Research article

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Lipid markers, gender and cardiovascular disease; Highlights from the ATTICA prospective epidemiological study (2002-2012)

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ABSTRACT

Aim: The sex-specific effect of lipid-related biomarkers on 10-year first fatal/non fatal cardiovascular disease (CVD) incidence was evaluated. **Material and Methods:** ATTICA study was conducted during 2001-2012. *N*=1,514 men and *n*=1,528 women (>18 years) from greater Athens area, Greece were recruited. Follow-up (2011-2012) was achieved in *n*=2,020 participants.Baseline lipid profile was measured. In particular, total cholesterol (TC), high density lipoprotein cholesterol (HDL-C) and triglycerides (TGL), apolipoprotein B100 and A1 (ApoB100 and ApoA1) were measured. Low density lipoprotein cholesterol (LDL-C) was assessed through the Friedewald formula. **Results:** Overall CVD event was 15.5% (*n*=317) (19.7% in men and 11.7% in women, *p<0.001*). HDL-C and TGL were independently associated with CVD in women; per 10mg/dL HDL-C increase, Hazard Ratio (HR)=0.73,95% Confidence Interval (95%CI)(0.53, 1.00) and per 10mg/dLTGL increase, HR=1.10,95%CI(1.00, 1.21). ApoA1 (per 10mg/dL increase, HR=0.90,95%CI(0.81, 0.99)) was inversely associated with CVD in women while a positive association with apoB100 was observed only in men (per 10mg/dL increase, HR=1.10,95%CI(1.00, 1.21)). **Conclusions:** Beyond the common cholesterol-adjusted risk scores, reclassifying total CVD risk according to other lipid markers may contribute to early CVD prevention.

KEY WORDS: *Heart disease, sex, woman, lipoproteins, apoliproteins, primary prevention*

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INTRODUCTION

Cardiovascular disease (CVD) is responsible for >4 million deaths in Europe each year killing more women (i.e. 2.2 million) than men (i.e. 1.8 million).[1] In addition to

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this,within the last year a transformation in women's risk-factor profile towards unhealthy lifestyle habits and obesity has been observed followed by an acceleration in coronary heart disease and acute myocardial infarction incidence, even in younger –pre-menopause– life stages.[2] Despite this epidemiological evidence as well as the increasing evidence that predictive risk factors differ between sexes, the vast majority of the obtained knowledge on prevention and risk prediction in CVD spectrum is still based on studies conducted predominately in men.[3]

Dyslipidemia remains a well-established CVD risk factor.[4] Numerous cohorts, Mendelian randomization studies, and randomized clinical trials have consistently demonstrated a log-linear relationship between the absolute changes in plasma LDL-C and CVD risk, providing compelling evidence for a causal relation.[5] On the other side, the inverse association between plasma high density lipoprotein cholesterol (HDL-C) and risk for atherosclerotic CVDstands among the most reproducible associations in observational epidemiology yet with weaker evidence regarding its added value as a therapeutic target.[6,7] In this regard, a sex-related heterogeneity has been previously suggested with total cholesterol (TC) and low density lipoprotein cholesterol (LDL-C) being stronger CVD predictors in case of men[8-10] and HDL-C in case of women.[11,12] What is more, traditional risk markers explain only a proportion of total CVD risk. To this issue, beyond the strong documentation and commentary on these conventional lipid biomarkers, their apo-lipoproteins (apolipoproteins A1 (ApoA1) and apolipoproteins B100 (ApoB100)) are lastly investigated as potentially strong independent CVD predictors. Nevertheless, no robust conclusions exist while their clinical use is often overlooked.[4] On the other hand, the hitherto literature lacks in the aforementioned need for a sex-specific orientation.[13,14]

Thereby, the aim of the present work was to evaluate the effect ofconventional lipid-related markers (TC, LDL-C, HDL-C, triglycerides (TGL)) as well as their apolipoproteins on 10-year first fatal/non fatal CVD incidence,in apparently healthy men and women using the sample of ATTICA study.[15]

METHODS

Study sample

The ATTICA study is a prospective, observational cohort investigation which was initiated in 2001.[15] At baseline (2001-2002), *n*=3,042 apparently healthy volunteers residing in the greater metropolitan Athens area, Greece, agreed to participate (75% participation rate). Of the enrolled participants, *n*=1,514 (49.8%) were men (46±13 years) and *n*=1,528 (50.2%) were women (45±14 years). During baseline examination, a detailed clinical evaluation was performed by trained physicians; all participants were free of CVD and other chronic diseases, according to the study protocol. For the scope of the present work, we initially used the *n*=2,020 participants with complete CVD evaluation in the follow-up assessment.

