Saudi Journal of Medicine (SJM)
Scholars Middle East Publishers
Dubai, United Arab Emirates
Website: http://scholarsmepub.com/

ISSN 2518-3389 (Print)
ISSN 2518-3397 (Online)

To Study the Anthropometric Parameters in Non-Alcoholic Fatty Liver Disease Patients

Vinay Kumar Warkade[1], Prashant Khuraiya[2*], Atul Shende[3]
[1]Medical Officer, Civil Hospital Nainpur, District Mandla, M.P, India
[2]Senior Resident, Department of Medicine, M.G.M. Medical College, Indore, M.P, India
[3]Associate professor, Department of Medicine, M.G.M. Medical College, Indore, M.P, India

***Corresponding author**
Prashant Khuraiya

Article History
Received: 16.05.2018
Accepted: 27.05.2018
Published: 30.05.2018

DOI:
10.21276/sjm.2018.3.5.17

Abstract: Fatty liver disease in absence of alcohol abuse is now emerging as a major health burden in the world. It represents the hepatic manifestation of the metabolic syndrome, a variably defined aggregate of disorders related to obesity, insulin resistance, hypertension and hyperlipdemia. To study the various anthropometric parameters in non-alcoholic fatty liver disease patients. The present study was conducted in the Department of Medicine on 65 patients with ultra-sonographic finding of fatty liver disease with no history of alcohol. Various anthropometric measurements like neck circumference, height, weight, waist to hip ratio, BMI were measured and recorded. For analysis, statistical software SPSS latest Version 20.0 was used. The results were analysed using the appropriate statistics. In our study we found that 45 patients ie 69% are obese and maximum number of the patients ie 95% males and 100% females have their waist hip ratio above the cut off value and 64% male and 98% female have neck circumference more than the cut off value . The study concludes obesity, neck circumference and waist: hip ratio was associated with NAFLD in our study.
Keywords: anthropometric parameters, Obesity, waist to hip ratio, Neck circumference, non-alcoholic fatty liver disease.

INTRODUCTION

Non-alcoholic Fatty liver disorder (NAFLD) is emerging as a major health problem in parallel with increasing prevalence of obesity. Non-alcoholic fatty liver disease (NAFLD) is defined by excessive fat accumulation in the form of triglycerides (steatosis) in liver (>5% of hepatocytes histologically). The increasing incidence of NAFLD has extended globally to involve the countries of Asia Pacific region due to wide spread proliferation of Caloric-intense food consumption and increasing obesity. Prevalence of NAFLD in general population is estimated to be 16% - 30%. Prevalence of NAFLD in coastal eastern India is estimated 24.5% [1], which shows that prevalence of NAFLD is also increasing in India. Obesity is the most important risk factor for the development of NAFLD. Prevalence of both NAFLD and NASH has been shown to be associated strongly with excess body weight in particular central obesity [2]. A subgroup of the patients have liver cell injury and inflammation in addition to excessive fat (steatohepatitis), that condition is designated as Non-alcoholic steatohepatitis (NASH).

Overweight and obesity are terms used for people who weigh more than the limits recommended for their age and gender. This leads to a number of diseases that contribute to increased morbidity and mortality. Practical and easily performed methods for measuring obesity include various anthropometric measures such as body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), as well as the not-so-easy method of measuring the thickness of subcutaneous fat layer at specific sites for estimating body fat percentage. BMI has been adopted by most health professionals for obesity surveys, as it is easy to perform on a large scale. However, it does not depict the true body composition. Furthermore, visceral obesity, which closely relates to cholesterol levels in the body and its associated coronary artery disease, is better defined by measuring the waist circumference [3]. Measurement of neck circumference (NC) has recently been used to identify overweight and obesity and is observed to have good correlation with age, weight, waist and hip circumferences, waist-to-hip ratio, and BMI for both genders [4]. Besides, NC is considered an index of upper body obesity and correlates positively with changes in systolic and diastolic blood pressure and other components of the metabolic syndrome [5]. Thus the aim of this study was to find out the association between various anthropometric parameters with non-alcoholic fatty liver disease.

