and analysis was done by SPSS statistics version 26. Percentage, Chi-square test and logistic regression were used in final analysis.

3.Results

3.1. Result analysis on general demography and prevalence of NAFLD

In this study among 500 participants were evaluated. From them total of 60% (299) of individuals were identified as having high risk for NAFLD according to the Non - laboratory based screening score for NAFLD. The positive rate of having NAFLD risk for male was 40 % and female was 60 %. As shown in Table 1.

3.2. Result analysis on screening score of study population

Result analysis indicates the younger age group (35 - 55 years) had higher risk prevalence of NAFLD (58%) compared to older age group (40%). This may be due to the facts that the younger age group was dominated by female sex and the metabolic syndrome was commoner in this age group. Central obesity was calculated by the waist measurements. Male having the waist measurement of 30 – 34.9 inches (50.8%) and Female having the waist measurement of 33 – 36.9 inch (56.4%) are more prevalent to NAFLD risk. Majority of the patients in the NAFLD group were Overweight/ obese. In our study the data suggested that subjects with NAFLD risk are more likely to be Overweight or obese, confirming that the BMI is an independent predictor of NAFLD. The participants with NAFLD risk had a much higher BMI of □27 (42.8%). As shown in Table 2.

3.3. Association between variables and NAFLD of the individuals participate in the study

Out of 500 participants 60%(299) were identified as having high risk for NAFLD. The prevalence of risk factors and NAFLD risk were follows: Age <35 years n = 80 (NAFLD risk 7.5 %), ≥ 35 years n = 480 (70%), Waist measurement of male < 80cm n= 26 (NAFLD risk 8 %), 80 – 89.9 cm n = 83 (NAFLD risk 73 %), 90 – 99.9 cm n = 66 (NAFLD risk 64%), ≥ 100 cm n= 45 (NAFLD risk 33 %), waist measurement of female <75 cm n = 35 (NAFLD risk 3 %), 75 – 84.9 cmn = 53 (NAFLD risk 62 %), 85 – 94.9 cm n = 142 (NAFLD risk 71 %), ≥ 95 cm n= 50 (NAFLD risk 88 %), BMI < 23 kg/m2 n = 54 (NAFLD risk 2 %), 23 – 24.9 kg/m2 n = 141 (NAFLD risk 38 %), 25 – 26.9 kg/m2 n = 157 (NAFLD risk 75 %), ≥ 27 kg/m2 n= 148 (NAFLD risk 86%), Cholesterol present n = 60 (NAFLD risk 99 %), Absent n = 440 (NAFLD risk 54 %), Diabetes present n = 180 (NAFLD risk 89 %) absent n = 320 (NAFLD risk 43 %), Physically active yes n = 80 (NAFLD risk 58 %), No n = 420 (NAFLD risk 60 %), Alcohol consumption yes n = 148 (NAFLD risk 60 %) No n = 72 (NAFLD risk 42 %), menopause yes n = 154 (NAFLD risk 80 %), No n = 126 (NAFLD risk 44 %).Age, Waist circumference, BMI, Diabetes, Cholesterol, Alcohol consumption and Menopause were the factors significantly (p< 0.05) associated with NAFLD risk. As shown in Table 3.

4.Discussion

The prevalence rate of NAFLD increases with increasing body mass index (BMI) [12]. An analysis of liver histology obtained from liver donors [13], automobile crash victims [14], autopsy findings [15], and clinical liver biopsies [16] suggests that the prevalence rates of steatosis and steatohepatitis are approximately 15% and 3%, respectively, in non-obese persons, 65% and 20%, respectively, in persons with class I and II obesity (BMI 30.0–39.9 kg/m2), and 85% and 40%, respectively, in extremely obese patients (BMI ≥40 kg/m2). The relationship between BMI and NAFLD is influenced by racial/ethnic background and genetic variation in specific genes [17]. Present study reflects that the younger age group (35 -55 years) had higher risk prevalence of NAFLD (58%) compared to older age group (40%). This may be due to the facts that the younger age group was dominated by female sex and the metabolic syndrome was commoner in this age group. Central obesity was calculated by the waist measurements. Male having the waist measurement of 30 – 34.9 inches (50.8%) and Female having the waist measurement of 33 – 36.9 inch (56.4%) are more prevalent to NAFLD risk. Majority of the patients in the NAFLD group were Overweight/ obese. In our study the data suggested that subjects with NAFLD risk are more likely to be Overweight or obese, confirming that the BMI is an independent predictor of NAFLD. The participants with NAFLD risk had a much higher BMI of 27 (42.8%).

An individual's risk of developing diabetes is increased approximately 5-fold if they have NAFLD [18]. The association between NAFLD and type 2 diabetes could be explained by the insulin resistance, dyslipidemia and hepatic triglyceride (TG) accumulation in NAFLD and defective B-cell in type 2 diabetes mellitus [19]. Compared to healthy populations, type 2 diabetes mellitus patients show increased risk for catching of advanced liver disease including fibrosis, cirrhosis and hepatocellular carcinoma [20].

