

# Non Alcoholic Fatty Liver Disease: Problems in Perception and Solution

CHARU ARORA<sup>1</sup>, BIPIN SINHA<sup>2</sup>, PIYUSH RANJAN<sup>3</sup>, ANITA MALHOTRA<sup>4</sup>

## ABSTRACT

Non Alcoholic Fatty Liver Disease (NAFLD) is now being recognised as a healthcare burden in India and abroad. An inevitable increase in its incidence is expected in future, presenting before the physicians a larger number of NAFLD patients to manage. The NAFLD patients are prescribed calorie restricted diets for weight loss, along with increased physical activity as the first line of treatment. However, the real challenge lies in making the patients adhere to this prescription. NAFLD, being asymptomatic, is often overlooked by the patients as well as the physicians. Many patients do not perceive it as a serious problem, unless it reaches an advanced stage. Poor awareness, lack of seriousness towards the disease and unwillingness to change behaviour are the major hurdles in the success of NAFLD treatment. Correct perception about this growing epidemic and adoption of an interdisciplinary and multifaceted approach for its effective treatment can go a long way in controlling NAFLD. Initiatives that encourage healthy lifestyle, using the component of behaviour therapy for sustained results, may be a promising solution to this liver condition.

**Keywords:** Cognitive behaviour therapy, Compliance, Diet and Lifestyle Counselling, Interdisciplinary approach

## INTRODUCTION

Non alcoholic fatty liver disease is drawing national and global attention because of its increasing prevalence and its association with dreadful diseases leading to long lasting consequences like chronic liver disease and hepatocellular carcinoma. Urbanisation, unhealthy dietary habits and sedentary lifestyle have contributed to the rising prevalence of NAFLD which is recognised as the most common cause of chronic liver disease. It was earlier considered as a disease of the affluent nations, but studies indicate that it is equally prevalent in developing countries like India [1]. Incidence of this disease is expected to rise further in future.

NAFLD includes a spectrum of liver diseases, with a little fat accumulation in the hepatic cells at one end to complete scarring (liver cirrhosis) of the liver and irreversible liver damage at the other. This disease is asymptomatic and is often detected incidentally. Currently, there is no effective drug therapy for reversal of NAFLD, especially when it has progressed to an advanced stage. Lifestyle modifications focusing on healthy diet and physical activity remain the cornerstones for the management of NAFLD at the moment. However, poor compliance to lifestyle related advice limits the effectiveness of these therapies among the patients.

Personal motivation and willingness to change behaviour can play a major role in the success of NAFLD treatment. Knowledge Attitude Behaviour (KAB) model proposes that after being convinced about the accumulated knowledge, people often initiate a change in their attitude, and this results in gradual behaviour change [2]. Knowledge Attitude Practices (KAP) surveys have become common in the community settings to identify the needs, problems, and possible barriers before developing and implementing an intervention. Well designed KAP questionnaires exist for diseases such as diabetes [3,4], and hypertension [5,6]. However, there is a lack of validated and reliable KAP instruments focusing on NAFLD.

The objective of this article is to review the existing literature on the

perception of the general public as well as physicians about NAFLD and to understand the gaps in their knowledge, attitude, practices and behaviour towards this disease. The article also aims to explore the strength of an interdisciplinary approach and the potential role of behaviour counselling in dietary and lifestyle intervention as a solution for improving the treatment outcome in NAFLD patients.

### NAFLD: Are We Sitting on a Volcano?

NAFLD, which was earlier considered innocuous, is now quietly becoming a global metabolic threat. The disease is associated with poor quality of life and high economic burden on the patients [7]. Population and hospital based studies from the West report that 10 to 24% of the general population, and 57 to 74% of obese individuals may have NAFLD [8,9]. If NAFLD is left unchecked, it can progress to Non Alcoholic Steatohepatitis (NASH). Of all the NAFLD patients, one-tenth to one-fourth may develop NASH, and 5 to 8% of the latter are estimated to develop liver cirrhosis in subsequent five years [10]. Furthermore, 12.8% of patients with liver cirrhosis are prone to develop Hepatocellular Carcinoma (HCC) within three years [11]. Subsequently, the last option is to go for a liver transplant; however, the demand for transplants is much more than the actual availability of livers for the purpose.