Bioethics

The ATTICA study was approved by the Bioethics Committee of Athens Medical School. The study was carried out in accordance with the Declaration of Helsinki (1989) of the World Medical Association. All participants were informed about the study aims and procedures and provided written informed consent.

Lipid-related markers measurements at baseline examination

Blood samples were collected from an antecubital vein, between 8 to 10 a.m., in a sitting position after 12h fasting and alcohol avoidance. Serum for blood lipid measurements was prepared immediately after collection. The biochemical evaluation was carried out in a laboratory that followed the criteria of the World Health Organization Lipid Reference Laboratories. Serum total cholesterol, HDL-C and triglycerides were measured using chromatographic enzymic method using a Technicon automatic analyzer RA-1000 (Dade Behring, Marburg, Germany). HDL-C was determined after precipitation of the ApoB-containing lipoproteins with dextran-magnesium-chloride. LDL-C (mg/dL) was calculated using the Friedewald formula: (TC) – (HDL-C) – 1/5*(TGL) (only for participants with TGL<400 mg/dL). ApoB100 and apoA1 were measured by rate immunonephelometry. An internal quality control was in place for assessing the validity of TC, TGL and HDL-C methods. The intra and inter-assay coefficients of variation of cholesterol levels did not exceed 9%, triglycerides 4% and HDL-C 4%. Cut-off values of LDL-C, TGL and TC were defined according to the most updated guidelines for dylipidaemias.[4] In case of HDL-C the sex-specific cut-off values suggested in NCEP ATP III (revised) criteria for metabolic syndrome were used.

Other baseline measurements

Baseline assessment regarding sociodemographic and lifestyle factors included among others age, sex, body mass index, level of adherence to Mediterranean diet, physical activity level and smoking habits. Height was measured to the nearest 0.5 cm and weight to the nearest 100 g. Body mass index was calculated as weight (in kg) divided by squared height (in m^2). Level of adherence

to Mediterranean diet was evaluated through the MedDietScore (range 0-55). Current smokers were defined as those who smoked at least one cigarette per day. Physical activity level was recorded through a translated, validated, version of International Physical Activity Questionnaire.

Further details regarding the methods and measurements applied have been previously described.[15]

Endpoint and follow-up evaluation

During 2011-12, the ATTICA Study's investigators performed the 10-year follow-up (median follow-up time 8.41 years). In order to participate in the follow-up all participants were initially appointed through telephone calls. Afterwards, the investigators of the ATTICA study (physicians, nurses, nutritionists) approached the participants and performed a detailed evaluation of their medical records. For the participants who died during the follow-up (i.e. *n*=99), the information achieved from their relatives, as well as death certificates. The combined endpoint studied in this work was the development of a fatal or non-fatal CVD event. A CVD event was defined as the development of: acute myocardial infarction, or unstable angina, or other identified forms of ischemia (WHO-ICD coding 410-414.9, 427.2, 427.6), or heart failure of different types and chronic arrhythmias (WHO-ICD coding 400.0-404.9, 427.0 -427.5, 427.9-) or stroke (WHO-ICD coding 430-438).

Statistical analysis

Categorical variables are presented as absolute (*n*) and relative frequencies (%). Continuous variables are presented as mean values ± standard deviation or median (Interquartile Range) if normality was not met. Associations between normally distributed variables and sex were evaluated through Student's t-test for independent samples. Whether these variables were normally distributed was tested through P-P plot and equality of variances through Levene's test. For non-normally distributed variables, the Mann-Whitney test was used. Associations between categorical variables and sex were tested with the chi-squared test. Hazard Ratios (HR) and their corresponding 95% Confidence Intervals (95%CI) for lipid-related markers in relation to 10-year CVD event were evaluated through multivariable Cox-regression analysis in the total sample, as well as in subgroups. Proportional hazards' assumption was graphically tested. The STATA software, version 14 (MP & Associates, Sparta, Greece) was used for all statistical analyses. Two sided level of significance was set at $p<0.05$.

