Re: Body Mass Index and Risk of Malignant Lymphoma in Scandinavian Men and Women

Incidence and mortality from non-Hodgkin lymphoma (NHL) have increased over the last few decades in most developed countries. Having an overweight or obesity status, which have also increased in most populations, have been identified as a possible risk factor.

Direct associations between body mass index (BMI) and NHL have been reported in the American Cancer Society Cancer Prevention Study II *(1)* and other cohort and case–control studies *(2)*. The evidence is, however, still limited and controversial *(3,4)*. The largest study, a case–control investigation of malignant lymphoma from Denmark and Sweden *(5)* that included 3055 case patients with NHL, 618 case patients with Hodgkin lymphoma (HL), and 3187 population-based control subjects found no association between BMI and the risk of NHL or HL.

We have analyzed the combined data of two case–control studies conducted in Italy between 1985 and 2002. Briefly, these studies included 671 case patients with incident, histologically confirmed NHL (376 men and 295 women; median age = 58 years and range = 17–84 years) and 220 case patients of HL (124 men and 96 women; median age = 37 years and range = 14–77 years) admitted to reference hospitals in the province of Pordenone, the greater Milan area, and the town of Naples *(3,6,7)*. Control subjects were 1799 individuals (1132 men and 667 women; median age = 58 years and range = 17–85 years) admitted to the same hospitals for a wide range of acute, non-neoplastic diseases. Information on BMI was available on 633 NHL case patients, 210 HL case patients, and 1769 control subjects.

In both studies, trained interviewers administered a structured questionnaire to case patients and control subjects in a hospital setting. Study subjects were asked to report their height and weight 1 year before cancer diagnosis (for case patients) or interview (for control subjects). In a the multivariable analysis of quintiles of BMI, we found that NHL was not associated with BMI (compared with subjects in the first quintile of BMI [i.e., <22.3 kg/m^2], odds ratio [OR] for NHL for subsequent quintiles = 0.99 [95% confidence interval [CI] = 0.74 to 1.32], 0.67 [95% CI = 0.49 to 0.92], 0.77 [95% CI = 0.57 to 1.05], and 0.81 [95% CI = 0.60 to 1.10]) (Table 1). We also found that HL was not associated with BMI (compared with subjects in the first quintile of BMI [i.e., <22.3 kg/m^2], OR for HL = 0.90 [95% CI = 0.57 to 1.40], 0.86 [95% CI = 0.53 to 1.38], 0.55 [95% CI = 0.32 to 0.96], and 0.83 [95% CI = 0.49 to 1.39]). In a multivariable analysis using BMI categories as defined by the World Health Organization standards and healthy subjects as the referent category, we also found that NHL was not associated with BMI (OR = 0.70 [95% CI = 0.56 to 0.86] for overweight subjects and OR = 0.79 [95% CI = 0.58 to 1.07] for obese subjects) and that HL was also not associated with BMI (OR = 0.75 [95% CI = 0.52 to 1.08] and 0.71 [95% CI = 0.39 to 1.27]). The odds ratios for subjects in the highest tertile of BMI (i.e., ≥27.9 kg/m^2), compared with the lowest tertile (i.e., <24.5 kg/m^2), were 0.48 (95% CI = 0.24 to 0.97) for low-grade B-cell NHL (65 cases), 0.66 (95% CI = 0.38 to 1.15) for intermediate/high-grade B-cell NHL (104 cases), and 1.19 (95% CI = 0.28 to 5.07) for T-cell NHL (14 cases). When BMI at ages 30 years and 50 years [available only in the more recent study *(7)*] was considered, no excess risk was found for either NHL or HL.

The present data confirm that BMI is not a relevant risk factor for lymphomas. The slight inverse association between BMI and the risk of lymphomas in our study may result from some weight loss of case patients in the period before diagnosis. No relation was, however, found with BMI at ages 30 years and 50 years. Other potential biases of our study should be limited, given the almost complete response rate, the administration of a standard questionnaire under similar conditions, and the same catchment area for case patients and control subjects.

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Table 1. Distribution of 633 case patients with non-Hodgkin lymphoma (NHL), 210 case patients with Hodgkin lymphoma (HL), and 1769 control subjects, with corresponding odds ratios (ORs) and 95% confidence intervals (CIs), according to body mass index (BMI), Italy 1985–2002

Categories	Control subjects No. (%)	Case patients with NHL		Case patients with HL	
		No. (%)	OR* (95% CI)	No. (%)	OR* (95% CI)
BMI quintiles					
<22.3 kg/m^2	354 (20.0)	143 (22.6)	1 (referent)	70 (33.3)	1 (referent)
22.3 to <24.4 kg/m^2	360 (20.4)	145 (22.9)	0.99 (0.74 to 1.32)	48 (22.9)	0.90 (0.57 to 1.40)
24.4 to <26.1 kg/m^2	349 (19.7)	100 (15.8)	0.67 (0.49 to 0.92)	39 (18.6)	0.86 (0.53 to 1.38)
26.1 to <28.4 kg/m^2	350 (19.8)	117 (18.5)	0.77 (0.57 to 1.05)	23 (11.0)	0.55 (0.32 to 0.96)
≥28.4 kg/m^2	356 (20.1)	128 (20.2)	0.81 (0.60 to 1.10)	30 (14.3)	0.83 (0.49 to 1.39)
WHO BMI†					
Underweight (<18.5 kg/m^2)	41 (2.3)	12 (1.9)	0.84 (0.42 to 1.65)	11 (5.2)	1.74 (0.79 to 3.85)
Healthy (18.5 to <24.9 kg/m^2)	801 (45.3)	329 (52.0)	1 (referent)	124 (59.1)	1 (referent)
Overweight (25.0 to <29.9 kg/m^2)	706 (39.9)	213 (33.7)	0.70 (0.56 to 0.86)	59 (28.1)	0.75 (0.52 to 1.08)
Obese (≥30.0 kg/m^2)	221 (12.5)	79 (12.5)	0.79 (0.58 to 1.07)	16 (7.6)	0.71 (0.38 to 1.27)
BMI at age 30 y‡					
<22.7 kg/m^2	152 (34.2)	60 (34.7)	1 (referent)	8 (32.0)	1 (referent)
22.7 to <25.4 kg/m^2	143 (32.1)	52 (30.1)	1.09 (0.68 to 1.74)	17 (68.0)	1.01 (0.36 to 2.82)
≥25.4 kg/m^2	150 (33.7)	61 (35.3)	1.23 (0.78 to 1.94)		
BMI at age 50 y§					
<24.1 kg/m^2	121 (33.7)	38 (29.9)	1 (referent)	1 (20.1)	—‖
24.1 to <27.3 kg/m^2	119 (35.2)	48 (37.8)	0.99 (0.74 to 1.32)	1 (20.1)	—
≥27.3 kg/m^2	119 (33.2)	41 (32.3)	0.81 (0.60 to 1.10)	3 (60.0)	—

*Estimated from unconditional logistic regression adjusted for age, sex, study center, years of education, tobacco smoking, and area of residence.

†Categorized by World Health Organization (WHO) standards (Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. World Health Organization Technical Report Series, No. 854. Geneva; 1955. p. 1–452).

‡Results were based on 173 NHL case patients, 25 HL case patients, and 445 control subjects.

§Results were based on 127 NHL case patients and 359 control subjects.

‖Dashes = No odds ratio was given because of limited numbers of cases.

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Notes

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