



Association between fruit-vegetable intake and non-alcohol fatty liver disease in patients with diabetes.

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BACKGROUND

- ◆ In China, nationwide prevalence of NAFLD was 29.2%, and it could be as high as 49%~62% in patients with diabetes.
- ◆ The relationship between fruit and vegetable intake and the prevalence of NAFLD is uncertain, especially in people with diabetes.
- ◆ This study aims to assess how fruit and vegetable consumption associated with NAFLD in patients with diabetes.

METHODS

◆ Study population:

A total of 2,401 participants with diabetes recruited from 1st affiliated hospital of Wenzhou medical university Metabolic management center (MMC) were enrolled in this study.

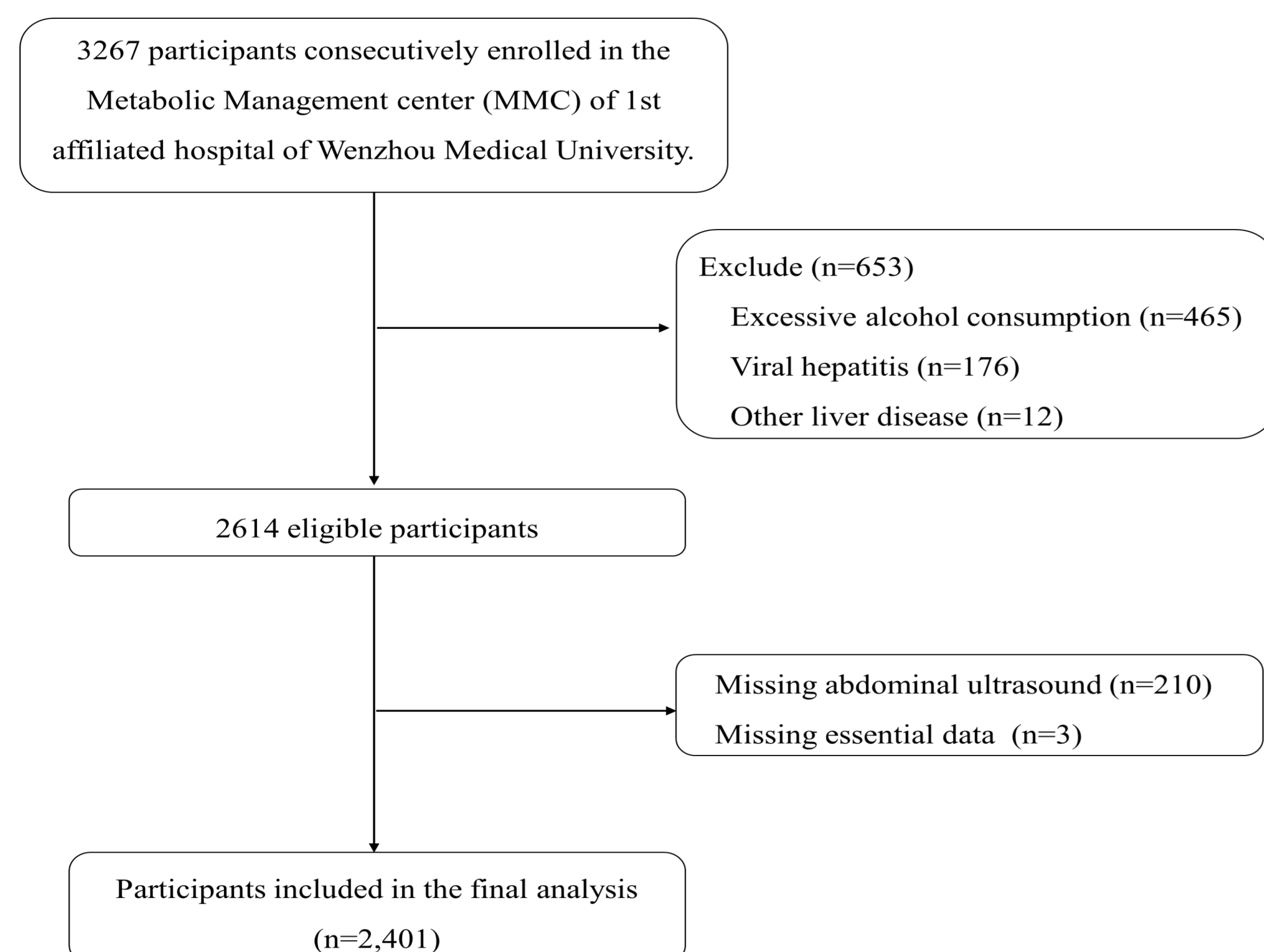


Fig 1. Flow diagram of study participant selection.

◆ Diagnosis of NAFLD

Diagnosis of fatty liver: abdominal sonography. Those with significant alcohol consumption (≥ 210 g/week in men, ≥ 140 g/week in women) and with other liver diseases were excluded.

◆ Statistical analysis

All statistical analyses were carried out using the SPSS 25.0. Logistic regression was used to calculate the odds ratios and 95% confidence intervals.

CONCLUSION

Higher vegetable intakes were associated with a lower odds of NAFLD in patients with diabetes, particularly in the older people.

RESULTS

◆ Baseline characteristics of participants

Table 1. Baseline characteristics of participants according to fruit-vegetable intake.

	Total	<500g/d	≥ 500 g/d	p
Case/participants (%)	1256/2401 (52.31)	625/1145 (54.59)	631/1256 (50.24)	0.033
Gender (men%)	62.60	64.10	61.23	0.145
Age (years)	52 (42-59)	52 (41-59)	53 (43-59)	0.035
