



Association of weight loss agents with the risk of abnormal liver function : A population-based cross-sectional study

Ye-Jee Kim¹, Seo Young Kang², Mi-Sook Kim³, Joongyub Lee⁴, Bo Ram Yang⁵

1 Department of Clinical Epidemiology and Biostatistics, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea, 2 Uijeongbu Eulji Medical Center, Eulji University School of Medicine, Department of Family Medicine, Uijeongbu, Korea, 3 Medical Research Collaborating Center, Seoul National University Hospital, Seoul, Republic of Korea., 4 Department of Preventive Medicine, Seoul National University College of Medicine, Seoul, Republic of Korea, 5 College of Pharmacy, Chungnam National University, Daejeon, Republic of Korea

Background

Although the widespread use of weight control agents might increase the risk of abnormal liver function, few case reports have described this finding. This study was to compare the associations of weight loss agents with the risk of abnormal liver enzyme levels at the population level.

Methods

Data source and study design

We conducted a cross-sectional study using Korea National Health and Nutrition Examination Survey (KNHANES) data from 2013 to 2019. conducted by the Korea Disease Control and Prevention Agency of the Ministry of Health and Welfare. All participants were selected using multi-stage clustered probability sampling and comprised a representative sample of non-institutionalized civilians in South Korea. All participants gave written informed consent before study participation.

Variables

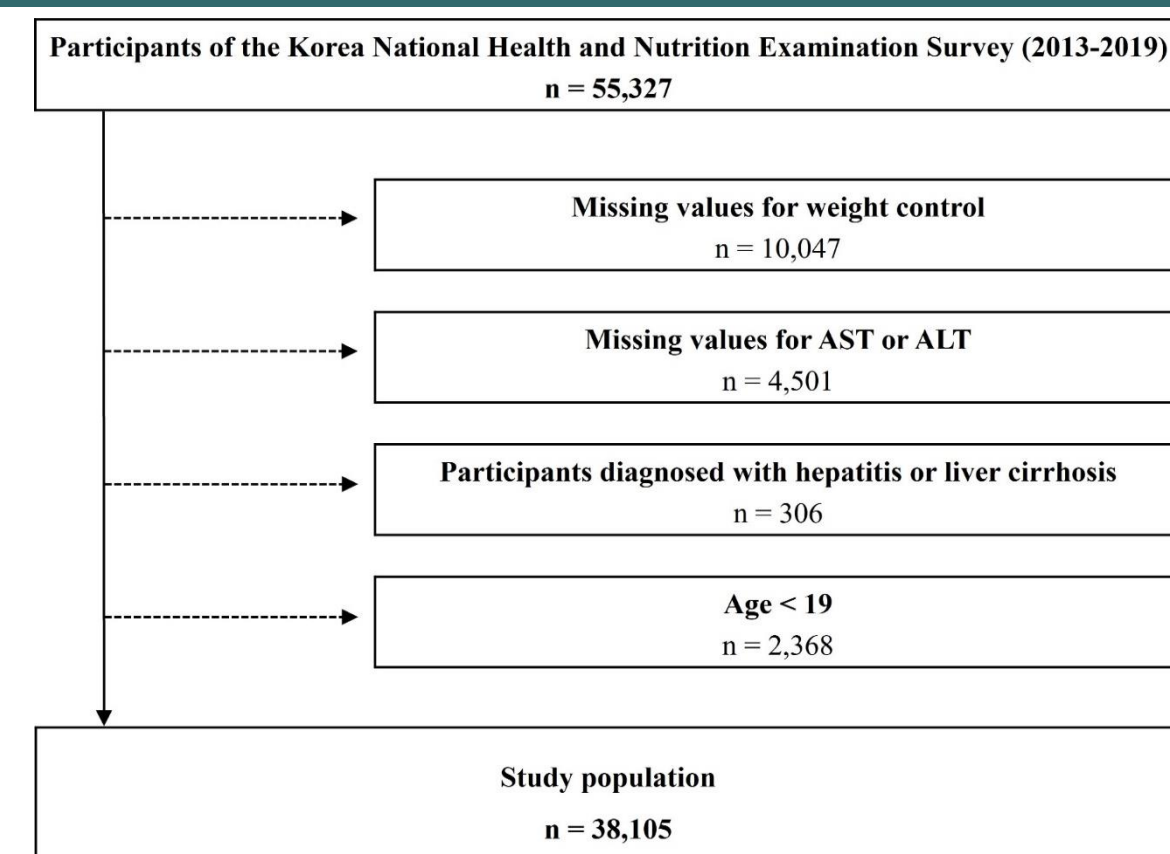
Participants underwent liver function testing and completed a questionnaire on their weight control. Age, sex, economic status, educational status, marital status, degree of stress recognition, body mass index (BMI), smoking status, alcohol consumption, engagement in medium-intensity physical activity, and participants' history of hypertension, hyperlipidemia, and diabetes were also evaluated.

