



ISFAHAN UNIVERSITY OF MEDICAL SCIENCES

SCHOOL OF MEDICINE

RADIOLOGY DEPARTMENT

Thesis for obtaining the specialty degree in Radiology

Title:

**Prevalence of Non-Alcoholic Fatty liver Disease and its
related metabolic risk factors in Isfahan-Iran**

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Abstract:

Background: This study aimed to determine the prevalence of NAFLD and its related risk factors and their predictive value among the general population of Isfahan city located in the central part of Iran.

Methods: In this cross-sectional study the prevalence of non alcoholic fatty liver disease (NAFLD) among general adult population aged 30-60 years was determined using ultrasonography. Anthropometrics and biochemical variables of studied population was measured and compared in groups with and without NAFLD. The predictive value of age, BMI, metabolic risk factors (lipids, FBS) and liver enzymes for occurrence of NAFLD was investigated.

Results: Overall 483 subjects (291 female and 192 males) with mean age of 45.53 ± 8.92 were studied. NAFLD was diagnosed in 190 (39.3%) of participants. Frequency of different grades of NAFLD was 46(9.5%), 102(21.1%), 35(7.2%), 7(1.4%) for focal fatty infiltration (FFI), grade I, II and III respectively. There was not significant differences between female and male participants regarding the prevalence of different type of NAFLD, FFI and normal groups ($P=0.238$). Ordinal regression was determined that all of the studied variables have significant predictive value for NAFLD ($P<0.001$, $\gamma =0.615$). Spearman correlation indicated that there was a significant relationship between NAFLD and BMI ($r=0.37$, $P <0.001$), age ($r=0.15$, $P=0.001$), FBS ($r=0.20$, $P<0.001$), cholesterol ($r= 0.19$, $P<0.001$), triglyceride ($r=0.20$, $P<0.001$), LDL-C ($r=0.16$, $P<0.001$), SGOT ($r=0.17$, $P< 0.001$) and SGPT ($r=0.31$, $P<0.001$). Conclusion: Our findings showed a higher rate of NAFLD among Isfahani adult general population, but considering the high proportion of NAFLD cases was the milder form of the disease (grade I and FFI) and the association of anthropometrics and metabolic variables with occurrence of NAFLD, it seems that interventional studies which target related risk factors could reduce the occurrence of severe form of NAFLD and its related complications.

Key words: Non alcoholic Fatty Liver Disease, Prevalence, Risk Factors, Metabolic, Iran

References

1. Sanyal AJ, Brunt EM, Kleiner DE, Kowdley KV, Chalasani N, Lavine JE, Ratzliff V, McCullough A. Endpoints and clinical trial design for nonalcoholic steatohepatitis. *Hepatology*. 2011;54(1):344-53.
2. Khedmat H, Taheri S. Non-alcoholic steatohepatitis: An update in pathophysiology, diagnosis and therapy. *Hepat Mon*. 2011;11(2):74- 85.
3. Tiniakos DG, Vos MB, Brunt EM. Nonalcoholic fatty liver disease: pathology and pathogenesis. *Annu Rev Pathol*. 2010;5:145-71.
4. Alavian SM, Motlagh ME, Ardalan G, Motaghian M, Davarpanah AH, Kelishadi R. Hypertriglyceridemic waist phenotype and associated lifestyle factors in a national population of youths: CASPIAN Study. *J Trop Pediatr*. 2008;54(3):169-77.
5. Farrell GC, Larter CZ. Nonalcoholic Fatty Liver Disease: from Steatosis to cirrhosis. *Hepatology* 2006;43:S00-S112.
6. Lazo M, Clark JM., The epidemiology of nonalcoholic fatty liver disease: a global perspective. *Semin Liver Dis* 2008;28:39-50.
5. Bellentani S, Scaglioni F, Marino M, Bedogni G., Epidemiology of non-alcoholic fatty liver disease. *Dig Dis* 2010;28:155-61.
7. Alavian SM, Mohammad-Alizadeh AH, Esna-Ashari F, Ardalan G, Hajarizadeh B. Non-alcoholic fatty liver disease prevalence among school-aged children and adolescents in Iran and its association with biochemical and anthropometric measures. *Liver Int*. 2009;29(2):159-63.
8. Sohrabpour AA, Rezvan H, Amini-Kafiabad S, Dayhim MR, Merat Shahin, Pourshams Akram. Prevalence of nonalcoholic steatohepatitis in Iran: a population based study. *Middle East J Dig Dis*. 2011;2(1):14-19.