Diabetes duration (month)	67 (7-139)	64 (7-129.5)	72 (9-149)	0.020
Family history of diabetes (%)	57.38	56.91	57.80	0.657
Anthropometric parameters				
DBP (mmHg)	74.77 (11.04)	74.98 (11.34)	74.59 (10.76)	0.384
SBP (mmHg)	126.73 (18.77)	126.30 (19.00)	127.13 (18.55)	0.283
BMI (Kg/m ²)	24.61 (3.80)	24.73 (3.87)	24.51 (3.72)	0.161
WC (cm)	88.59 (10.32)	89.04 (10.54)	88.17 (10.10)	0.040
HC (cm)	94.59 (7.53)	94.74 (7.57)	94.46 (7.48)	0.372
Lifestyle factors				
Education attainment (high school or above%)	26.03	25.84	26.20	0.845
Current Smoking (%)	24.24	27.25	21.50	0.001
Current drinking (%)	3.83	4.63	3.11	0.052
Physical activity (almost never%)	34.07	36.24	32.09	0.032
Fruit and vegetable intake (%)				
Fruit intake				
<200g/d	69.97	79.74	61.07	<0.001
200-400g/d	21.62	18.17	24.76	
>400g/d	8.41	2.10	14.17	
Vegetable intake				
<200g/d	12.04	22.62	2.39	<0.001
200-400g/d	39.82	52.75	28.03	
>400g/d	48.15	24.63	69.59	
Biochemical index				
HbA1c (%)	9.88 (2.47)	9.85 (2.45)	9.92 (2.50)	0.516
UA (μ mol/L)	324.39 (95.63)	326.76 (99.33)	322.23 (92.13)	0.256
ALT (U/L)	22 (15-35)	23 (15-37)	22 (15-33)	0.022
AST (U/L)	21 (17-28)	21 (17-29)	21 (17-27)	0.486
TG (mmol/L)	1.52 (1.03-2.28)	1.52 (1.04-2.42)	1.52 (1.02-2.19)	0.031
TC (mmol/L)	4.91 (1.43)	4.96 (1.44)	4.87 (1.42)	0.135
HDL-c (mmol/L)	0.99 (0.84-1.17)	0.98 (0.84-1.15)	1.00 (0.85-1.18)	0.027
LDL-c (mmol/L)	2.69 (0.90)	2.71 (0.93)	2.67 (0.88)	0.227
HOMA-IR	2.34 (1.43-4.01)	2.44 (1.47-4.10)	2.27 (1.39-3.90)	0.099

◆ Cross-sectional associations between vegetable-fruit intake and NAFLD

Table 2. Odds ratios with 95% confidence intervals for non-alcoholic fatty liver disease according to daily fruit-vegetable intake.