By 2020, NASH is projected to overtake hepatitis C as the leading cause of liver transplants in the United States [12]. NAFLD runs in families but often goes undetected for many years in non drinkers [13]. Being asymptomatic, it is precariously ignored until it has progressed to an advanced stage. Unlike diabetes and blood pressure, where patients are ready to seek help and take treatment, NAFLD patients are unaware of the serious repercussions of the disease and are generally not inclined to consult a physician.

### Indian Scenario in the Global NAFLD Pandemic and the Need to Contextualise the Treatment

NAFLD is deeply penetrating itself in the Asian subcontinent with rampant increase in obesity, hypertension, and diabetes mellitus

[14]. Findings from few published studies carried out in India reveal that 9 to 35% of the Indian population suffers from NAFLD [15,16]. Considering the large population in the country, the absolute number of patients suffering from this silent liver disease in India equals or exceeds the number in the west, despite the prevalence being somewhat lower [17]. Individuals in the age group of 40 to 50 years, especially men, are most affected by NAFLD [18]. Urbanisation, socioeconomic growth, lack of health awareness, sedentary lifestyle and unhealthy dietary habits are the major factors contributing to its high prevalence in India [19].

It has been observed that the Indian population is predisposed to develop NAFLD at a lower Body Mass Index (BMI) than in the west. A strong genetic susceptibility for developing fatty liver has been indicated as the cause for this inter ethnic difference in the prevalence of NAFLD and NASH among Indian and western population [20]. The pathogenesis and clinicopathological profile of Indian patients with NAFLD is different from that of the patients in the west; additionally, the available guidelines from the west for patients with NAFLD may not be applicable to patients with NAFLD in India [20]. The dietary modifications and lifestyle interventions recommended as first line treatment for NAFLD also need to be adapted in the Indian context. Therefore, it is important to contextualise the treatment of Indian NAFLD patients.

### NAFLD: Problems in Perception

Though, studies are available from other parts of the world, no Indian study has been carried out till date to document how seriously Indians perceive the problem of NAFLD.

A case-control study, conducted by Mlynarsky L et al., in 2016, concluded that fatty liver without clinically significant liver disease does not have independent impact on self health perception. The findings indicated that NAFLD diagnosis is not associated with higher healthcare utilisation. Further, the diagnosed patients did not predict any health deterioration over the coming years [21]. Another community based study involving 227 subjects in Singapore found that majority of the subjects had superficial awareness of NAFLD and did not perceive the risk of developing this disease. The authors highlighted the need for enhanced public education and screening to improve the understanding of NAFLD among the general

population [22]. Yet another study, carried out on 5000 subjects in USA, showed lack of awareness about NAFLD among a large majority of the respondents who reported that their physicians had never discussed the said disease with them [23]. This study also underscored the urgent need for initiating education campaign for physicians and the general population to increase their awareness about this liver disease.

Since, NAFLD is not yet perceived as a serious disease, its potential risks are often overlooked in vulnerable individuals. Available data underlines the fact that there is a dire need for carrying out research on self-rated health perception among NAFLD patients, particularly in the Indian context.

### Are Physicians Tackling the Situation Correctly?

General practitioners are the first point of medical consultation for majority of patients with or 'at risk' of NAFLD. Their (particularly non hepatologists') awareness and attitude are crucial for motivating the patients to adopt healthy lifestyle and sustain it for a long period. There is scant information in the literature about physicians' awareness about NAFLD diagnosis and management [24]. The available studies [Table/Fig-1] indicate that it is restricted and inadequate [25,26]. A study from the US reports that many doctors do not recognise NAFLD as a clinically relevant diagnosis [27]. The gap in awareness and perception of primary care practitioners can be detrimental in optimising patient care. For example, screening guidelines and position papers for NAFLD exist, but many practitioners are often unaware of these important guidelines [28]. According to a survey carried out in the US, many primary care practitioners do accept NAFLD as a major public health problem, but they have self-reported lack of confidence in their knowledge about this disease. The survey also found that the physicians' knowledge on prevalence of the disease, identification of associated conditions, and screening of NAFLD was inadequate. Less time, cost of diagnosis and evaluation, lack of confidence in initial assessment, lack of referral to specialists and unclear responsibility for screening were some of the identified barriers to patient care [29].