9. Crabb DW, Galli A, Fischer M, You M. Molecular mechanisms of alcoholic fatty liver: role of peroxisome proliferator-activated receptor alpha. *Alcohol*. 2004;34(1):35-8.
10. Li H, Wang YJ, Tan K, Zeng L, Liu L, Liu FJ, et al. Prevalence and risk factors of fatty liver disease in Chengdu, Southwest China. *Hepatobiliary Pancreat Dis Int*. 2009;8(4):377-82.
11. Targher G. Non-alcoholic fatty liver disease, the metabolic syndrome and the risk of cardiovascular disease: the plot thickens. *Diabet Med*. 2007;24(1):1-6.
12. Chalasani N, Younossi Z, Lavine JE, Diehl AM, Brunt EM, Cusi K, Charlton M, Sanyal AJ. The diagnosis and management of non-alcoholic fatty liver disease: Practice guideline by the American Gastroenterological Association, American Association for the Study of Liver Diseases, and American College of Gastroenterology. *Gastroenterology*. 2012;142:1592-1609.
13. Bhatia LS, Curzen NP, Calder PC, Byrne CD. Non-alcoholic fatty liver disease: a new and important cardiovascular risk factor? *Eur. Heart J*. 2012;33:1190-1200.
14. Marchesini G, Bugianesi E, Forlani G, Cerrelli F, Lenzi M, Manini R, Natale S, Vanni E, Villanova N, Melchionda N, Rizzetto M. Nonalcoholic fatty liver, steatohepatitis, and the metabolic syndrome. *Hepatology*. 2003 Apr;37(4):917-23.
15. Ong JP, Pitts A, Younossi ZM. Increased overall mortality and liver-related mortality in non-alcoholic fatty liver disease. *J Hepatol*. 2008;49:608-612.
16. Pacana T, Sanyal AJ. Vitamin E and nonalcoholic fatty liver disease. *Curr Opin Clin Nutr Metab Care*. 2012 ;15(6):641-8.
17. Kemmer N, Neff GW, Franco E, Osman-Mohammed H, Leone J, Parkinson E, Cece E, Alsina A. Nonalcoholic fatty liver disease epidemic and its implications for liver transplantation. *Transplantation*. 2013;96(10):860-2.
18. Chalasani N, Younossi Z, Lavine JE, Diehl AM, Brunt EM, Cusi K, Charlton M, Sanyal AJ; American Gastroenterological Association; American Association for the Study of Liver Diseases; American College of Gastroenterology. The diagnosis and management of non-alcoholic fatty liver disease: practice guideline by the American Gastroenterological Association, American Association for the Study of Liver Diseases, and American College of Gastroenterology. *Gastroenterology*. 2012 ;142(7):1592-609.
19. Saverymuttu SH, Joseph AE, Maxwell JD. Ultrasound scanning in the detection of hepatic fibrosis and steatosis. *Br Med J (Clin Res Ed)*. 1986;292(6512):13-5.
20. Sanyal AJ, American Gastroenterological Association. AGA technical review on nonalcoholic fatty liver disease. *Gastroenterology*. 2002;123(5):1705-25.
21. Kennedy G. Non-alcoholic fatty liver disease: Can ultrasound assist in early diagnosis of prediabetes and delay progression to type 2 diabetes mellitus. *Sound Effects*. 2009.
22. Hernaez R, Lazo M, Bonekamp S, Kamel I, Brancati FL, Guallar E, Clark JM. Diagnostic accuracy and reliability of ultrasonography for the detection of fatty liver: a meta-analysis. *Hepatology*. 2011;54(3):1082-90.