RESULTS

Median survival time was 9.7 years in men and 9.8 years in women (p=0.55). The 10-year fatal/non fatal CVD event rate in the ATTICA study participants was 15.7% (n=317) [19.7% (n=198) in men and 11.7% (n=119) in women, $p<0.001$]. Median survival time was 9.7 years in men and 9.8 years in women ($p=0.55$).Baseline sociodemographic and clinical characteristics of participants as well as their metrics for lipid-related markersseparately for men and women are summarized in Table 1.

Findings from nested Cox regression models that evaluated the association between lipid markers (i.e. TC, LDL-C, HDL-C and TGL)and CVD incidence in free-of-CVD men and women of ATTICA study are presented in *Table 2*. In the unadjusted models, a positive association was observed between all lipid-related factors and CVD in both men and women (all *p-values<0.05*). However, in the age-adjusted models several sex-specific associations were revealed. In particular, TC lost its independent aggravating effect in both men and women. In case of men only HDL-C in terms of continuous variable was inversely associated with CVD onset; per 10mg/dL HDL-C increase was associated with 20% lower CVD risk within the decade. However, when adjusting for other clinical and lifestyle factors this association remained yet without reaching the level of significance. As for women, the age-adjusted models revealed significant associations only in case of HDL-C and TGL. This was retained even in multi-adjusted models. In specific, per 10mg/dL increase in HDL-C 10% lower CVD risk was observed while women with HDL-C>45mg/dL had about 27% lower risk to develop CVD within the decade, Similarly, per 10mg/dL raise in TGL, 10% lower CVD risk was revealed with the risk for CVD onset being about 31% higher in women with TGL>150mg/dL, in the multi-adjusted model (Table 2).

The association between apolipoproteins and 10-year CVD incidence was as well evaluated in free-of-CVD men and women of ATTICA study through nested Cox regression analysis and results are summarized in *Table 3*. It was revealed that in case of women apo-lipoproteins A1 (ApoA1) was independently associated with 10-year CVD onset; particularly, per 10mg/dL increase in ApoA1 the risk to develop CVD was 19% lower. In case of men, besides the significant trends observed principally for apo-lipoprotein B100 (ApoB100) indicating an independent aggravating effect in age-adjusted models this was not the case after taking into account potential confounders (Table 3).

DISCUSSION

To the best of our knowledge, the sex-specific effect of lipid-related markers, conventional and novel, on long-term CVD onset has been inadequately investigated. This work stands among the very few in the Mediterranean region that suggested different predictive ability among

TABLE 1. Baseline sociodemographic, clinical, biochemical and lifestyle factors of men and women from ATTICA study, according to 10-year cardiovascular disease incidence (n=2,020)