The seriousness of NAFLD as perceived by physicians can play an important role in the follow up and treatment of 'at-risk' patients. Despite the known high risk factors in obese and diabetic patients,

Author, Year	Type of study	Subjects	Aim of study	Results and conclusions
Grattagliano I et al., 2008 [25]	Pre and post study design	56 General practitioners	To assess the impact of an education training program for general practitioners in NAFLD	General practitioners knowledge about NAFLD is barely adequate; thus, targeted training is essential to improve their knowledge and practice.
Bergqvist et CJ al., 2013 [26]	Survey	100 Clinicians (non hepatologists) at two major tertiary hospitals	To assess the awareness about NAFLD and opinions regarding management among non hepatologists at two major tertiary hospitals in Brisbane	Non hepatologists appreciate the seriousness of NAFLD but appear to underestimate its prevalence, especially among their own patients despite known risk factors. More can be done to improve the understanding of this disease among non hepatologists.
Wieland AC et al., 2013 [27]	Online survey	479 Primary care practitioners (PCPs) in Internal Medicine, Family Medicine, Endocrinology, Cardiology, Gynaecology	To investigate the understanding of PCPs with respect to diagnosis and management of NAFLD	Majority do not identify NAFLD as a clinically important diagnosis and do not refer patients to a hepatologist. 83% expressed need for education on NAFLD.
Said A et al., 2013 [29]	State-wide stratified survey	250 Primary Care Practitioners	To understand knowledge, attitudes and practices regarding NAFLD and the barriers to providing care for this condition	Majority of participants perceived NAFLD as an important health issue in their practice. A major barrier to managing these patients was self-reported lack of knowledge about NAFLD.
Ratzu V et al., 2012 [30]	Survey	352 Gastroenterologists	To understand the clinical burden, perceived severity, and management patterns of NAFLD.	Most at risk patients are currently missed because of non referral by endocrinologists and no exploration of those with normal aminotransferases. The medical need for the diagnosis and treatment of NAFLD is real in the community of gastroenterologists at large.
Iacob S et al., 2016 [31]	Cross-sectional observational study	102 Gastroenterologists	To assess current diagnostic and treatment patterns of management of NAFLD	Clinical practice patterns among Romanian gastroenterologists for the diagnosis and management of NAFLD frequently diverge from published practice guidelines.
Polanco-Briceno S et al., 2016 [32]	Online survey	302 physicians (152 Primary care physicians, 150 Specialists)	To assess their current practices regarding various liver conditions	More education on the recent practice guidelines for NAFLD and non alcoholic steatohepatitis is needed for the physicians.

**[Table/Fig-1]:** Studies of Physician Awareness about NAFLD

non hepatologists underestimate the prevalence and severity of NAFLD in their patients [26]. A study, carried out in France, has shown that most 'at-risk' patients of NAFLD are currently missed because of non referral by endocrinologists and no exploration of those with normal aminotransferases.

In view of their limited awareness about NAFLD, there is an urgent need to improve the understanding of this disease among the physicians (especially the non hepatologists). This is important for appropriate referral of patients to Hepatology Clinics and the correct treatment of patients who are at risk of developing NAFLD [26]. It is also important to educate the physicians about the recent practice guidelines for NAFLD and NASH [32]. A large majority of physicians have clearly expressed their inclination to learn the skills required for correct screening, diagnosis and management of NAFLD, through targeted medical education programmes [27].

### Diet and Lifestyle Counselling for NAFLD Patients

Calorie reduction is regarded as the most important factor in facilitating weight loss in a NAFLD patient regardless of the type of diet a person consumes [33]. Changing the dietary composition even without weight loss can also reduce steatosis and improve metabolic alterations such as insulin resistance and lipid profile [34]. Low calorie diets have proven to show beneficial results in NAFLD patients, but continuous support and regular monitoring is required to maintain adherence to these dietary prescriptions. The Mediterranean Diet (MD) pattern has been recommended as the diet of choice for the treatment of NAFLD by the EASL-EASD-EASO Clinical Practice Guidelines [34]. In view of supporting scientific evidence, restricting fructose, trans fatty acids and saturated fats is recommended in NAFLD patients. For long term weight loss maintenance, a general healthy balanced diet is recommended [35].