23. Bellentani S, Bedogni G, Miglioli L, Tiribelli C. The epidemiology of fatty liver. *Eur J Gastroenterol Hepatol.* 2004;16(11):1087-93.
24. Zhou YJ, Li YY, Nie YQ, Ma JX, Lu LG, Shi SL, Chen MH, Hu PJ. Prevalence of fatty liver disease and its risk factors in the population of South China. *World J Gastroenterol.* 2007;13(47):6419-24.
25. Browning JD, Szczepaniak LS, Dobbins R, Nuremberg P, Horton JD, Cohen JC, Grundy SM, Hobbs HH. Prevalence of hepatic steatosis in an urban population in the United States: impact of ethnicity. *Hepatology* 2004; 40: 1387-1395.
26. Omagari K, Kadokawa Y, Masuda J, Egawa I, Sawa T, Hazama H, Ohba K, Isomoto H, Mizuta Y, Hayashida K, Murase K, Kadota T, Murata I, Kohno S. Fatty liver in non-alcoholic non-overweight Japanese adults: incidence and clinical characteristics. *J Gastroenterol Hepatol.* 2002 ;17(10):1098-105.
27. Park SH, Jeon WK, Kim SH, Kim HJ, Park DI, Cho YK, Sung IK, Sohn CI, Keum DK, Kim BI. Prevalence and risk factors of non-alcoholic fatty liver disease among Korean adults. *J Gastroenterol Hepatol.* 2006 ;21(1 Pt 1):138-43.
28. Rogha M, Najafi N, Azari A, Kaji M, Pourmoghaddas Z, Rajabi F, Rezaee M. Non-alcoholic Steatohepatitis in a Sample of Iranian Adult Population: Age is a Risk Factor. *Int J Prev Med.* 2011 ;2(1):24-7.
29. Lankarani KB, Ghaffarpasand F, Mahmoodi M, Lotfi M, Zamiri N, Heydari ST, Fallahzadeh MK, Maharlouei N, Babaeinejad M, Mehravar S, Geramizadeh B. Non alcoholic fatty liver disease in southern Iran: a population based study. *Hepat Mon.* 2013;13(5):e9248.
30. Fan JG, Farrell GC. Epidemiology of non-alcoholic fatty liver disease in China. *J Hepatol.* 2009 ;50(1):204-10.
31. Feldman M, Friedman L S, Brandt L J. Nonalcoholic fatty liver disease. *Gastrointestinal and Liver Disease.* 8th ed. Canada: Saunders; 2006. pp. 1793–1805.
32. García-Monzón C, Martín-Pérez E, Iacono OL, Fernández-Bermejo M, Majano PL, Apolinario A, Larrañaga E, Moreno-Otero R. Characterization of pathogenic and prognostic factors of nonalcoholic steatohepatitis associated with obesity. *J Hepatol.* 2000;33(5):716-24.
33. Kabir M, Catalano KJ, Ananthnarayan S, Kim SP, Van Citters GW, Dea MK, Bergman RN. Molecular evidence supporting the portal theory: a causative link between visceral adiposity and hepatic insulin resistance. *Am J Physiol Endocrinol Metab.* 2005; 288(2):E454-61.

