Prevalence of Non-Alcoholic Fatty Liver Disease in Iran: A Population Based Study

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Abstract

Introduction: Non-alcoholic fatty liver disease is currently recognized as one of the most common causes of chronic liver disease. The risk factors that are generally accepted for NAFLD are obesity, insulin resistance, hyperlipidemia and diabetes. The aim of this study is to find the estimated prevalence of NAFLD in the Iranian population. Method: This study is a cross sectional study conducted in 2016 in three central cities of Iran including Isfahan, Yazd and Shahrekord. Total 520 subjects were involved in this study by cluster random sampling. Blood samples were taken from each subject, and demographic and anthropometric information and risk factors were completed for individuals. The significance level for this study was $P\_value < 0.05$. Result: The overall prevalence of NAFLD in three central provinces of Iran is 37.8%, the highest prevalence of NAFLD is %30.2 in Isfahan and the lowest prevalence of NAFLD is %20.9 in the city of Shahrekord.Also, The prevalence of NAFLD is higher in men than women. The prevalence of NAFLD is higher in the age group of 30 to 45 years. Conclusion: In our study, the overall prevalence of presumed NAFLD was determined at 37.8%. The rate of presumed NAFLD varies across dif¬ferent provinces. The prevalence was significantly higher in Isfahan and lower in Shahrekord. The presence of presumed NAFLD was signifi¬cantly associated with higher BMI.

Keywords: Non-Alcoholic Fatty Liver, NAFLD, Prevalence, Iran.

Introduction

Non-alcoholic fatty liver disease is currently recognized as one of

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the most common causes of chronic liver disease. It is usually associated with metabolic syndrome. Many potential risk factors for NAFLD have been identified previously (Eriksson et al. 1986; Powell et al., 1990). The risk factors that are generally accepted for NAFLD are obesity, insulin resistance, hyperlipidemia and diabetes (Powell et al., 1990).

NAFLD is considered to be the hepatic manifestation of the metabolic syndrome. Approximately 90% of NAFLD cases have at least one characteristic feature of the metabolic syndrome, and one-third of them fulfill the complete diagnostic criteria. Patients with NASH are more likely to have the metabolic syndrome than are those with mere steatosis (Hamaguchiet al., 2005). Ethnic change in the prevalence of NAFLD/NASH has been described; several studies have indicated less common prevalence in African Americans (Browning et al., 2004).

Many studies have been conducted on the prevalence of NAFLD in different parts of the world. Prevalence of NAFLD in Mediterranean region is 36.8%, in Europe is 20%–40%, in japan is 9%– 30%, in Indian urban areas is 16%–32%, and in Indian rural areas is 9%. The least prevalence rate in Asian countries is 5% in Singapore (Alisi & Nobili, 2014). Prevalence of NAFLD in Iran has been expressed to be 2.9%–7.1% in the general population (Adibi et al., 2017).

The data from Asian countries derived from different published series where there was no uniformity in definition of NAFLD and population studied. NAFLD is a common cause of chronic liver disease and liver transplantation in western countries (Bellentani et al., 2010). Increasing incidence of NAFLD has been well documented from Asian countries like China (Chitturiet al., 2007). Diabetes mellitus (DM), hyperinsulinemia, obesity are predisposing factors NAFLD (Mohan & Deepa, 2006).The incidence of NAFLD is likely to rise steadily in the Iranian population owing to excessive food intake, changes in lifestyle and a general lack of exercise. NAFLD is probably the most common cause of liver disease in Iran (Jamalietal., 2008). However, a large-scale population-based study has not been performed in this country.

The aim of this study is to find the estimated prevalence of NAFLD in the Iranian population.

Material and Methods

Study design

This study is a cross sectional study conducted in 2016 in three central cities of Iran including Isfahan, Yazd and Shahrekord. Total 520 subjects were involved in this study by cluster random sampling.

Data collection

The study population included all people referred to hospitals in these three cities who have NAFLD. Using cluster sampling, 751 people referred to hospitals with NAFLD were selected. 359 people were selected randomly in Isfahan city, 245 people from Yazd and 147 people from Shahrekord. Blood samples were taken from each subject, and demographic and anthropometric information and risk factors were completed for individuals.