Physical activity targets that have been set for NAFLD/NASH patients are in accordance to the targets described in the diabetes prevention trials [36]. It is recommended that NAFLD patients should engage themselves in at least 150 minutes per week of moderate intensity physical activity (e.g., brisk walking) and a minimum of 75 minutes per week of vigorous-intensity physical activity (e.g., jogging), along with muscle strengthening activities twice a week. However, each patient must receive individualised counselling for physical activity based on their age, gender and health status. Even limited physical activity is better than none; therefore, any increase over baseline should be encouraged [36].

### Barriers in Compliance to Diet and Lifestyle Related Advice Given to NAFLD Patients

A weight loss goal of 10% of current body weight is recommended for patients with NAFLD [37]. However, long term data indicate that only 15% of participants achieve the goal of 10% body weight reduction and adherence drops after the initial few months. Most of these patients regain the lost weight [38].

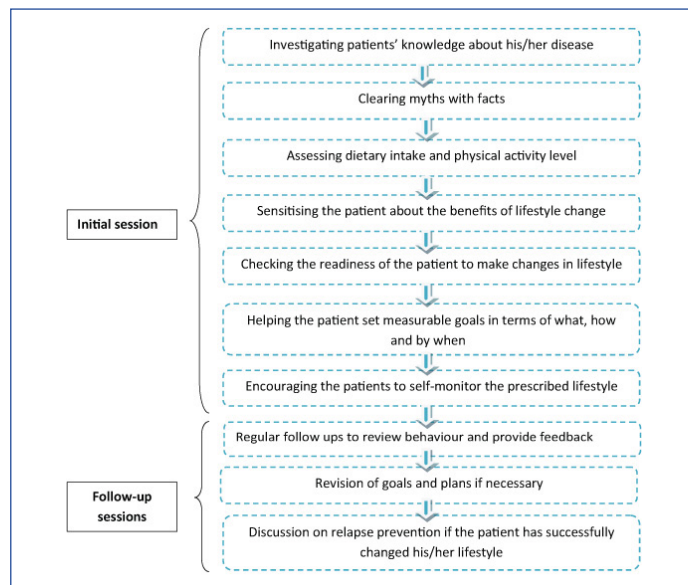
There is ample evidence to prove that behavioural intervention targeting diet and physical activity is effective in treating such patients. However, NAFLD patients are unwilling to accept lifestyle changes, especially in terms of physical activity [39]. Compliance to prescription is poor and a major challenge for medical caregivers is to motivate these patients to make long term changes in their lifestyle [34].

The primary reason for reluctance of NAFLD patients to diet and lifestyle related treatment is the inadequate awareness about the progression and possible fatal consequences of the disease. Secondly, patients with NAFLD are advised by clinicians to lose weight without any meaningful and continuous support to make changes in their lifestyle behaviours. Physicians' negative attitudes toward patients with obesity are well documented [40]. Low levels of emotional rapport in primary care visits with overweight and obese

patients may also diminish patients' adherence to recommendations, and decrease the effectiveness of behaviour change counselling [40]. Frequent unsuccessful weight loss attempts lead to disappointment among the patients. Also, conflicting information from health care professionals, friends, family members, and internet, results in further confusion in the minds of these patients, about the advice to follow [40].

### Improving Patient Compliance - Need for an Interdisciplinary Approach

To reduce non compliance to prescription in NAFLD, it is pertinent to have holistic contributions from an interdisciplinary team of physicians, dietitians, clinical psychologists, patients and care givers. "Patient-centred" clinical care [Table/Fig-2] involving a two-way conversation with the patient can bring about more successful treatment outcome [34].



**[Table/Fig-2]:** Flow diagram outlining the process for targeting lifestyle behaviour change during NAFLD consultations.

Each member of the multidisciplinary team should have a well defined role to play. The treatment should begin with sensitisation of the patients so that they understand their diagnosis well. It is important that the physician explains this liver disease to the NAFLD patients along with the possible causes, and effective ways to control or reverse its progression. The medical caregiver should try to understand the previous experiences and attempts of the patients for changing their lifestyle and behaviour. Such an approach will help them in addressing the barriers in treatment and improve compliance.

As dietary modification leading to weight loss is the first line of treatment, the dietitian must play a proactive role in the interdisciplinary team to treat NAFLD. His/her role includes helping patients identify their dietary goals and reach therapeutic targets, through effective and individualised weight management plans. Correct knowledge and a serious attitude towards NAFLD from the dietitians may be a key factor in how patients perceive the seriousness of the condition and thereby, affecting the compliance to the prescribed diet.