MATERIALS & METHODS

The present study was conducted in the Department of Medicine on 65 patients with ultra-sonographic finding of fatty liver disease with no history of alcohol. Total 65 patients with ultra-sonographic finding of fatty liver disease were selected either on OPD basis or on IPD basis of Department of medicine, M.Y. Hospital, Indore.

Only those participants were taken into study that fulfilled our inclusion criteria's.

Inclusion criteria

- All cases of Fatty liver disease assessed on imaging.
- Patients of either gender.
- All cases of NAFLD with ongoing alcohol consumption of not taking >21 drinks/week (10 gms/drinks) in males and > 14 drinks/week in females for over two years.
- Patients and/or his/her legally acceptable representative willing to provide written voluntary informed consent for participation in the present study.

Exclusion criteria

- Those having history of alcohol abuse more than baseline.
- Those on steatogenic drugs for more than six month.
- Those who cannot be followed during the study period.
- Prisoners and orphans.
- Patients and/or his/her legally acceptable representative not willing to provide written voluntary informed consent for participation in the present study.

METHODOLOGY

After identifying the suitable candidate for the study, the patient and/or his/her legally acceptables were explained in detail about the study, its risks/benefits, costs involved, about the study procedures, etc. in detail. After getting their verbal approval for participation, a voluntary written informed consent was obtained from patient and/or his/her legally acceptable representative.

After obtaining the consent, the patients having fatty liver disease, but no history of alcohol consumption were asked to their anthropometric measurements like neck circumference, height, weight, waist to hip ratio were measured and recorded.

Anthropometric measurements were conducted using standard techniques [6] as under:

Weight was measured while wearing light clothing and without shoes, after emptying of bladder, using a digital scale to the nearest 100 g. Height was measured without shoes, with stadiometer to the nearest 0.5 cm. BMI was calculated by dividing weight (kg) with the square of height (m).

Waist circumference (cm) was taken horizontally to within 1 mm, using plastic tape measure at midpoint between the costal margin and iliac crest in the mid-axillary line, with the subject standing and at the end of a gentle expiration. Hip circumference (HC) was measured in centimetres, at the level of greater trochanters, with the legs close together. WC was then divided by HC to get the waist-to-hip ratio (WHR).

The neck circumference (cm) was taken to the nearest 1 mm, using plastic tape measure. It was taken in a plane as horizontal as possible, at a point just below the larynx (thyroid cartilage) and perpendicular to the long axis of the neck (the tape line in front of the neck at the same height as the tape line in the back of the neck). While taking this reading the subject was asked to look straight ahead, with shoulders down, but not hunched. Care was taken not to involve the shoulder/neck muscles (trapezius) in the measurement.

STATISTICAL ANALYSIS

In the present study, results were expressed as Mean ± SD. All statistical analysis was done by using SPSS software version 20. A P value of < 0.05 will be considered as statistically significant. In the final report, the data has been represented in the form of tables and graphs.

RESULTS

In our study the total 65 patients with ultrasonography finding of fatty liver disease without the history of alcohol intake were selected either on OPD basis or on IPD basis of Department of medicine, M.Y. Hospital, Indore. The patients were evaluated and asked for various anthropometric measurements and these details are recorded in approved proforma in details. All the parameters were recorded in standard format and parameters were compared with each independent parameter using appropriate statistics.

As per this table total 65 patients were included. In our study most of the patients were of the age group 41-50 years ie 33% of total patients and Minimum no of patients were of the age group 71-80 years with 3% of total patients. With this table it is observed that maximum patients are of middle age from age 31-60 years comprising 76% of patients.

Table-1: Distribution of cases according to age group

S.No.	Age group	No. Cases	Percentage
1	20-30	6	9%
2	31-40	16	25%
3	41-50	21	33%
4	51-60	12	18%
5	61-70	8	12%
6	71-80	2	3%
Total		65	100%