Obesity is associated with a spectrum of liver abnormalities, known as nonalcoholic fatty liver disease (NAFLD), characterized by an increase in intrahepatic triglyceride (IHTG) content (i.e. steatosis) with or without inflammation and fibrosis (i.e. steatohepatitis). NAFLD has become an important public health problem because of its high prevalence, potential progression to severe liver disease, and association with serious cardiometabolic abnormalities, including type 2 diabetes mellitus (T2DM), the metabolic syndrome and coronary heart disease (CHD) [21]. In addition, the presence of NAFLD is associated with a high risk of developing T2DM, dyslipidemia (high plasma TG and/or low plasma HDL-cholesterol concentrations), and hypertension [22]. In the present study Cholesterol present n = 60 (NAFLD risk 99 %), Absent n = 440 (NAFLD risk 54 %), Diabetes present n = 180 (NAFLD risk 89 %) absent n = 320 (NAFLD risk 43 %), Physically active yes n = 80 (NAFLD risk 58 %), No n = 420 (NAFLD risk 60 %), Alcohol consumption yes n = 148 (NAFLD risk 60 %) No n = 72 (NAFLD risk 42 %), menopause yes n = 154 (NAFLD risk 80 %), No n = 126   (NAFLD risk 44 %).Age, Waist circumference, BMI, Diabetes, Cholesterol, Alcohol consumption and Menopause were the factors significantly (p< 0.05) associated with NAFLD risk.

5.Conclusion

Nonalcoholic fatty liver disease (NAFLD) comprises a spectrum of liver disorders from simple steatosis through to steatohepatitis and cirrhosis. The prevalence of NAFLD in the general population is up to 30%. This figure is even higher among persons with type 2 diabetes (50%), obesity (76%) and the morbidly obese (nearly 100%). A similar epidemic of NAFLD looms large in the developing world, with a reported prevalence of 10–29% in some countries within the Asia-Pacific region. Till date there is no standard recommended guideline available for treating the NAFLD in this context proper understating about the influencing factors greatly helps in disease prevention and effective management in near future.

Acknowledgement

6. References

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Table1: Demographic characteristics of participants

Variables	NAFLD risk Frequency n = 299	(%)
Age		
20 – 34	6	2
35 – 55	174	58
56 – 80	119	40
Gender		
Male	120	40
Female	179	60
Marital status		
Married	298	99.7
Unmarried	1	0.3
Occupation		
House wife/ non-working	148	49
Labour	116	39
Business	43	14

Table 2: Screening score of study population

Variables	Score	Frequency (%) n = 500
Age		
< 35 years	(0 point)	80 (16%)
≥ 35 years	(2 points)	420(84%)
Waist measurement (cm)		
< 80 (M) /<75 (F)	(0 point)	26 (12%) / 35(13%)
80 – 89.9(M) / 75 – 84.9 (F)	(2 points/ 1point)	83(38%) / 53 (19%)
90 – 99.9(M) / 85 – 94.9 (F)	(3 points/ 2points)	66 (30%) / 142(51%)
≥ 100 (M) / ≥ 95 (F)	(4 points/ 3points)	45(21%) / 50 (18%)
BMI (kg/m²)		
< 23	(0 point)	54 (11%)
23 – 24.9	(1 point)	141 (28%)
25 – 26.9	(2 points)	157 (31%)
≥ 27	(3 points)	148 (30%)
Diabetes		

Yes	(0 point)	180 (36%)
No	(2 points)	320 (64%)
Cholesterol		
Yes	(0 point)	60 (12%)
No	(2 points)	440 (88%)
Physically activity		
Yes	(0 point)	80 (16%)
No	(1 point)	420 (84%)
Alcohol consumption		
Yes	(1 point)	148 (67%)
No	(0 point)	72 (33%)
Menopause		
Yes	(1 point)	154(55%)
No	(0 point)	126 (45%)

Table 3: Association between variables and NAFLD of the individuals under study screening

| Variables | NAFLD risk | | p value |
	Present n = 299 (%)	Absent n = 201 (%)	
Age			
< 35 years	6 (8)	74(92)	**0.0001***
≥ 35 years	293(70)	127(30)	
Waist measurement (cm)			
< 80 (M), <75 (F)	2(8), 1(3)	24(92), 34(97)	**0.00001***
80 – 89.9(M), 75 – 84.9 (F)	61(73), 33(62)	22(27), 20 (38)	
90 – 99.9(M), 85 – 94.9 (F)	42 (64), 101(71)	2436, 41(29)	
≥ 100 (M),≥ 95 (F)	15(33), 44(88)	30(77), 6(12)	
BMI (kg/m²)			
< 23	1(2)	53(98)	
23 – 24.9	54(38)	87(62)	**0.00001***
25 – 26.9	118(75)	39(25)	
≥ 27	128(86)	20(14)	
Diabetes			
Yes	160(89)	20(11)	**0.00001***

No	139(43)	181(57)	
Cholesterol			
Yes	58(99)	2(1)	**0.00001***
No	241(54)	199(46)	
Physically active			
Yes	46(58)	34(42)	0.6471
No	253(60)	167(40)	
Alcohol consumption			
Yes	90(60)	58(40)	**0.0074***
No	30(42)	42(58)	
Menopause			
Yes	124(80)	0(20)	**0.0001***
No	55(44)	71(56)	