Integrated multidisciplinary approaches that address psychiatric needs and provide behavioural support for weight loss may help patients with NAFLD implement sustained lifestyle changes [41]. This highlights the role of a clinical psychologist in the team.

The caregivers and family members of a patient diagnosed with NAFLD are expected to have inadequate knowledge and a non serious attitude towards the disease condition, thereby affecting the practices of the patient. Thus, to ensure successful treatment, it is important to keep the patient and his caregivers at a central position.

## Potential Role of Cognitive Behaviour Therapy in Achieving Diet and Physical Activity Targets among NAFLD

Cognitive Behaviour Therapy (CBT) is an upcoming promising component which should be added to the interdisciplinary approach to tackle NAFLD. This approach has been extensively used in treatment of obesity and other metabolic diseases. Nevertheless, the effectiveness of CBT in (NAFLD) remains mainly unexplored so far [42].

<p><b>Self-Monitoring:</b></p> <ul style="list-style-type: none"> <li>It involves monitoring of food intake, physical activity and body weight.</li> <li>It enhances compliance with dietary and physical activity interventions and favours weight loss.</li> </ul> <p><b>Goal Setting:</b></p> <ul style="list-style-type: none"> <li>Set, specific, realistic and quantifiable weekly behavioural goals, gives a sense of accomplishment to the patient.</li> <li>Leads to enhancement of self-efficacy.</li> </ul> <p><b>Stimulus Control:</b></p> <ul style="list-style-type: none"> <li>It is based on the principles of classical and operant conditioning.</li> <li>The focus is on changing the external environment by removing negative cues for undesirable behaviour and increasing positive cues for desirable behaviour.</li> </ul> <p><b>Alternative Behaviours</b></p> <p>An attempt is made to train the patients to identify non hunger cues and substitute eating at such times with alternative behaviours.</p> <p><b>Problem Solving:</b></p> <p>Address problems that hinder weight loss or weight loss maintenance, using five steps.</p> <ul style="list-style-type: none"> <li>Encourage patients to detail the event that led to the behavioural problem.</li> <li>Help them brainstorm any possible solution.</li> <li>Help the patient generate a list of pros and cons for each potential solution.</li> <li>Let the patients choose the best option on the basis of the previous analyses, to be implemented for a fixed amount of time.</li> <li>Let the patients evaluate the results achieved. If the solution fails, the process should be repeated.</li> </ul> <p><b>Cognitive Restructuring:</b></p> <ul style="list-style-type: none"> <li>This highlights the role of thoughts in influencing both mood and behaviour.</li> <li>It is used to modify cognitive biases about weight regulation.</li> <li>It corrects unrealistic weight loss expectations, which are associated with higher attrition rates.</li> </ul>
---

**[Table/Fig-3]:** Components of a cognitive behaviour therapy sessions for NAFLD

Besides enabling the patients to achieve their diet and physical activity targets, CBT also assures long term sustainability of change. The behaviour component of lifestyle modification for weight loss includes self-monitoring, goal setting, stimulus control, alternative behaviours, problem solving and cognitive restructuring [Table/Fig-3].

CBT requires a well defined program, the availability of manuals for both patients and therapists, and a team to address both the physical and the psychological needs of patients. The team must include physicians, as well as dietitians, psychologists, trained nurses, experts of physical exercise, working on individual patients or on groups with multiple sessions over several months. The major challenge is the cost, time associated with a team approach and multiple session treatments. Also, the skills and the logistics to carry out a cognitive behaviour approach to diseases are beyond the scope of many hospitals and clinics [43].

General practitioners, hepatologists and dietitians need to undergo training in behaviour therapy. A Canadian study, published in the year 2014 regarding the views and practices of 514 dietitians regarding obesity and weight management, reported that these dietitians wanted to learn more about motivational and behavioural modification counselling techniques, to help bring better and sustainable weight loss results in their clients [44].

The interdisciplinary team needs to communicate with their NAFLD patients more about the broader picture of complications; hepatocellular cancer, increased risk of diabetes, heart attack or stroke, with the message that risk reduction is possible. The physicians/dietitians may use the 5 A's model (ask, advise, assess, assist, and arrange) while advising NAFLD patients to modify their behaviour, assessing their willingness for doing so, assisting in their behaviour change efforts, and arranging timely and regular

follow up for them [45]. CBT, if added along with regular dietary and lifestyle counselling should help improve dietary compliance and also lead to sustained weight loss over a longer period of time [46].