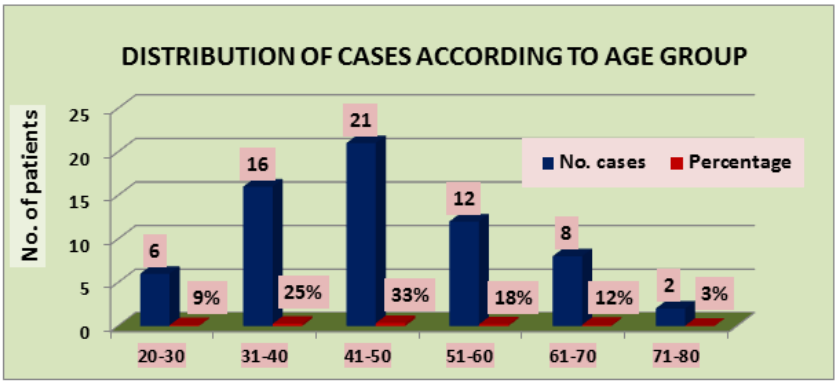

Table-2: Distribution of cases according to gender

GENDER	No. cases	Percentage
Male	22	34%
Female	43	66%

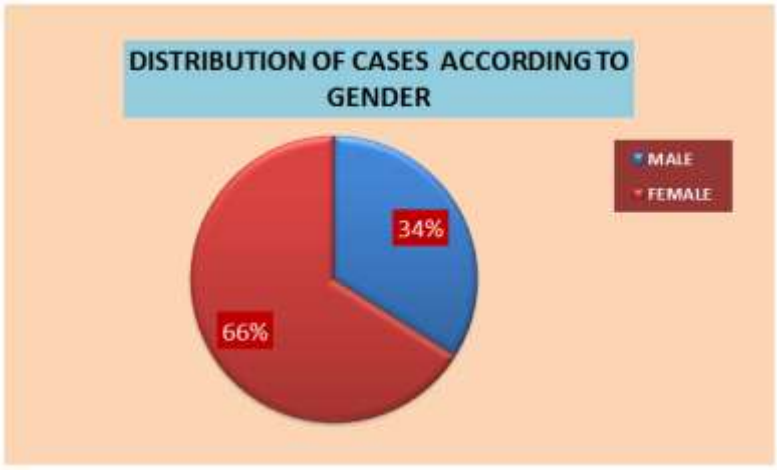

Table-3: Distribution of subject according to bmi

S.No.	BMI	No. of cases	Percentage
1	<18.5(underweight)	0	0%
2	18.5 -22.9 (Normal range)	5	8%
3	23-24.9 (over weight)	15	23%
4	25-29.9(Obese – I)	23	35%
5	>30 (Obese – II)	22	34%

As per this table 22 (34%) patients are males and 43(66%) patients are females of total patients (Table-2).

As per this table maximum patients ie. 45 patients are obese constituting 69% of total cases (Table-3).

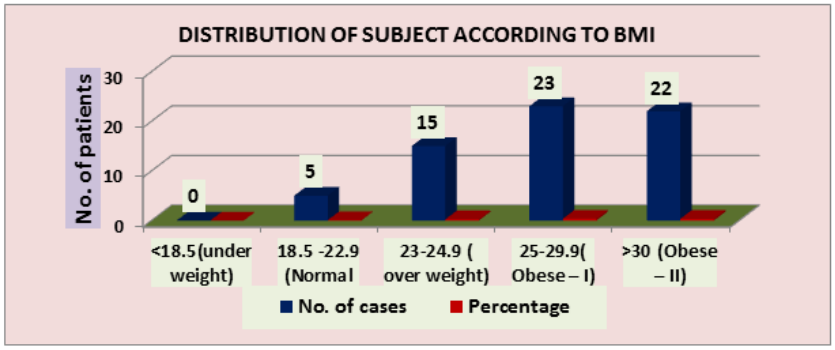

Table-4: Distribution of subject according to waist hip ratio

GENDER	WAIST HIP RATIO (%)	No. of cases	Percentage
MALE	≤90	1	5%
	≥90	21	95%
FEMALE	≤80	0	0%
	≥80	43	100%

As per this table we found that in both categories of gender maximum number of the patients have waist hip ratio more than the cut off value (Table-4).

As per this table we found that in both categories of gender maximum no of patients have neck circumference more than the cut off value (Table-5).