34. Tung T, Chiu W, Lin T, Shih H, Hsu C. An exploration of prevalence and associated factors of nonalcoholic Fatty liver disease in the taiwanese police service. *Iran J Public Health*. 2011 ;40(4):54-62.
35. Eguchi Y, Hyogo H, Ono M, Mizuta T, Ono N, Fujimoto K, Chayama K, Saibara T; JSG-NAFLD. Prevalence and associated metabolic factors of nonalcoholic fatty liver disease in the general population from 2009 to 2010 in Japan: a multicenter large retrospective study. *J Gastroenterol*. 2012;47(5):586-95.
36. Zelber-Sagi S, Nitzan-Kaluski D, Halpern Z, Oren R. Prevalence of primary non-alcoholic fatty liver disease in a population-based study and its association with biochemical and anthropometric measures. *Liver Int*. 2006;26(7):856-63.
37. Lin YC, Chou SC, Huang PT, Chiou HY. Risk factors and predictors of non-alcoholic fatty liver disease in Taiwan. *Ann Hepatol*. 2011;10(2):125-32.
38. Kwon YM, Oh SW, Hwang SS, Lee C, Kwon H, Chung GE. Association of nonalcoholic fatty liver disease with components of metabolic syndrome according to body mass index in Korean adults. *Am J Gastroenterol*. 2012 ;107(12):1852-8.
39. Ghamar-Chehreh ME, Khedmat H, Amini M, Taheri S. Predictive factors for ultrasonographic grading of nonalcoholic Fatty liver disease. *Hepat Mon*. 2012;12(11):e6860.
40. Razavizade M, Jamali R, Arj A, Talari H. Serum parameters predict the severity of ultrasonographic findings in non-alcoholic fatty liver disease. *Hepatobiliary Pancreat Dis Int*. 2012 ;11(5):513-20.
41. Abangah G, Yousefi A, Asadollahi R, Veisani Y, Rahimifar P, Alizadeh S. Correlation of Body Mass Index and Serum Parameters With Ultrasonographic Grade of Fatty Change in Non-alcoholic Fatty Liver Disease. *Iran Red Crescent Med J*. 2014;16(1):e12669.
42. Hashemi Kani A, Alavian SM, Esmailzadeh A, Adibi P, Azadbakht L. Dietary Quality Indices and Biochemical Parameters Among Patients With Non Alcoholic Fatty Liver Disease (NAFLD). *Hepat Mon*. 2013;13(7):e10943.
43. Lee S, Jin Kim Y, Yong Jeon T, Hoi Kim H, Woo Oh S, Park Y, Soo Kim S. Obesity is the only independent factor associated with ultrasound-diagnosed non-alcoholic fatty liver disease: a cross-sectional case-control study. *Scand J Gastroenterol*. 2006 ;41(5):566-72.
44. Sogabe M, Okahisa T, Tsujigami K, Fukuno H, Hibino S, Yamanoi A. Visceral fat predominance is associated with non-alcoholic fatty liver disease in Japanese women with metabolic syndrome. *Hepatol Res*. 2014 ;44(5):515-22.
45. Kwon YM, Oh SW, Hwang SS, Lee C, Kwon H, Chung GE. Association of nonalcoholic fatty liver disease with components of metabolic syndrome according to body mass index in Korean adults. *Am J Gastroenterol*. 2012;107(12):1852-8.
46. Pratt DS, Kaplan MM. Evaluation of abnormal liver-enzyme results in asymptomatic patients. *N Engl J Med*. 2000 ;342(17):1266-71.

47. Jamali R, Khonsari M, Merat S, Khoshnia M, Jafari E, Bahram Kalhori A, Abolghasemi H, Amini S, Maghsoudlu M, Deyhim MR, Rezvan H, Pourshams A. Persistent alanine aminotransferase elevation among the general Iranian population: prevalence and causes. . World J Gastroenterol. 2008;14(18):2867-71.
48. Ye J, Chen Z, Wang T, Tong J, Li X, Jiang J, et al. Role of tissue disorder markers in the evaluation of disease progress and outcome prediction: a prospective cohort study in noncardiac critically ill patients. J Clin Lab Anal 2010; 24:376-384.
40. Obika M, Noguchi H. Diagnosis and evaluation of nonalcoholic fatty liver disease. Exp Diabetes Res. 2012;2012:145754.
50. Razavizade M, Jamali R, Arj A, Talari H. Serum parameters predict the severity of ultrasonographic findings in non-alcoholic fatty liver disease. Hepatobiliary Pancreat Dis Int. 2012;11(5):513–20.
51. Ghamar-Chehreh ME, Amini M, Khedmat H, Moayed Alavian S, Daraei F, Mohtashami R, Hadi R, Beyram BA, Taheri S. Elevated alanine aminotransferase activity is not associated with dyslipidemias, but related to insulin resistance and higher disease grades in non-diabetic non-alcoholic fatty liver disease. Asian Pac J Trop Biomed. 2012 ;2(9):702-6.