Men	With10-year CVD event	Without10-yearCVD event	p-value
N	198	808	
Age, years	56 (13)	43 (12)	<0.001
Body mass index, kg/m2	28.3 (4.0)	27.1 (3.9)	0.001
Body fat mass index, kg/m2	8.5 (2.2)	7.6 (2.3)	<0.001
Body lean mass index, kg/m2	19.1 (2.1)	18.9 (2.1)	<0.001
Waistcircumference, cm	101.5 (11.3)	97.0 (12.9)	<0.001
Currentsmoking, %	28	38	<0.001
History of hypertension, %	51	36	<0.001
History of diabetesmellitus, %	22	5	<0.001
History of hypercholesterolemia, %	58	44	<0.001
TC, mg/dL	206 (43)	195 (42)	0.001
LDL-C, mg/dL	135 (42)	125 (37)	0.01
HDL-C, mg/dL	44 (13)	41 (10)	0.01
TGL, mg/dL	182 (63)	133 (86)	<0.001
non-HDL-C, mg/dL	164 (44)	151 (43)	<0.001
TC/HDL-C	5.22 (1.81)	4.70 (1.52)	0.001
non-HDL-C/HDL-C	4.22 (1.81)	3.70 (1.52)	0.001
ApoA1, mg/dL	144 (23)	147 (25)	0.13
ApoB100, mg/dL	124 (27)	112 (29)	<0.001
Family history of cardiovascular disease, %	29	26	<0.001
Women	**With 10-year CVD event**	**Without10-year CVD event**	**p-value**
N	119	895	
Age, years	59 (12)	42 (13)	<0.001
Body mass index, kg/m2	27.3 (5.1)	24.9 (4.7)	<0.001
Body fat mass index, kg/m2	11.4 (3.4)	9.4 (3.1)	<0.001
Body lean mass index, kg/m2	14.9 (1.5)	15.5 (1.7)	0.14
Waistcircumference, cm	89.7 (14.1)	82.4 (13.3)	<0.001
Currentsmoking, %	39	45	<0.001
History of hypertension, %	49	20	<0.001
History of diabetesmellitus, %	19	3	<0.001
History of hypercholesterolemia, %	55	36	<0.001
TC, mg/dL	208 (41)	189 (40)	<0.001
LDL-C, mg/dL	131 (36)	117 (36)	0.08
HDL-C, mg/dL	45 (12)	53 (14)	0.006
TGL, mg/dL	126 (66)	94 (54)	<0.001
non-HDL-C, mg/dL	156 (40)	135 (41)	<0.001
TC/HDL-C	4.47 (2.05)	3.75 (1.25)	0.001
non-HDL-C/HDL-C	3.47 (2.05)	2.75 (1.25)	0.001
ApoA1, mg/dL	158 (23)	163 (26)	0.03
ApoB100, mg/dL	108 (29)	101 (49)	0.08
Family history of cardiovascular disease, %	37	29	<0.001

Data are presented as mean ± standard deviation (SD) or median (Interquartile Range) if normality was not met. P-values were obtained using Student's t-test for independent samples for the normally distributed variables (age, body mass index), Mann-Whitney test for the rest quantitative variables and chi-squared test for categorical variables. Abbreviations:apolipoprotein A1 (ApoA1); apolipoprotein B100 (ApoB100); high density lipoprotein cholesterol (HDL-C); low density lipoprotein cholesterol (LDL-C); total cholesterol (TC); triglycerides (TGL)

TABLE 2. Cox regression analysis to evaluate the association between conventional lipid markers and 10-year first fatal/non fatal cardiovascular disease incidence in apparently healthy men and women (*n*=2020)

Men (*n*=1,006/*n*=198 CVD cases)			
	Unadjusted (crude) model	**Age-adjusted model**	**Fully adjusted model**
Model for TC			
TC, per 10mg/dL increase	1.10 (1.00, 1.21)	1.00 (0.90, 1.10)	1.00 (0.90, 1.10)
TC (>200 vs. ≤200mg/dL))	1.75 (1.28, 2.40)	1.24 (0.87, 1.75)	1.21 (0.85, 1.73)
Model for LDL			
LDL, per 10mg/dL increase	1.00 (0.90, 1.10)	1.00 (0.90, 1.10)	1.00 (0.90, 1.10)
LDL status (>100 vs. ≤100mg/dL)	1.57 (1.00, 2.50)	0.90 (0.54, 1.52)	1.10 (0.57, 2.13)
Model for HDL			
HDL, per 10mg/dL increase	0.81 (0.66, 0.90)	0.81 (0.66, 0.90)	0.81 (0.66, 1.21)
HDL status (<55 vs. ≥55mg/dL)	1.42 (0.91, 2.21)	1.44 (0.87, 2.46)	1.36 (0.81, 2.31)
Model for TGL			
TGL, per 10mg/dL increase	1.10 (1.00, 1.21)	1.00 (0.90, 1.10)	1.00 (0.90, 1.10)
TGL status (>150 vs. ≤150mg/dL)	2.29 (1.39, 3.77)	1.10 (0.63, 1.92)	1.60 (0.24, 1.49)
Women (*n*=1,014/*n*=119 CVD cases)			
	Unadjusted (crude) model	**Age-adjusted model**	**Multi-adjusted model**
Model for TC			
TC, per 10mg/dL increase	1.10 (1.00, 1.21)	1.00 (0.90, 1.10)	1.00 (0.90, 1.10)
TC (>200 vs. ≤200mg/dL))	2.19 (1.49, 3.23)	0.96 (0.42, 1.69)	0.91 (0.58, 1.43)
Model for LDL			
LDL, per 10mg/dL increase	1.10 (1.00, 1.21)	1.00 (0.90, 1.10)	1.00 (0.90, 1.10)
LDL status (>100 vs. ≤100mg/dL)	2.66 (1.50, 4.72)	1.19 (0.63, 2.25)	2.10 (0.72, 2.57)
Model for HDL			
HDL, per 10mg/dL increase	0.73 (0.66, 0.90)	0.73 (0.66, 0.90)	0,73 (0.53, 1.00)
HDL status (<45 vs. ≥45mg/dL)	1.53 (1.07, 2.17)	1.65 (1.12, 2.43)	1.44 (1.17, 2.14)
Model for TGL			
TGL, per 10mg/dL increase	1.10 (1.00, 1.21)	1.10 (1.00, 1.21)	1.10 (1.00, 1.21)
TGL status (>150 vs. ≤150mg/dL)	2.14 (1.52, 3.03)	1.60 (1.09, 2.34)	1.31 (1.01, 2.12)