## CONCLUSION

Correct perception about NAFLD and adoption of an interdisciplinary and multifaceted approach for its effective treatment can go a long way in controlling this growing epidemic. CBT is likely to be an effective solution to NAFLD if delivered in an interdisciplinary team setup; although, evidence based tools and training are lacking. Trials exploring the potential effect of CBT as an additive therapy in NAFLD patients call for fervent endeavours.

## REFERENCES

- [1] Amarapurkar D, Kamani P, Patel N, Gupta P, Kumar P, Agal S, et al. Prevalence of non-alcoholic fatty liver disease: population based study. *Ann Hepatol*. 2007;6(3):161-63.
- [2] Hiew C, Chin Y, Chan Y, Mohd NM. Development and validation of Knowledge, Attitude and Practice on Healthy Lifestyle Questionnaire (KAP-HLQ) for Malaysian adolescents. *Journal of Nutrition and Health Sciences*. 2015;2(4):01-11.
- [3] Upadhyay DK, Palaian S, Shankar PR, Mishra P, Pokhara N. Knowledge, attitude and practice about diabetes among diabetes patients in Western Nepal. *Rawal Med J*. 2008;33(1):08-11.
- [4] Shera AS, Jawad F, Basit A. Diabetes related knowledge, attitude and practices of family physicians in Pakistan. *J Pak Med Assoc (JPMA)* 2002. Available from <http://www.jpma.org.pk/PdfDownload/2425.pdf> (Accessed on 25<sup>th</sup> August, 2017).
- [5] Akl OA, Khairy AE, Abdel-Aal NM, Deghedi BS, Amer ZF. Knowledge, attitude, practice and performance of family physicians concerning holistic management of hypertension. *J Egypt Public Health Assoc*. 2006;81(5&6):337-53.
- [6] Parmar P, Rathod GB, Rathod S, Goyal R, Aggarwal S, Parikh A. Study of knowledge, attitude and practice of general population of Gandhinagar towards hypertension. *International Journal of Current Microbiology and Applied Sciences* 2014;3(8):680-85.
- [7] Golabi P, Otgonsuren M, Cable R, Felix S, Koenig A, Sayiner M, et al. Non-alcoholic fatty liver disease (NAFLD) is associated with impairment of Health Related Quality of Life (HRQOL). *Health and Quality of Life Outcomes*. 2016;14(1):18.
- [8] Sanyal AJ, American Gastroenterological Association. AGA technical review on nonalcoholic fatty liver disease. *Gastroenterology*. 2002;123:1705-25.
- [9] Neuschwander-Tetri BA, Caldwell SH. Nonalcoholic steatohepatitis: summary of an AASLD single topic conference. *Hepatology*. 2003;37:1202-19.
- [10] Milić S, Stimac D. Nonalcoholic fatty liver disease/steatohepatitis: epidemiology, pathogenesis, clinical presentation and treatment. *Dig Dis*. 2012;30:158-62.
- [11] White DL, Kanwal F, El-Serag HB. Association between nonalcoholic fatty liver disease and risk for hepatocellular cancer, based on systematic review. *Clin Gastroenterol Hepatol*. 2012;10:1342-59.
- [12] Charlton M. Nonalcoholic fatty liver disease: a review of current understanding and future impact. *Clin Gastroenterol Hepatol*. 2004;2(12):1048-58.
- [13] Schwimmer JB, Celedon MA, Lavine JE, Salem R, Campbell N, Schork NJ, et al. Heritability of nonalcoholic fatty liver disease. *Gastroenterology*. 2009;136(5):1585-92.
- [14] Fu CC, Chen MC, Li YM, Liu TT, Wang LY. The risk factors for ultrasound-diagnosed non-alcoholic fatty liver disease among adolescents. *Ann Acad Med Singapore*. 2009;38:15-17.
- [15] Mohan V, Farooq S, Deepa M, Ravikumar R, Pitchumoni C. Prevalence of non-alcoholic fatty liver disease in urban south Indians in relation to different grades of glucose intolerance and metabolic syndrome. *Diabetes Res Clin Pract*. 2009;84(1):84-91.
- [16] Singh S, Kuffinec GN, Sarkar S. Non-alcoholic fatty liver disease in South Asians: a review of the literature. *J Clin Transl Hepatol*. 2017;5(1):76-81.
- [17] De Silva HJ, Dassanayake AS. Non alcoholic fatty liver disease: confronting the global epidemic requires better awareness. *J Gastroenterol Hepatol*. 2009;24(11):1705-07.
- [18] Duseja A. Nonalcoholic fatty liver disease in India—a lot done, yet more required. *Indian J Gastroenterol*. 2010;29(6):217-25.
- [19] Singh SP, Singh A, Misra D, Misra B, Pati GK, Panigrahi MK, et al. Risk factors associated with non-alcoholic fatty liver disease in Indians: a case-control study. *J Clin Exp Hepatol*. 2015;5(4):295-302.
- [20] Duseja A, Singh SP, Saraswat VA, Acharya SK, Chawla YK, Chowdhury S, et al. Non-alcoholic fatty liver disease and metabolic syndrome—position paper of the Indian National Association for the Study of the Liver, Endocrine Society of India, Indian College of Cardiology and Indian Society of Gastroenterology. *Journal of Clinical and Experimental Hepatology*. 2015;5(1):51-68.
- [21] Mlynarsky L, Schlesinger D, Lotan R, Webb M, Halpern Z, Santo E, et al. Non-alcoholic fatty liver disease is not associated with a lower health perception. *World Journal of Gastroenterology* 2016;22(17):4362-72.

