Research Article

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Stage of change and motivation to healthier lifestyle in non-alcoholic fatty liver disease

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Backgrounds & Aims: Healthy diet and physical activity are the treatment cornerstones of non-alcoholic fatty liver disease (NAFLD); their effectiveness is however limited by difficulties in implementing lifestyle changes. We aimed at determining the stage of change and associated psychological factors as a prerequisite to refine strategies to implement behavior changes.

Methods: We studied 138 consecutive NAFLD patients (73% male, age 19–73 years). The diagnosis was confirmed by liver biopsy in 64 cases (steatohepatitis, 47%). All cases completed the validated EMME-3 questionnaire, consisting of two parallel sets of instruments (for diet and physical activity, respectively) and providing stages of change according to transtheoretical model. Logistic regression analysis was used to identify factors associated with stages making behavioral changes more demanding.

Results: The individual profiles were variable; for diet, no cases had precontemplation as prevalent stage of change (highest score in individual profiles); 36% had contemplation. For physical activity, 50% were classified in either precontemplation or contemplation. Minor differences were recorded in relation to associated metabolic complications or steatohepatitis. Logistic regression identified male sex (odds ratio, 4.51; 95% confidence interval, 1.69–12.08) and age (1.70; 1.20–2.43 per decade) as the independent parameters predicting precontemplation or contemplation for diet. No predictors were identified for physical activity.

Conclusions: NAFLD cases have scarce readiness to lifestyle changes, particularly with regard to physical activity. Defining stages of change and motivation offers the opportunity to improve clinical care of NAFLD people through individual programs exploiting the powerful potential of behavioral counseling, an issue to be tested in longitudinal studies.

Keywords: Lifestyle; Psychological factors; Physical activity; Healthy diet.
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Introduction

Healthy diet and physical activity are the cornerstones in the treatment of non-alcoholic fatty liver disease (NAFLD). A series of epidemiological and observational studies have consistently linked NAFLD to excess body weight [1], unhealthy diet [2] and sedentary behaviors [3]. Of note, disease progression from fatty liver to necroinflammation and fibrosis (non-alcoholic steatohepatitis – NASH) is also largely dictated by obesity, diabetes, and the other features of the metabolic syndrome associated with unhealthy behaviors [1]. Diet and physical activity promote weight loss, reduce liver fat and tend to normalize liver enzymes [4–6]. These benefits have been supported by a randomized, controlled trial of behavior therapy in subjects with NASH [7], mimicking the procedures and main targets of the US Diabetes Prevention Program (7% weight loss; 150-min/week physical activity) [8]. Achieving the target of 7% weight loss significantly reduced liver steatosis and several histological indices of necroinflammation. Fibrosis did not improve significantly, but the trend was nonetheless favorable [7].

Notably, the effects of physical activity on liver fat seem to be independent of weight loss [9] and any effort should be made to combine a healthy diet with aerobic and resistance training [10]. Physical activity is also expected to improve cardiorespiratory fitness [11], thus reducing the high cardiovascular risk associated with NAFLD [12].

However, it is not easy to make patients change their unhealthy lifestyle [13]. Behavior therapy may only be successful in motivated patients, and motivation to dieting and exercising may be different according to age and sex. Personal motivation for change plays a pivotal role in behavior changes. According to the transtheoretical model proposed by Prochaska and DiClemente [14], behavioral changes occur through a defined sequence of the following qualitatively distinct five stages: (a) precontemplation (not thinking about changing the problem behavior within the next 6 months); (b) contemplation (intending to change in the next 6 months, but unwilling to start); (c) determination (planning to change in the next month, mostly having already tried unsuccessfully to change at least once in the past year); (d) action (making health-relevant changes in

the behavior for as little as one day or as long as 6 months); (e) maintenance (having made behavioral changes for longer than 6 months) [15]. The different stages of change have been theorized to predict treatment participation to programs and dropout, as well as efficacy and long-term maintenance of improvement [15,16]. In addition, the transtheoretical model recommends that approaches need to be matched to the individual's specific stage of change in order to be effective [15,17]. Accordingly, the proposed interventions may be less effective than programs that match patients' readiness to change. Finally, the model has also been associated with the development of an effective approach to overcome resistance to change, namely, the motivational interview [18].