HRs and their corresponding 95%CIs were obtained through Cox regression analysis. Multi-adjusted model was adjusted for age, body mass index, current smoking, MedDietScore, hypertension, diabetes mellitus, family history of cardiovascular disease. **Bold** indicates statistical significant outcomes (*p-value<0.05*)

Abbreviations: CVD: cardiovascular disease, HR: hazard ratio, HDL-C: high density lipoprotein cholesterol, LDL-C: low density lipoprotein cholesterol, TC: total cholesterol, TGL: triglycerides, 95%CI: 95% Confidence Interval

various lipid markers and their apolipoproteins specifying the outcomes to men and women. Despite the potential limitations of the present study, the results presented here may confer to better understanding the role of lipid-related markers on CVD risk stratification, even more from the standpoint of a sex-specific approach highly suggested in primary health care spectrum.

Dyslipidemia stands among the most important predictors of CVD. In this context, LDL-C reduction remains the primary therapeutic target in CVD with preventive and prognostic potentials. Taking into account the updates on CVD prevention and dyslipidemia management guidelines from the European Society of Cardiology, the concept "less is more" regarding LDL-C values is strongly supported.[4] Besides the high recognition of this lipid marker in therapeutic regimens to accurately prevent major cardiac episodes or achieve a better prognosis, its efficiency in the context of CVD risk prediction is still

TABLE 3. Cox regression analysis to evaluate the association between **apo-lipoproteins** and 10-year first fatal/non fatal cardiovascular disease incidence in apparently healthy men and women (*n*=2020)

Men (*n*=1,006/*n*=198 CVD cases)			
	Unadjusted (crude) model	**Age-adjusted model**	**Multi-adjusted model**
Model for ApoB100			
ApoB100, per 10mg/dL increase	1.21 (1.10, 1.34)	1.10 (1.00, 1.21)	1.10 (1.00, 1.21)
Model for ApoA1			
ApoA1, per 10mg/dL increase	0.81 (0.66, 0.90)	0.81 (0.66, 0.90)	0.81 (0.66, 1.21)
Model for ApoB100/ApoA1			
ApoB100/ApoA1, per 1 unit increase	1.63 (1.03, 2.57)	1.18 (0.73, 1.89)	0.93 (0.56, 1.54)
Women (*n*=1,014/*n*=119 CVD cases)			
	Unadjusted (crude) model	**Age-adjusted model**	**Multi-adjusted model**
Model for ApoB100			
ApoB100, per 10mg/dL increase	1.10 (1.00, 1.21)	1.00 (0.90, 1.10)	1.00 (0.90, 1.10)
Model for ApoA1			
ApoA1, per 10mg/dL increase	0.81 (0.66, 0.90)	0.90 (0.81, 0.99)	0.90 (0.81, 0.99)
Model for ApoB100/ApoA1			
ApoB100/ApoA1, per 1 unit increase	1.40 (0.89, 2.22)	0.83 (0.34, 2.00)	0.69 (0.25, 1.88)