- [22] Goh GB, Kwan C, Lim SY, Venkatanarasimha NK, Abu-Bakar R, Krishnamoorthy TL, et al. Perceptions of non-alcoholic fatty liver disease-an Asian community based study. *Gastroenterol Rep*. 2015;4(2):131-35.
- [23] Ghevariya V, Sandar N, Patel K, Ghevariya N, Shah R, Aron J, et al. Knowing what's out there: awareness of non-alcoholic fatty liver disease. *Front Med*. 2014;1:4. Available from: <https://dx.doi.org/10.3389%2Ffmed.2014.00004> (Accessed on 24<sup>th</sup> June 2017).
- [24] Kallman JB, Arsalla A, Park V, Dhungel S, Bhatia P, Haddad D, et al. Screening for hepatitis B, C and non alcoholic fatty liver disease: a survey of community based physicians. *Aliment Pharmacol Ther*. 2009;29(9):1019-24.
- [25] Grattagliano I, D'Ambrosio G, Palmieri VO, Moschetta A, Palasciano G, Portincasa P. Improving nonalcoholic fatty liver disease management by general practitioners: a critical evaluation and impact of an educational training program. *J Gastrointest Liver Dis*. 2008;17(4):389-94.
- [26] Bergqvist CJ, Skoien R, Horsfall L, Clouston AD, Jonsson JR, Powell EE. Awareness and opinions of non alcoholic fatty liver disease by hospital specialists. *Intern Med J*. 2013;43(3):247-53.
- [27] Wieland AC, Quallick M, Truesdale A, Mettler P, Bambha KM. Identifying practice gaps to optimize medical care for patients with nonalcoholic fatty liver disease. *Dig Dis Sci*. 2013;58(10):2809-16.
- [28] Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abboud PA, et al. Why don't physicians follow clinical practice guidelines? :A framework for improvement. *J Am Med Assoc*. 1999;282(15):1458-65.
- [29] Said A, Gagovic V, Malecki K, Givens ML, Nieto FJ. Primary care practitioners survey of non-alcoholic fatty liver disease. *Ann Hepatol*. 2013;12(5):758-65.
- [30] Ratziu V, Cadranet JF, Serfaty L, Denis J, Renou C, Delassalle P, et al. A survey of patterns of practice and perception of NAFLD in a large sample of practicing gastroenterologists in France. *J Hepatol*. 2012; 57(2):376-83.
- [31] Iacob S, Ester C, Lita M, Ratziu V, Gheorghe L. Real-life perception and practice patterns of NAFLD/NASH in Romania: results of a survey completed by 102 board-certified gastroenterologists. *J Gastrointest Liver Dis*. 2016;25(2):183-89.
- [32] Polanco-Briceno S, Glass D, Stuntz M, Caze A. Awareness of nonalcoholic steatohepatitis and associated practice patterns of primary care physicians and specialists. *BMC Res Notes*. 2016;9(1):157.
- [33] Hallsworth K, Avery L, Trenell MI. Targeting lifestyle behavior change in adults with NAFLD during a 20-min consultation: summary of the dietary and exercise literature. *Curr Gastroenterol Rep*. 2016;18(3):11.
- [34] ZelberSagi S, Salomone F, Mlynarsky L. The Mediterranean dietary pattern as the diet of choice for NAFLD; evidence and plausible mechanisms. *Liver Int*. 2017;37(7):936-49.
- [35] Ratziu V, Bellentani S, Cortez-Pinto H, Day C, Marchesini G. A position statement on NAFLD/NASH based on the EASL 2009 special conference. *J Hepatol*. 2010;53(2):372-84.