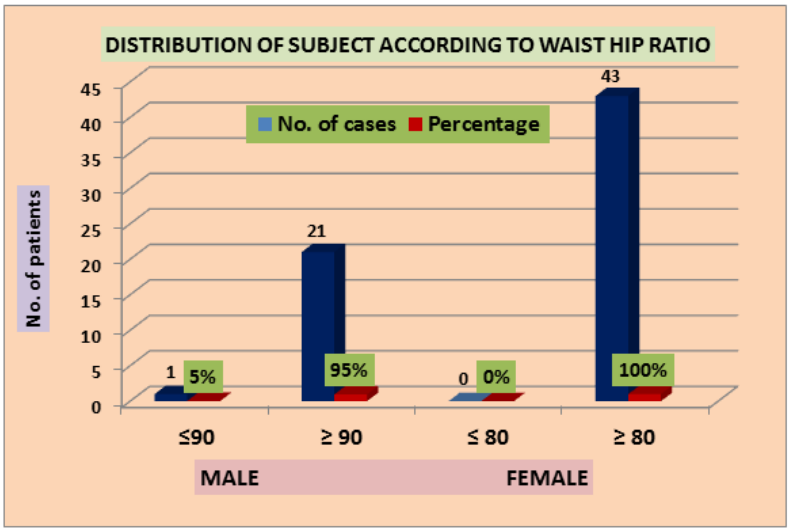

Table-5: Distribution of subject according to neck circumference

GENDER	NECK CIRCUMFERENCE	NO. OF CASES	PERCENTAGE
MALE	>35.5 cm	14	64%
	<35.5 cm	8	36%
FEMALE	≥32 cm	42	98%
	< 32 cm	1	2%

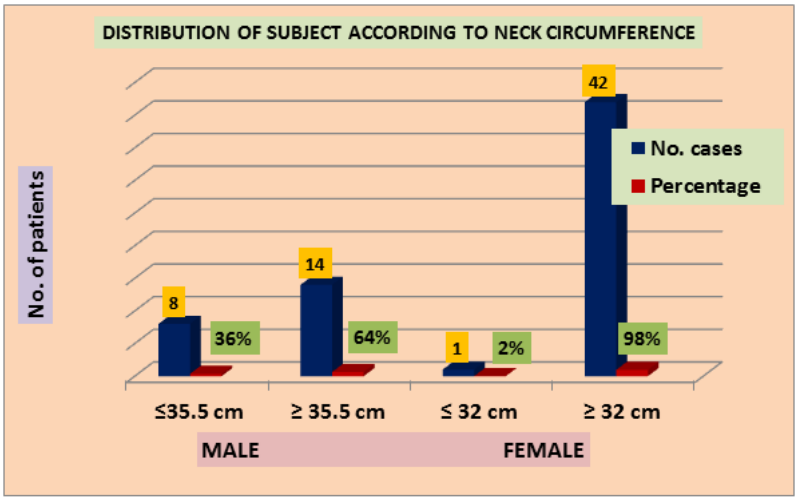

Table-6: Distribution of the anthropometric para-meters across the categories of gender

ANTHROPOMETRIC PARAMETERS	MALE	FEMALE	P VALUE
AGE	44±11.003	45±14.37	.388
BMI	29±5.451	26.33±3.197	0.059
NECK CIRCUMFERENCE	34.32±2.644	33.26±2.920	0.155
WAIST HIP RATIO	92.45±3.759	100.148±6.94	0.000

As per this table various anthropometric parameters including age of the patients were compared across the Gender where it was found that variable like age, BMI, neck circumference approximately same across the gender without any significance with P values respectively of (0.388,0.059,0.155) but waist hip ratio values was significant (P=0.000).

DISCUSSION

Total 65 patients with ultrasonography finding of fatty liver disease without the history of alcohol intake were selected either on OPD basis or on IPD basis of Department of medicine, M.Y. Hospital, Indore. The patients were evaluated and asked for various anthropometric measurements and these details are recorded in approved proforma in details. All the parameters were recorded in standard format and parameters were compared with each independent parameter using appropriate statistics.

In our study most of the patients were of the age group 41-50 years ie 33% followed by 31-40 years ie. 25% and from age group 51-60 years 18% of total patients and Minimum no of patients were of the age group 71-80 years with 3% of total patients. So with this we concluded that maximum patients are of middle age ie from age 31-60 years comprising 76% of total patients.