Statistical Analysis

Data for continuous variables are presented as means ± standard deviation (SD), and data for categorical variables are presented as the number of cases with a weighted percentage. Analysis of variance and the chi-square test were used to examine differences between weight control methods. We analyzed associations between abnormal liver function and weight control methods using simple and multiple logistic regression models adjusting for confounding. All statistical analyses were performed with SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). A p-value < 0.05 was considered to indicate statistical significance.

Results

Study flow



Baseline characteristics for study subjects

		Weight control method		
		No control or gain weight	Try to lose or maintain	Weight loss agent
		15387	20055	2663
Age, mean ± SD		53.9±17.72	49.31±15.5	43.73±13.93
Sex, (%)		7713 (50.13)	8441 (42.09)	512 (19.23)
		7674 (49.87)	11614 (57.91)	2151 (80.77)
Household income level, (%)		3886 (25.38)	2896 (14.49)	227 (8.55)
		3967 (25.91)	4832 (24.17)	661 (24.91)
		3876 (25.32)	5673 (28.38)	844 (31.8)
		3581 (23.39)	6591 (32.97)	922 (34.74)
Economic activity, (%)		8653 (56.24)	11971 (59.69)	1664 (62.49)
		5996 (38.97)	7438 (37.09)	911 (34.21)
		738 (4.8)	646 (3.22)	88 (3.3)
Marital status, (%)		13021 (84.62)	16629 (82.92)	2114 (79.38)
		2364 (15.36)	3425 (17.08)	549 (20.62)
Education, (%)		5504 (37.61)	4586 (23.64)	365 (14.17)
		3701 (25.29)	5637 (29.06)	815 (31.65)
		5431 (37.11)	9177 (47.3)	1395 (54.17)
Degree of stress, (%)		738 (4.8)	781 (3.89)	207 (7.77)
		3254 (21.15)	4149 (20.69)	725 (27.22)
		8328 (54.12)	12003 (59.85)	1475 (55.39)
		3034 (19.72)	3106 (15.49)	254 (9.54)
		33 (0.21)	16 (0.08)	2 (0.08)
BMI, mean ± SD		22.93±3.4	24.49±3.33	25.12±4.4
Obesity, (%)		3630 (23.67)	8138 (40.63)	1187 (44.64)
		11703 (76.33)	11891 (59.37)	1472 (55.36)
Smoking status, (%)		8430 (54.79)	12608 (62.87)	1853 (69.58)
		3280 (21.32)	4334 (21.61)	441 (16.56)
		3650 (23.72)	3096 (15.44)	366 (13.74)
		27 (0.18)	17 (0.08)	3 (0.11)
Alcohol consumption, (%)		1782 (11.58)	2169 (10.82)	338 (12.69)
		8702 (56.55)	12913 (64.39)	1808 (67.89)
		4889 (31.77)	4966 (24.76)	516 (19.38)
		14 (0.09)	7 (0.03)	1 (0.04)
Medium intensity physical activity, (%)		999 (6.49)	1454 (7.25)	225 (8.45)
		11799 (76.68)	15257 (76.08)	2072 (77.81)
		2589 (16.83)	3344 (16.67)	366 (13.74)
Hypertension, (%)		3953 (25.69)	4504 (22.46)	377 (14.16)
		11255 (73.15)	15322 (76.4)	2255 (84.68)
		179 (1.16)	229 (1.14)	31 (1.16)
Hyperlipidemia, (%)		2457 (15.97)	3583 (17.87)	379 (14.23)
		12751 (82.87)	16243 (80.99)	2253 (84.6)
		179 (1.16)	229 (1.14)	31 (1.16)
Diabetes mellitus, (%)		1596 (10.37)	1692 (8.44)	143 (5.37)
		13611 (88.46)	18132 (90.41)	2489 (93.47)
		180 (1.17)	231 (1.15)	31 (1.16)