The aim of the study was to determine the stage of change and a series of psychological factors associated with motivation to change dietary habits and physical activity in NAFLD patients, as a prerequisite to refine strategies to implement behavior changes in the population [19]. As far as we know, no study has evaluated the stage of change towards lifestyle modification in patients referred to tertiary centers for the assessment and treatment of their NAFLD.

Patients and methods

Patients

The study involved 138 consecutive NAFLD patients attending the centers of Bologna, Carpi (MO), Milan, Palermo and Turin, Italy, as part of a cooperative study within the European Union FP7 Health Program. They had been specifically referred to the institutions as 2nd level Centers for the assessment and treatment of NAFLD. Their anthropometric, clinical and biochemical characteristics are reported in Table 1. In all cases, the diagnosis was based on "bright liver" at ultrasonography, with/without elevated liver enzymes (alanine aminotransferase – ALT or g-glutamyl transpeptidase – GGT), negative hepatitis B and C virus tests,

Table 1. Characteristics of the NAFLD population. Data are presented as means ± SD or as number of cases (%).

Characteristics	Males (n = 101)	Females (n = 37)
Age (yr)	44.0 ± 11.5	57.5 ± 10.9*
Education (%)		
Primary/secondary/commercial or vocational/degree	1/9/54/36	3/18/64/15
Occupation (%)		
Employee/self-employed/housewife/retired	63/32/0/5	17/22/41/20*
Anthropometric data		
Body Mass Index (kg/m^2)	30.0 ± 5.3	32.2 ± 5.0
Waist circumference (cm)	104.8 ± 11.9	103.2 ± 9.1
Clinical data		
Diabetes	14 (14%)	11 (30%)
Hypertension	34 (34%)	17 (46%)
Dyslipidemia	50 (50%)	20 (54%)
Overweight (BMI, 25-29.9 kg/m^2)	50 (50%)	13 (35%)
Obesity (BMI, ≥30 kg/m^2)	50 (50%)	23 (62%)
Systolic pressure (mmHg)	128.1 ± 11.9	132.9 ± 12.7
Diastolic pressure (mmHg)	82.8 ± 9.0	85.1 ± 8.3
Biochemical tests		
Blood glucose (mg/dl)	94.6 ± 19.5	103.6 ± 22.4
Fasting insulin (μU/ml)	15.9 ± 10.2	15.8 ± 6.0
HOMA (%)	3.64 ± 2.37	4.11 ± 2.03
Total cholesterol (mg/dl)	199.2 ± 42.0	207.3 ± 39.5
HDL-cholesterol (mg/dl)	45.6 ± 10.4	51.8 ± 13.2*
Triglycerides (mg/dl)	171.1 ± 130.5	171.6 ± 172.8
Aspartate aminostransferase (U/L)	34.2 ± 18.1	29.9 ± 15.6
Alanine aminotransferase (U/L)	55.4 ± 31.7	40.5 ± 25.3*
γ-glutamyl-transpeptidase (U/L)	71.3 ± 81.6	58.9 ± 44.5
Histology^		
Steatosis (grade 1-3)	1.98 ± 0.63	1.93 ± 0.70
Ballooning (score 0-2)	1.25 ± 0.69	1.13 ± 0.52
Lobular inflammation (score 0-2)	1.22 ± 0.71	1.13 ± 0.74
NASH Activity Score (1-7)	4.45 ± 1.46	4.20 ± 1.42
Fibrosis (stage 0-4)	1.39 ± 1.02	1.07 ± 1.10

^n = 49 in men and n = 15 in women.
*Significantly different from the corresponding value of males (p <0.025).