Inclusion criteria

Subjects between 18- 65 year old, who gave written informed consent, participated in the study and having a permanent residence in the city were the inclusion criteria. Only the urban population entered the study.

Exclusion criteria

Non-Iranian citizens and Subjects with chronic liver diseases, alcohol consumption, Subjects with cognitive diseases and Subjects who were incapable of communicating.were excluded from the study.

Definition of Fatty liver

In sonography, fatty liver was diagnosed with an increase in hepatic echogenicity using renal echo-genicity as a reference, the presence of enhancement and a lack of differentiation of periportal and bile duct walls reinforcement because of great hyperechogenicity of the parenchyma.Individuals who were diagnosed with NAFLD after giving laboratory tests and the results of liver sonography, by an expert physician.

Statistical analysis

Data were analyzed by SPSS ver. 25. To check normality,we used Kolmogorov- smirnov test. The significance level for this study was $P\_value < 0.05$.

Results:

From 751 people who were selected to participate in the study, 231 people were excluded due to exclusion criteria. A total of 520 people entered the study and their information was completed. 240 people from Isfahan, 156 people from Yazd and 124 people from Shahrekord participated in this study.

Table 1 shows the demographic characteristics of the population studied in the three provinces according to gender and the average age.

Table 2 shows the prevalence of NAFLD in three provinces, by gender and age groups. As Table 2 shows, the overall prevalence of NAFLD in three central provinces of Iran is 37.8%, the highest prevalence of NAFLD is %30.2 in Isfahan and the lowest prevalence of NAFLD is %20.9 in the city of Shahrekord.Also, Table 2 shows that the prevalence of NAFLD is higher in men than women. The prevalence of NAFLD is higher in the age group of 30 to 45 years.

Table 3 evaluates the risk factors for NAFLD. The results of Table 3 show that people who live in Isfahan 2.2 times and people who live in the city of Yazd 1.8 times more people who live in Shahrekord are at risk of NAFLD. Also, the risk of NAFLD in men is 1.5 times more than women and People with a BMI higher than 30 are 3.1 times more at risk of NAFLD than others.

Table 1: Demographic data of the study population.

City	Participants	Male Frequency (Percent)e	Female Frequency (Percent)	Age (Mean±SD)
Isfahan	240	93(%38.7)	147(%61.3)	33.1+10.2
Yazd	156	65(%41.6)	91(%58.4)	39.7+14.5
Shahrekord	124	57(%45.9)	67(%54.1)	35.6+12.8
Total	520	215(%41.3)	305(%58.7)	36.4+13.3

Table 2: Prevalence of NAFLD in three Iranian provinces [n (%)].

	Isfahan	Yazd	Shahrekord	Total
Male	75(%17.8)	25(%16)	15(%12)	115(%22.1)
Female	52(%12.3)	19(%12.1)	11(%8.8)	82(%15.7)
Age group (years)				
18-29	29(%6.9)	9(%5.7)	5(%8.9)	43(%8.2)
30-45	57(%13.5)	19(%12.1)	12(%6.4)	88(%16.9)
46-65	41(%9.7)	16(%10.2)	9(%8.9)	66(%12.6)
Total	127(%30.2)	44(%28.1)	26(%20.9)	197(%37.8)

Table 3: Risk factors associated with NAFLD.

	OR (95% CI)	*p*-value
Province*		
Isfahan	2.2(1.5-3.2)	0.01
Yazd	1.8(1.4-2.3)	0.04
Sex*		
male	1.5(1.1-1.9)	<0.001
BMI**		
Overweight (25≤BMI<30)	1.1(0.6-1.7)	0.06
Obese (30≤BMI)	3.1(2.5-3.8)	<0.001

*Compared to Shahrekord province
**Compared to BMI<25

Discussion:

NAFLD is among the common chronic liver diseases with the variety of factors including genetic, metabolic, environmental, and stress-related. The natural history of NAFLD ranges from asymptomatic indolent to the end-stage liver disease. The prevalence of ultrasonographically diagnosed NAFLD in industrialized countries ranges from 20% to 60% (Bellentaniet al., 2004). With 21.8%, 24.3%in Japan and South Korea (Omagari et al., 2002; Park et al., 2005) . Several studies have investigated the prevalence of NAFLD and NASH in Iranian population (Sohrabpour et al., 2011; Sohrabpouret al., 2011). in one study prevalence NAFLD was reported 7.1% in Iranian children while Sohrabpour et al. reported a NASH prevalence of 2.9% in Iranian general population (Alavian et al., 2009; Rogha et al., 2011).

The true prevalence of NAFLD and its different stages is hard to determine. The definition of NAFLD remains clinic pathological with well-defined criteria of the patterns of liver injury. The condition is asymptomatic until very late in its period and most patients are incidentally diagnosed.

Moreover, the gold standard for diagnosis and staging is liver biopsy, which is not feasible in population-based studies. Liver biopsy is an invasive method and has the potential for sampling and interpretation error (Clark & Diehl, 2003).

In our study, the overall prevalence of presumed NAFLD was determined at 37.8%. The rate of presumed NAFLD varies across different provinces. The prevalence was significantly higher in Isfahan and lower in Shahrekord. In multivariate analysis, this remained as an independent associated factor after adjustment for age, sex, BMI, as well as other relevant factors.

It remains unclear if there are any genetically defined metabolic characteristics or environmental factors-including nutritional habits and other life style patterns-which can explain this difference.

The prevalence of presumed NAFLD was highest in subjects between 30-45 years of age. This was observed in both sexes. However age was not an independent associated factor after adjusting for other important risk factors including sex and BMI.

The presence of presumed NAFLD was significantly associated with higher BMI.

Results show that presumed NAFLD is almost twice more prevalent among males than females.

female hormones protect against NAFLD has been postulated and is supported by the fact that NAFLD is more common in postmenopausal women than premenopausal women by a factor of two (Carulli et al., 2006). Those who take hormone replacement therapy are significantly less likely to have NAFLD

in comparison with women who do not (Clark et al., 2002). Gender-specific fat distribution may also be contributory, as men tend to have more visceral fat than women (Enzi et al., 1986).

This possibility implies that female hormones might have favorable effects on lipid metabolism in the liver. Vice versa, androsterone and androgens may have unfavorable effects on liver function and hepatocytes. Another explanation for high male to female ration in NAFLD could be the higher consumption of alcoholic beverages by men compared to women.It is well recognized that the pattern of obesity plays an important role in NAFLD development and progression (Lirussi et al., 2009).

The critical pathophysiological step in the development of NAFLD is considered to be visceral obesity. This result is independent of insulin resistance and hepatic steatosis. Furthermore BMI and waist circumference, it has been showed that subcutaneous fat thickness measured by ultrasound, is significantly correlated with ultrasound-diagnosed NAFLD. This measure is feasible, easy to obtain, inexpensive and provides the clinician with quantitative values. Thus, it could be used in combination with visceral or perihepatic adipose tissue thickness in the diagnosis of NAFLD (Kim et al., 2004) .

Obesity and metabolic syndrome, the most predictive factors of NAFLD, are on the rise in Iran (Esteghamati et al., 2010; Hosseinpanah et al., 2009) so the prevalence of NAFLD and related complications are expected to increase in the future. Health promoting campaigns advocating a healthy lifestyle, containing a balanced diet, adequate physical exercise, and weight maintenance programs are of essential importance for the future extensive health plans, in order to control a rather prevalent cause of liver morbidity.

In conclusion, the prevalence of NAFLD in Iranian adult general population is 37.8%, which is roughly high. NAFLD in Iranian population is associated with male sex, old age, obesity, and other features of metabolic syndrome. As NAFLD has the possibility of progression toward end-stage liver disease and is associated with increased cardiovascular risk, appropriate action should be undertaken in our region for screening and control of this disease. Preventive strategies should also be pursued in our region.

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