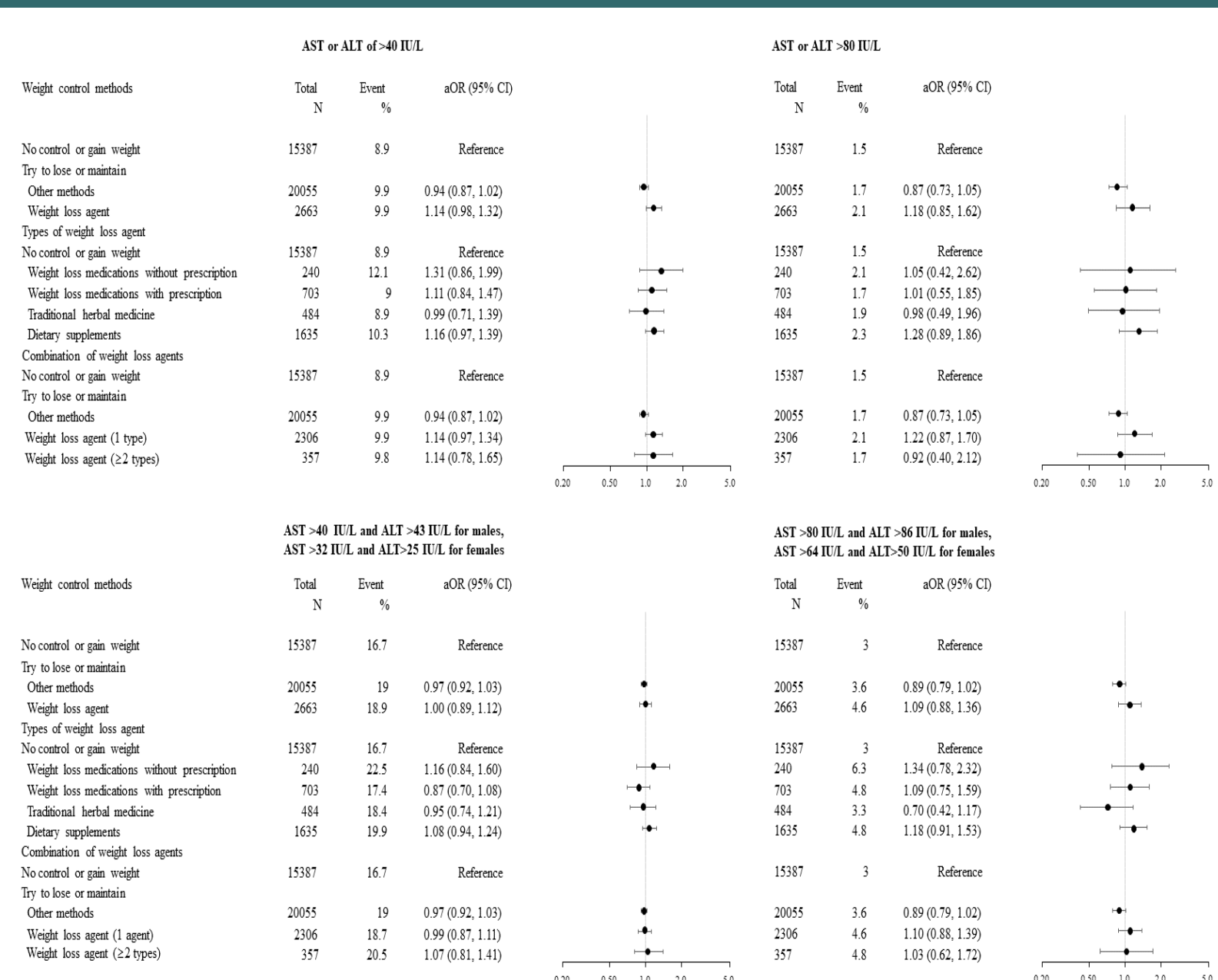
Abbreviations: KNHANES: Korean National Health and Nutrition Examination Survey, SD: standard deviation, BMI: body mass index.