HRs and their corresponding 95%CIs were obtained through Cox regression analysis. Multi-adjusted model was adjusted for age, body mass index, current smoking, MedDietScore, hypertension, diabetes mellitus, family history of cardiovascular disease. **Bold** indicates statistical significant outcomes (*p-value<0.05*).
Abbreviations: ApoA1: apolipoprotein A1, ApoB100: apolipoprotein B100, CVD: cardiovascular disease, HR: hazard ratio, 95%CI: 95% Confidence Interval

questioned. For instance, people with obesity or metabolic syndrome are assigned in high or even very high CVD risk category, even if their lipid profile is beyond the typical one e.g., high LDL-C.[16] Indeed, such people are principally characterized by low HDL-C values, elevated levels of TGL and a high content of small dense pro-atherogenic ApoB100 particles.[16] It is therefore possible that people with a high content of elevated small dense lipoprotein particles have near normal LDL-C values due to the discordance between the ApoB100 particle number and their cholesterol content. These people will have an underestimated risk prediction score. Hence, the high residual risk for CVD as well as the different phenotypes exist,have driven lipid research towards novel surrogate lipid markers such as ApoB100, ApoA1, non-HDL-C, small dense LDL-C particles, Lp(a)etc.

To the best of our knowledge, this work stands among the very few that examined the role of lipid biomarkers against hard CVD-related endpoints, specifying the outcomes for men and women. Focusing on the traditional lipid markers, what we revealed was that LDL-C was an important CVD predictor only in men yet in case of women HDL-C seemed to contribute more to the overall CVD risk. Men have higher LDL-C levels compared with the age-matched women, till the menopause stage; since then a steep LDL-C raise occurs, predisposing women to a CVD-risk escalation.[20] On the other side, HDL-C and triglycerides have been suggested as stronger lipid indicators in case of women which comes in line with findings arisen here. More specifically, HDL-C addition in SCORE risk stratification led to a modest improvement in its predictive ability for women.[21] In Women's Health Study, the inverse association between HDL-C and primary CVD incidence was retained across all LDL-C levels, with the exception of women with low total atherogenic particle burden.[20] As for triglycerides, in a relevantmeta-analysis, a stronger association of fasting triglycerides with CVD mortality in women was revealed.[22]

Among the primary purposes of the present work was to evaluate the sex-specific effect of apolipoproteins against hard CVD endpoints.In the INTERHEART study, dyslipidemia, defined as (ApoB100)/(ApoA1) ratio possessed the highest population-attributed risk in both sexes.[23] Here, we saw that ApoB100 was a stronger CVD predictor for men yet ApoA1 for women. However, apolipoproteins seem to have the lowest discriminative ability against CVD in both men and women which comes in line a meta-analysis of cohort studies implemented by the Emerging Risk Factors Collaboration.[6]

Strengths and limitations

Several limitations should be presented for better interpretation of the observed outcomes. Specifically, only baseline measurements were taken into account for our research hypothesis; hence misclassifications of transitions cannot be precluded due to the extended interim periods between follow-up assessments. Additionally, the ATTICA study participants presented a generally mild dyslipidemic profile at baseline along with relatively small variability of the lipid levels among individuals; this may contribute to –unexpectedly– non-significant trends in case of biomarkers such as TC and LDL-C; these characteristics of ATTICA study sample may modest the strength of the observed associations between lipid indices and 10-year CVD risk.

The aforementioned limitations are compensated for the fact that this is one of the very few works that evaluated the sex-based effect of lipid-related markers and apolipoproteins on 10-year CVD onset; to the best of our knowledge the evidence-based data regarding this issue are inadequate.