In our study maximum patients are 43 (66%) patients are females and 22 (34%) patients are males of total patients but as per study done by Bellentani S *et al*.[7] prevalence of NAFLD is higher in males and increases with increasing age, with a male-to-female ratio of 2:1. In our study females are more than the males because in our country females drink less alcohol than males due to social stigmata or ritual behaviour. Drinking alcohol by females is generally unacceptable in Indian culture.

In many of the earlier NAFLD studies the majority of patients were females. In the report by Ludwig J *et al.* [8] 65% of patients were women. However, in cohorts of NAFLD patients derived from the general population NAFLD is more prevalent in males. In the largest study by Browning JD *et al.* [9] NAFLD was more prevalent in men than in women with a ratio of 1.1:1. This gender difference was even more obvious in white subjects. In white males 42% had increased hepatic triglyceride content compared with 24% of white women. In an Israeli NAFLD cohort derived from the general population male gender was associated with the diagnosis of NAFLD even after adjusting for obesity and abdominal obesity [10].

BMI and WC are indices of general and central (visceral) obesity respectively, and are an important first step in determining the level and distribution of obesity [11] In our study we found that 45 patients ie 69% are obese, 15 patients ie 23% are overweight and only 5 patients ie 8% are within normal range and total prevalence of overweight and obese are 92%. In our study percentage of obese patient was high (69%) in contrast to the percentage of obese in Behl N [12] study (35.5%), in his study percentage of overweight patient was more (37.9%) in comparison to our study (23%). It was due to the difference in the cut off level for overweight and obesity, which was ≥ 23 kg/m^2 for overweight and ≥25 kg/m^2 for obese in our study as per modified WHO criteria for Asian and ≥25 kg/m^2 and

≥30 kg/m^2 for overweight and obesity for his study as per WHO Criteria.

Waist: Hip Ratio (WHR) which is also a good indicator for abdominal obesity. In our study maximum number of the patients ie 95% males and 100% females have their waist hip ratio above the cut off value and 64% male and 98% female have neck circumference more than the cut off value. These findings resembles with the findings presented by Behl N[12] who reported abdominal or central obesity in 92% males and 100% females. As per the study done by Hingorjo MR *et al*.[13] and Agrawal R et al[14] the maximum number of the patients are obese, have neck circumference and waist hip ratio above their cut off value both in males and females.

In our study various parameters of the patients were compared across the gender where it was found that variable like age, BMI, neck circumference were approximately same across the Gender without any statistically significance with P values of (0.388,0.059,0.155) respectively but waist hip ratio values was significant (P=0.000).

The pathogenesis of NAFLD/NASH and, in particular, the mechanisms responsible for liver injury and disease progression remain still incompletely understood [15]. Since fat accumulation within the liver is tightly linked to insulin resistance it is not surprising that of obesity and diabetes, conditions associated with insulin resistance, are very common in NAFLD patients. Obesity is found in 39-100% of NAFLD patients, and diabetes in 5-55% [16]. The large differences seen in the prevalence of obesity and diabetes between different NAFLD cohorts are probably due to selection biases. The typical NAFLD patient is an obese middle aged individual with diabetes. In obese persons fatty liver affects more than 50% [17, 18] and 100% of severely obese with diabetes [19]. Thus, the prevalence of NAFLD in the general population is linked to the frequency of obesity and diabetes. It is evident that overweight/obesity are important risk factors for developing NAFLD.

CONCLUSION

In conclusion, anthropometric parameters like BMI, obesity, waist: hip ratio and neck circumference, shows positive association with Non-alcoholic fatty liver disease. Therefore assessment of anthropometric parameters in NAFLD patients may be useful in clinical follow-up. In our study sample size was small consisting of total 65 patients with ultrasonography finding of fatty liver disease therefore, the results cannot be generalised over the whole population. Further investigations are required to explore the possible biomechanisms underlying our findings.