Results

Associations between weight control method and abnormal liver function

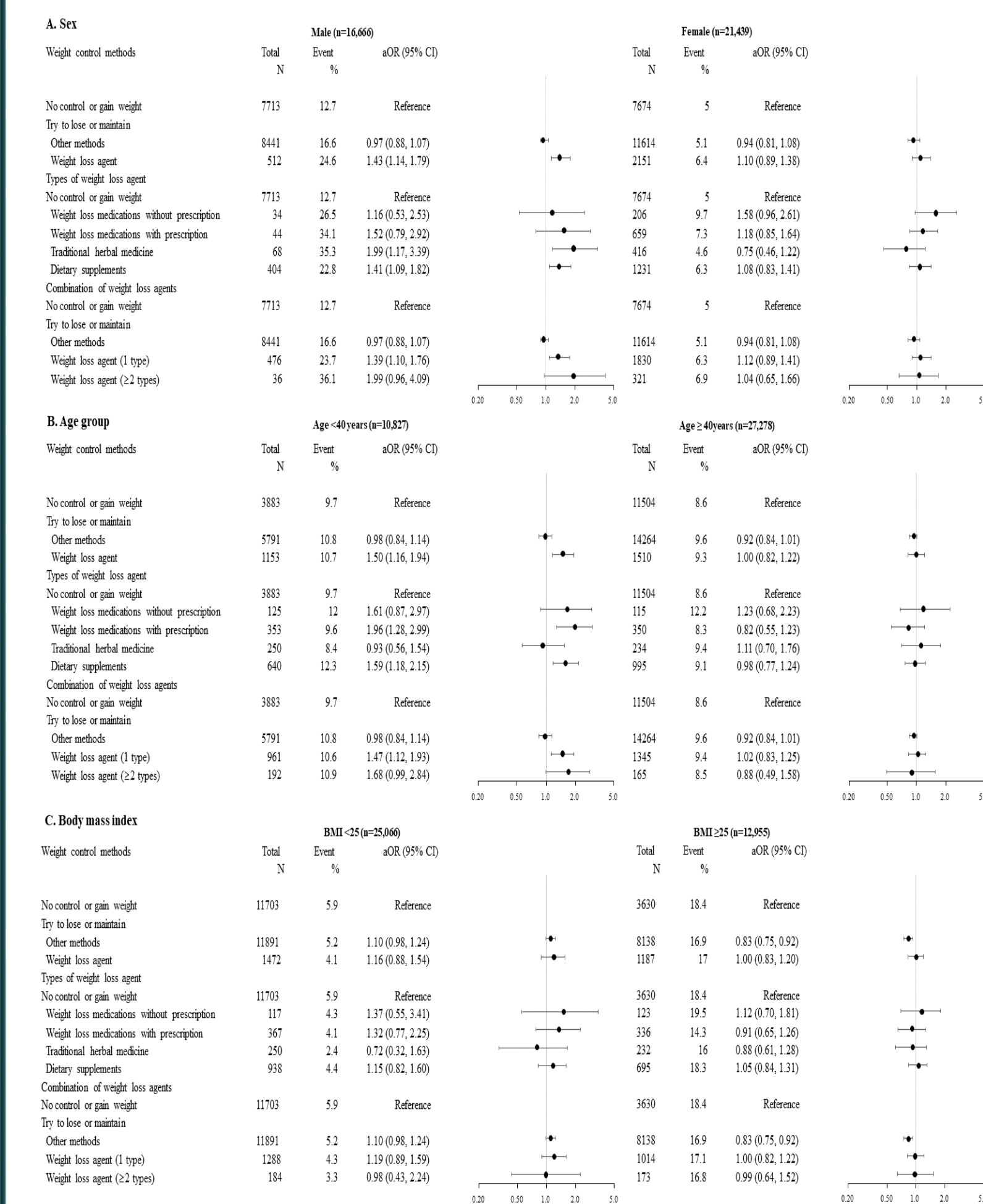
Type of weight control methods	Total	No. of events (%)	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Weight control attempts						
No control or gain weight	15387	1363 (8.86)	Reference		Reference	
Try to lose or maintain						
Other methods	20055	1991 (9.93)	1.13 (1.05, 1.22)	<0.001	0.94 (0.87, 1.02)	0.118
Weight loss agent	2663	264 (9.91)	1.13 (0.99, 1.30)	0.079	1.14 (0.98, 1.32)	0.096
Types of weight loss agents						
No control or gain weight	15387	1363 (8.86)	Reference		Reference	
Try to lose or maintain						
Weight loss medications without prescription	240	29 (12.08)	1.41 (0.96, 2.09)	0.083	1.31 (0.86, 1.99)	0.204
Weight loss medications with prescription	703	63 (8.96)	1.01 (0.78, 1.32)	0.925	1.11 (0.84, 1.47)	0.478
Traditional herbal medicine	484	43 (8.88)	1.00 (0.73, 1.38)	0.984	0.99 (0.71, 1.39)	0.963
Dietary supplements	1635	169 (10.34)	1.19 (1.00, 1.40)	0.047	1.16 (0.97, 1.39)	0.107
Combination of weight loss agents						
No control or gain weights	15387	1363 (8.86)	Reference		Reference	
Try to lose or maintain						
Other methods	20055	1991 (9.93)	1.13 (1.05, 1.22)	<0.001	0.94 (0.87, 1.02)	0.118
Weight loss agent (1 type)	2006	229 (9.93)	1.13 (0.98, 1.31)	0.093	1.14 (0.97, 1.34)	0.113
Weight loss agent (2 types)	357	59 (16.53)	1.99 (1.09, 3.57)	0.021	1.99 (1.09, 3.57)	0.021

Sensitivity analysis; several cut-offs of liver enzyme



Results

Stratified results; sex, age group and BMI



Conclusions

For the safe use of weight loss agents, members of the public and health care professionals should receive education to improve their awareness of the risk of abnormal liver function associated with weight loss agents.

The authors declare no conflict of interest.

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Data Availability The data used in this study are openly available from the Korea National Health and Nutritional Examination Survey webpage (URL: https://knhanes.kdca.go.kr/knhanes/sub03/sub03_02_05.do.)