Case/participants (%)	Model1		Model2		Model3		Model4		
	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p	
Fruit-vegetable									
<500g/d	625/1145 (54.59)	ref	ref	ref	ref	ref	ref	ref	
≥ 500 g/d	631/1256 (50.24)	1.15 (0.97,1.36)	0.106	1.08 (0.90,1.31)	0.408	1.13 (0.93,1.37)	0.235	1.12 (0.92,1.37)	0.263
Fruit									
<200g/d	843/1680 (50.18)	ref	ref	ref	ref	ref	ref	ref	
200-400g/d	300/519 (57.80)	1.33 (1.08,1.64)	0.007	1.24 (0.97,1.57)	0.082	1.16 (0.91,1.48)	0.229	1.09 (0.85,1.40)	0.487
>400g/d	113/202 (55.94)	1.37 (1.01,1.85)	0.045	1.18 (0.84,1.68)	0.342	1.08 (0.75,1.56)	0.662	1.02 (0.71,1.48)	0.907
Vegetable									
<200g/d	194/289 (67.13)	ref	ref	ref	ref	ref	ref	ref	
200-400g/d	500/956 (52.30)	0.57 (0.42,0.76)	<0.001	0.57 (0.41,0.79)	0.001	0.58 (0.41,0.81)	<0.001	0.58 (0.41,0.81)	0.001
>400g/d	562/1156 (48.62)	0.50 (0.37,0.66)	<0.001	0.53 (0.38,0.73)	<0.001	0.54 (0.39,0.75)	0.001	0.56 (0.40,0.78)	0.002

Model1: No adjusted.

Model2: Adjusted for demographic parameters, diabetes duration and anthropometric parameters.

Model3: Adjusted for variables in model 2 plus family history, lifestyle and food intake.

Model4: Adjusted for variables in model 3 plus biochemical index.

P values is calculated by logistic regression.

◆ Subgroup analyses

Table 3. Subgroups analyses for prevalent non-alcoholic fatty liver disease among 2401 participants with the top vs. bottom intake of vegetable.

	Case/participants (%)	OR (95%CI)	p	P-interaction
Gender				0.519
Male	827/1503 (55.02)	0.52 (0.34,0.79)	0.002	
Female	429/898 (47.77)	0.64 (0.35,1.16)	0.139	
Age				0.029
<50 years	605/1037 (58.34)	0.84 (0.50,1.41)	0.507	
≥ 50 years	651/1364 (47.73)	0.40 (0.25,0.64)	<0.001	
Duration				0.973
<67 months	688/1171 (58.75)	0.56 (0.35,0.92)	0.021	
≥ 67 months	540/1196 (45.15)	0.50 (0.31,0.83)	0.006	
Overweight/Obesity				0.688
No	332/1094 (30.35)	0.50 (0.31,0.81)	0.004	
Yes	915/1287 (71.10)	0.51 (0.30,0.84)	0.008	
Central obesity				0.762
No	387/1154 (33.53)	0.63 (0.39,1.01)	0.056	
Yes	854/1218 (70.11)	0.54 (0.32,0.88)	0.014	
Hypertension				0.387
No	596/1280 (46.56)	0.61 (0.39,0.96)	0.032	
Yes	660/1121 (58.88)	0.42 (0.24,0.73)	0.002	
Hyperlipidemia				0.759
No	324/899 (36.04)	0.71 (0.39,1.28)	0.251	
Yes	932/1502 (62.05)	0.48 (0.31,0.74)	0.001	

All analyses were adjusted for demographic parameters, diabetes duration, anthropometric parameters, family history, lifestyle, food intake and biochemical index. P values is calculated by logistic regression.

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