Conclusions

While ever increasing efforts have sought to elucidate the lipid-related biomarkers that contribute more or less to the CVD risk in the primary prevention, recommendations remain to be guided with appropriate conclusive evidence, mostly from a sex-oriented approach.[23] The findings presented here partially address the literature gaps in the following key areas. Firstly, much as LDL-C is the key therapeutic target to achieve a healthier vascular system, its contribution to early CVD risk prediction seems to be questioned; here, high LDL-C levels were independently associated with increased CVD only in men. Secondly, HDL-C accompanied by or not with triglycerides seemed to contribute more to women's CVD risk compared with other conventional lipid markers. Lastly, alternative lipid-related markers, predominately non-HDL-C particles, seemed to have an independent aggravating effect on long-term CVD principally in women. In this regard, beyond the commonly used TC-adjusted risk scores in primary prevention spectrum, more prospective studies are demanded to investigate the incremental value of reclassifying total CVD risk according to the most updated dyslipidaemia-related evidence. Sex differences should be an indispensable part of this process.

Conflict of interest

None to declare

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ΠΕΡΙΛΗΨΗ

Λιπιδαιμικό προφίλ, φύλο και καρδιαγγειακή νόσος: αποτελέσματα από την επιδημιολογική προοπτική μελέτη ΑΤΤΙΚΗ (2002-2012)

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Σκοπός: Η επίδραση των επιπέδων παραμέτρων του λιπιδαιμικού προφίλ στον 10ετή κίνδυνο εμφάνισης καρδιαγγειακής νόσου σε υγιείς άντρες και γυναίκες. **Υλικό και μέθοδοι:** Κατά την περίοδο 2001-02 εντάχθηκαν στη μελέτη 1,514 άντρες και 1,528 γυναίκες (>18 ετών) ελεύθεροι καρδιαγγειακής νόσου, από το Νομό Αττικής. Το 2011-12 πραγματοποιήθηκε ο 10ετής επανέλεγχος σε 2,020 συμμετέχοντες (ν=317 περιπτώσεις καρδιαγγειακής νόσου). Κατά την έναρξη της μελέτης μετρήθηκαν δείκτες του λιπιδαιμικού προφίλ των

συμμετεχόντων και συγκεκριμένα: ολική χοληστερόλη (TC), η λιποπρωτεΐνη υψηλής πυκνότητας σε χοληστερόλη (HDL-C), τα τριγλυκερίδια (TGL), η απολιποπρωτεΐνη B100 και A1 (ApoB100 και ApoA1). Η η λιποπρωτεΐνη χαμηλής πυκνότητας σε χοληστερόλη (LDL-C) αξιολογήθηκε μέσω του τύπου Friedewald. **Αποτελέσματα:** 15,5% (ν=317) των συμμετεχόντων βίωσαν κάποιο καρδιαγγειακό επεισόδιο στην 10ετία (θανατηφόρο και μη) (19,7% στους άνδρες και 11,7% στις γυναίκες, *p<0,001*). Οι δείκτες HDL-C και TGL συσχετίστηκαν ανεξάρτητα με την εμφάνιση καρδιαγγειακής νόσου στις γυναίκες: ανά 10mg/dL HDL-C αύξηση, Σχετικός Κίνδυνος (ΣΚ) = 0,73, 95% Διάστημα Εμπιστοσύνης (95%ΔΕ) (0,53, 1,00) και ανά 10mg/dL TGL αύξηση, ΣΚ=1,10, 95%ΔΕ (1,00, 1,21). Ο δείκτης ApoA1 (ανά 10mg/dL αύξηση, ΣΚ = 0,90, 95%ΔΕ (0,81, 0,99)) συσχετίστηκε αντίστροφα με την εμφάνιση της νόσου στις γυναίκες, ενώ μια θετική συσχέτιση με τον δείκτη ApoB100 παρατηρήθηκε μόνο στους άνδρες (ανά 10mg/dL αύξηση, ΣΚ=1,10, 95%ΔΕ (1,00, 1,21)). **Συμπεράσματα:** Η σχέση των δεικτών του λιπιδαιμικού προφίλ με την εμφάνιση καρδιαγγειακής νόσου πρέπει να επανεκτιμηθεί λαμβάνοντας υπόψη και τις ιδιαιτερότητες και διαφορές που σχετίζονται με το φύλο.

ΛΕΞΕΙΣ ΚΛΕΙΔΙΑ: *Καρδιαγγειακή νόσος, φύλο, γυναίκες, λιποπρωτεΐνες, απολιποπρωτεΐνες, πρωτεγενής πρόληψη*

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