- [36] Orchard TJ, Temprosa M, Goldberg R, Haffner S, Ratner R, Marcovina S, et al. The effect of metformin and intensive lifestyle intervention on the metabolic syndrome: the Diabetes Prevention Program randomized trial. *Ann Intern Med*. 2005;142(8):611-19.
- [37] Dyson JK, Anstee QM, McPherson S. Republished: Non-alcoholic fatty liver disease: a practical approach to treatment. *Postgrad Med J*. 2015;91(1072):92-101.
- [38] Sacks FM, Bray GA, Carey VJ, Smith SR, Ryan DH, Anton SD, et al. Comparison of weight-loss diets with different compositions of fat, protein, and carbohydrates. *New Engl J Med*. 2009;360(9):859-73.
- [39] Centis E, Moscatiello S, Bugianesi E, Bellentani S, Fracanzani AL, Calugi S, et al. Stage of change and motivation to healthier lifestyle in non-alcoholic fatty liver disease. *J Hepatol*. 2013;58(4):771-77.
- [40] Gudzone KA, Beach MC, Roter DL, Cooper LA. Physicians build less rapport with obese patients. *Obesity*. 2013;21(10):2146-52.
- [41] Stewart KE, Haller DL, Sargeant C, Levenson JL, Puri P, Sanyal AJ. Readiness for behaviour change in non alcoholic fatty liver disease: implications for multidisciplinary care models. *Liver Int*. 2015;35(3):936-43.
- [42] Moscatiello S, Luzio R, Bugianesi E, Suppini A, Hickman IJ, Domizio S, et al. Cognitive behavioral treatment of nonalcoholic fatty liver disease: a propensity score adjusted observational study. *Obesity*. 2011;19(4):763-70.
- [43] Marchesini G, Suppini A, Forlani G. NAFLD treatment: Cognitive-behavioral therapy has entered the arena. *J Hepatol*. 2005;43(6):926-28.
- [44] Barr SI, Yarker KV, Levy-Milne R, Chapman GE. Canadian dietitians' views and practices regarding obesity and weight management. *J Hum Nutr Diet*. 2004;17(6):503-12.
- [45] Vallis M, Piccinini-Vallis H, Sharma AM, Freedhoff Y. Modified 5 As: minimal intervention for obesity counseling in primary care. *Can Fam Physician*. 2013;59(1):27-31.
- [46] Bellentani S, Dalle Grave R, Suppini A, Marchesini G. Behavior therapy for nonalcoholic fatty liver disease: the need for a multidisciplinary approach. *Hepatology*. 2008;47(2):746-54.

#### PARTICULARS OF CONTRIBUTORS:

1. PhD Scholar, Department of Food and Nutrition, University of Delhi; Department of Medicine, AIIMS, New Delhi, India.
2. Senior Resident, Department of Medicine, Patliputra Medical College, Dhanbad, Jharkhand, India.
3. Associate Professor, Department of Medicine, All India Institute of Medical Sciences, New Delhi, India.
4. Associate Professor, Department of Food Technology and Nutrition, Lakshmi Bai College, University of Delhi, Delhi, India.

#### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Piyush Ranjan,  
Associate Professor, Department of Medicine, All India Institute of Medical Sciences, New Delhi-110029, India.  
E-mail: drpiyushaiims@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Oct 04, 2017**

Date of Peer Review: **Dec 18, 2017**

Date of Acceptance: **Dec 21, 2017**

Date of Publishing: **Jan 01, 2018**