REFERENCES

1. Singh, S. P., Nayak, S., Swain, M., Rout, N., Mallik, R. N., Agrawal, O., ... & Rao, M. V. K. (2004). Prevalence of nonalcoholic fatty liver disease in coastal eastern India: a preliminary ultrasonographic survey. *Tropical gastroenterology: official journal of the Digestive Diseases Foundation*, *25*(2), 76-79.
2. Church, T. S., Kuk, J. L., Ross, R., Priest, E. L., Biltoff, E., & Blair, S. N. (2006). Association of cardiorespiratory fitness, body mass index, and waist circumference to nonalcoholic fatty liver disease. *Gastroenterology*, *130*(7), 2023-2030.
3. Chan, D. C., Watts, G. F., Barrett, P. H. R., & Burke, V. (2003). Waist circumference, waist-to-hip ratio and body mass index as predictors of adipose tissue compartments in men. *Qjm*, *96*(6), 441-447.
4. Ben-Noun, L. L., Sohar, E., & Laor, A. (2001). Neck circumference as a simple screening measure for identifying overweight and obese patients. *Obesity*, *9*(8), 470-477.
5. Ben-Noun, L., & Laor, A. (2004). Relationship between changes in neck circumference and changes in blood pressure. *American journal of hypertension*, *17*(5), 409-414.
6. World Health Organization. (1989). *Measuring obesity: Classification and distribution of anthropometric data. Copenhagen: WHO. Nutr UD*. EUR/ICP/NUT 125.
7. Bellentani, S., Scaglioni, F., Marino, M., & Bedogni, G. (2010). Epidemiology of non-alcoholic fatty liver disease. *Digestive diseases*, *28*(1), 155-161.
8. Ludwig, J., Viggiano, T. R., Mcgill, D. B., & Oh, B. J. (1980, July). Nonalcoholic steatohepatitis: Mayo Clinic experiences with a hitherto unnamed disease. In *Mayo Clinic Proceedings*(Vol. 55, No. 7, pp. 434-438).
9. Browning, J. D., Szczepaniak, L. S., Dobbins, R., Horton, J. D., Cohen, J. C., Grundy, S. M., & Hobbs, H. H. (2004). Prevalence of hepatic steatosis in an urban population in the United States: impact of ethnicity. *Hepatology*, *40*(6), 1387-1395.
10. Zelber-Sagi, S., Nitzan-Kaluski, D., Halpern, Z., & Oren, R. (2006). Prevalence of primary non-alcoholic fatty liver disease in a population-based study and its association with biochemical and anthropometric measures. *Liver International*, *26*(7), 856-863.
11. Janssen, I., Heymsfield, S. B., Allison, D. B., Kotler, D. P., & Ross, R. (2002). Body mass index and waist circumference independently contribute to the prediction of nonabdominal, abdominal subcutaneous, and visceral fat. *The American journal of clinical nutrition*, *75*(4), 683-688.
12. Agrawal, R., Mishra, S., Dixit, V. K., & Rai, S. (2009). Association of non-alcoholic fatty liver

disorder with obesity. *Indian J Prev Soc Med*, *40*, 126-129.

13. Hingorjo, M. R., Qureshi, M. A., & Mehdi, A. (2012). Neck circumference as a useful marker of obesity: a comparison with body mass index and waist circumference. *JPMA-Journal of the Pakistan Medical Association*, *62*(1), 36.
14. Agrawal, R., Mishra, S., Dixit, V. K., & Rai, S. (2009). Association of non-alcoholic fatty liver disorder with obesity. *Indian J Prev Soc Med*, *40*, 126-129.
15. Carter-Kent, C., Zein, N. N., & Feldstein, A. E. (2008). Cytokines in the pathogenesis of fatty liver and disease progression to steatohepatitis: implications for treatment. *The American journal of gastroenterology*, *103*(4), 1036.
16. Angulo, P. (2002). Nonalcoholic fatty liver disease. *New England Journal of Medicine*, *346*(16), 1221-1231.
17. Nomura, H., Kashiwagi, S., Hayashi, J., Kajiyama, W., Tani, S., & Goto, M. (1988). Prevalence of fatty liver in a general population of Okinawa, Japan. *Japanese journal of medicine*, *27*(2), 142-149.
18. Luyckx, F. H., Desaive, C., Thiry, A., Dewe, W., Scheen, A. J., Gielen, J. E., & Lefebvre, P. J. (1998). Liver abnormalities in severely obese subjects: effect of drastic weight loss after gastroplasty. *International journal of obesity*, *22*(3), 222.
19. Silverman, J. F. (1989). Liver pathology in diabetes mellitus and morbid obesity: clinical pathological, and biochemical considerations. *Pathol Annu*, *24*, 275-302.