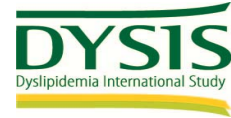


Do blood lipids correlate to Body Mass Index?

Findings from 52.916 statin treated patients. Results of the Dyslipidemia International Study

D. Lautsch¹, A.K.Gitt^{2,3}, J. Ferrieres⁴, M. Horack³, P. Brudi¹, B. Ambegaonkar¹ for the DYSIS-Study Group

¹Merck & Co. Inc., Kenilworth, NJ, USA; ²Herzzentrum Ludwigshafen, Germany; ³Institut für Herzinfarktforschung Ludwigshafen, Germany; ⁴Ranguell hospital, Toulouse, France



Introduction

It is unclear from existing literature whether LDL cholesterol (LDL-C) correlates to body mass index (BMI), while there is evidence of a common association between BMI, high density lipoprotein cholesterol (HDL-C) and triglycerides (TG).

Purpose:

In a representative, real world cohort of 52.916 statin treated patients (in whom the LDL-C was pharmacologically reduced) across the globe we evaluated the correlation between blood lipids and BMI.

Patients

Enrolment of Consecutive Patients on Statin Treatment



Methods

DYSIS was a cross-sectional, multicenter study in 30 countries around the world performed in primary care centers. Outpatients were ≥45 years of age, treated with statins for ≥3 months, and had at least one fasting blood lipid profile available within the last 6-12 months while on statins. Patients were consecutively enrolled. SAS 9.3 was used to calculate the non parametric Spearman rho correlation between BMI and LDL-C, HDL-C, and triglycerides, respectively. All variables were treated as continuous variables. Using Cochran-Armitage test we determined the trend wise differences between lipoprotein and TG levels per BMI category as defined by the world health organization (WHO). For this test only we split BMI into ordered categories.

Declaration of Interest

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Results

- BMI was distributed in DYSIS in the following way:
 - 1.1% of the patients were underweight (BMI<18.5 kg/m²), 33.1% had normal weight (BMI 18.5-24.9 kg/m²), 41.5% overweight (BMI 25.0-29.9 kg/m²), 17.1% suffered from class I obesity (BMI 30.0-34.9 kg/m²), 5.0% from class II obesity (BMI 35.0-39.9 kg/m²), and 2.1% from class III obesity (BMI ≥40.0 kg/m²).

- Statin were administered in all patients
 - Mean simvastatin equivalent dose was 33.5±25.1 mg per day
 - ezetimibe was administered in 6.6% of all patients.

- HDL-C values were significantly decreased per higher BMI category (p<0.0001).
- TG values significantly increased per BMI category (p<0.0001).
- No significant differences in LDL-cholesterol.

Spearman rho [Prob > |r| under H0: Rho=0]

- for LDL-C was 0.00283 (p=0.51), for HDL-C -0.14718 (p<.0001) and for TG 0.17001 (p<0.0001).

Key characteristics of patients included as to BMI categories - Medians or percentages (%), where indicated -

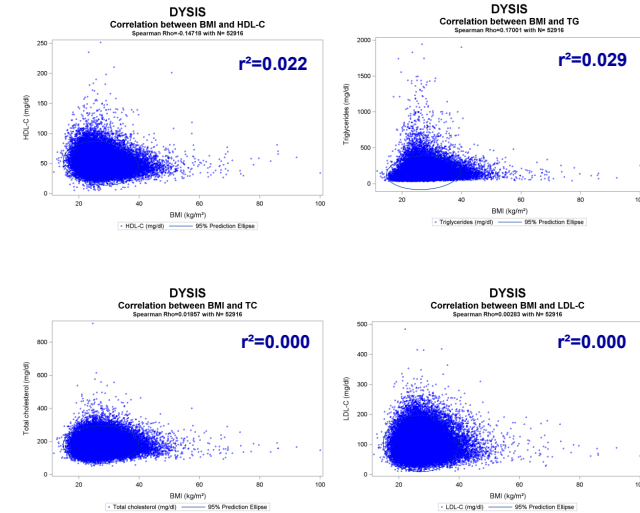
	Total	BMI <25	BMI 25-30	BMI 30-35	BMI ≥ 35	p-value
Number of patients	52916 (100.0 %)	18088 (34.2 %)	21976 (41.5 %)	9062 (17.1 %)	3790 (7.2 %)	
Age (years)	65.39 ± 10.18	66.94 ± 10.49	65.11 ± 10.04	64.19 ± 9.72	62.50 ± 9.31	<.0001
Female	45.0 % (23771/52792)	49.6 % (8961/18068)	40.5 % (8869/21915)	42.8 % (3863/9031)	55.0 % (2078/3778)	0.0071
BMI (kg/m ²)	26.53 (24.00, 29.76)	23.03 (21.60, 24.06)	27.06 (25.96, 28.34)	31.74 (30.80, 33.09)	37.74 (36.14, 40.75)	<.0001
LDL-C (mg/dl)	98.00 (76.00, 125.00)	97.06 (75.41, 124.13)	99.38 (77.34, 126.06)	98.00 (76.95, 125.00)	93.58 (72.70, 121.42)	0.5616
HDL-C (mg/dl)	47.95 (39.83, 58.00)	50.27 (41.76, 60.71)	47.56 (39.83, 57.23)	45.63 (38.67, 54.91)	45.00 (38.00, 54.14)	<.0001
Triglycerides (mg/dl)	130.20 (93.89, 182.46)	117.00 (84.15, 166.52)	132.86 (95.66, 185.00)	144.69 (104.52, 198.00)	149.69 (109.00, 200.00)	<.0001
Total cholesterol (mg/dl)	176.00 (147.72, 208.82)	174.79 (145.40, 207.66)	177.11 (148.88, 208.82)	177.88 (150.81, 209.00)	173.00 (146.95, 205.00)	<.0001
Fasting plasma glucose (mg/dl)	103.00 (91.88, 125.00)	98.00 (88.27, 113.49)	102.68 (91.90, 122.50)	109.89 (95.48, 137.00)	115.29 (98.00, 145.00)	<.0001
SBP (mmHg)*	132.84 ± 15.76	130.23 ± 15.79	133.13 ± 15.27	135.77 ± 15.74	136.65 ± 16.34	<.0001
DBP (mmHg)*	78.60 ± 9.68	76.87 ± 9.38	78.92 ± 9.44	80.35 ± 10.05	80.79 ± 10.17	<.0001
BP <140/90 mmHg (sys/dia)	62.2 % (32744/52623)	69.3 % (12488/18030)	61.6 % (13467/21856)	54.1 % (4863/8982)	51.3 % (1926/3755)	<.0001
Hypertension	72.6 % (38419/52892)	63.5 % (11483/18082)	73.2 % (16075/21969)	83.3 % (7543/9052)	87.6 % (3318/3789)	<.0001
Diabetes mellitus	37.9 % (20056/52855)	29.5 % (5339/18079)	35.7 % (7836/21957)	50.3 % (4549/9038)	61.7 % (2332/3781)	<.0001
Ischemic heart disease	40.7 % (21547/52900)	39.4 % (7118/18087)	41.5 % (9110/21970)	43.4 % (3925/9054)	36.8 % (1394/3789)	0.0632
Cerebrovascular disease	13.0 % (6862/52704)	15.5 % (2795/18049)	12.8 % (2791/21890)	10.9 % (981/9000)	7.8 % (295/3765)	<.0001
Heart failure	8.2 % (4331/52895)	5.8 % (1056/18086)	7.8 % (1707/21966)	11.3 % (1024/9053)	14.4 % (544/3790)	<.0001
Peripheral artery disease	5.7 % (3018/52694)	3.9 % (703/18046)	6.1 % (1331/21886)	7.9 % (713/8997)	7.2 % (271/3765)	<.0001

* mean±SD

p-values: Cochran-Armitage test or Jonckheere-Terpstra test

BMI, body mass index; LDL-C, low density lipoprotein cholesterol; HDL-C, high density lipoprotein cholesterol; SBP, sitting systolic blood pressure; DBP, sitting diastolic blood pressure; BP, blood pressure

Correlations between blood lipoproteins and triglycerides to BMI - Scatter plots & prediction ellipses -



BMI, body mass index; HDL-C, high density lipoprotein cholesterol; LDL-C, low density lipoprotein cholesterol; TC, total cholesterol; TG, triglycerides

Conclusion

- We found a significant correlation between BMI and HDL-C and triglycerides, respectively. This influence ranges around 2-3%.
- As expected there was no significant correlation or influence between BMI and LDL-C.
- These findings are important as they confirm that there is little influence of BMI on blood lipids. Hence diagnosis and screening for altered blood lipids should not be based on a patient's BMI or body weight.

Our finding was identified in a representative cohort of >50.000 statin treated patients from North America, Europe, the Middle East, Africa and China.