A Real-World Study of the Relationship between Lipoprotein(a) [Lp(a)] Concentrations and Atherosclerotic Cardiovascular Disease (ASCVD) Prognosis, Healthcare Resource Utilization and Medical Costs in Chinese Patients

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OBJECTIVES

The study aims to explore the effect of elevated Lp(a) concentrations on ASCVD prognosis, healthcare resource utilization (HCRU) and medical costs in Chinese ASCVD patients.

METHODS

Clinical data of 10,655 patients diagnosed with ASCVD for the first time were obtained from an electronic medical database from 2016 to 2020.

The risk of major adverse cardiovascular events (MACEs: emergency coronary artery revascularization, myocardial infarction, stroke, heart failure, and CV death) was compared between patients with baseline Lp(a) ≥30 mg/dL and Lp(a) <30 mg/dL using adjusted multivariate Cox-regression models.

Covariates with missing data were imputed by multiple imputation (MI).

Propensity score matching (PSM) or inverse probability treatment weighting (IPTW) was used to doubly balance the baseline confounders.

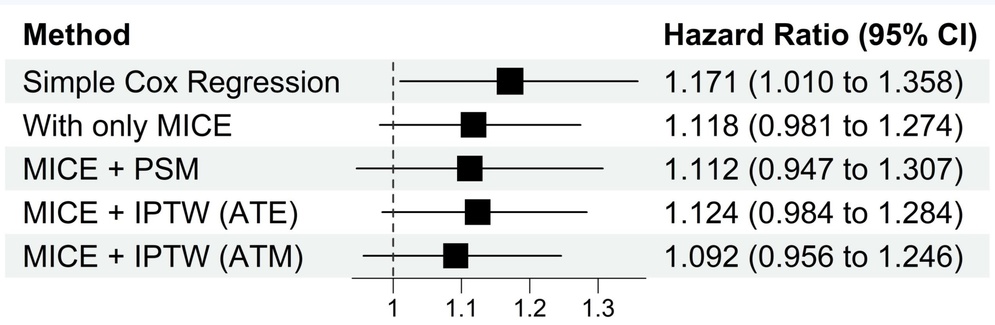
HCRU and costs were assessed one year after ASCVD diagnosis based on Lp(a) concentrations, with *t*-test and linear regression used for statistical analysis.

RESULTS

Incidence of MACEs was 147.7 per 1,000 person-years after the first diagnosis of ASCVD.

Compared to Lp(a) <30 mg/dL, Lp(a) ≥30 mg/dL had increased risk of MACEs. Hazard ratio was 1.171 (95%CI: 1.010-1.358) by the covariate-adjusted Cox model without MI, PSM or IPTW; 1.118 (95%CI: 0.981-1.274) with MI; 1.112 (95%CI: 0.947-1.307) with MI and PSM; and 1.124 (95%CI: 0.984-1.284) with MI and IPTW.

Table 1 Hazard ratios for MACEs Incidence between Lp(a) ≥30 mg/dL and Lp(a)<30 mg/dL using different adjusted statistical methods



MICE, multiple imputation by chained equations; PSM, propensity score matching; IPTW, inverse probability of treatment weighting; ATE, average treatment effect; ATM, average treatment effect on the evenly matchable units.

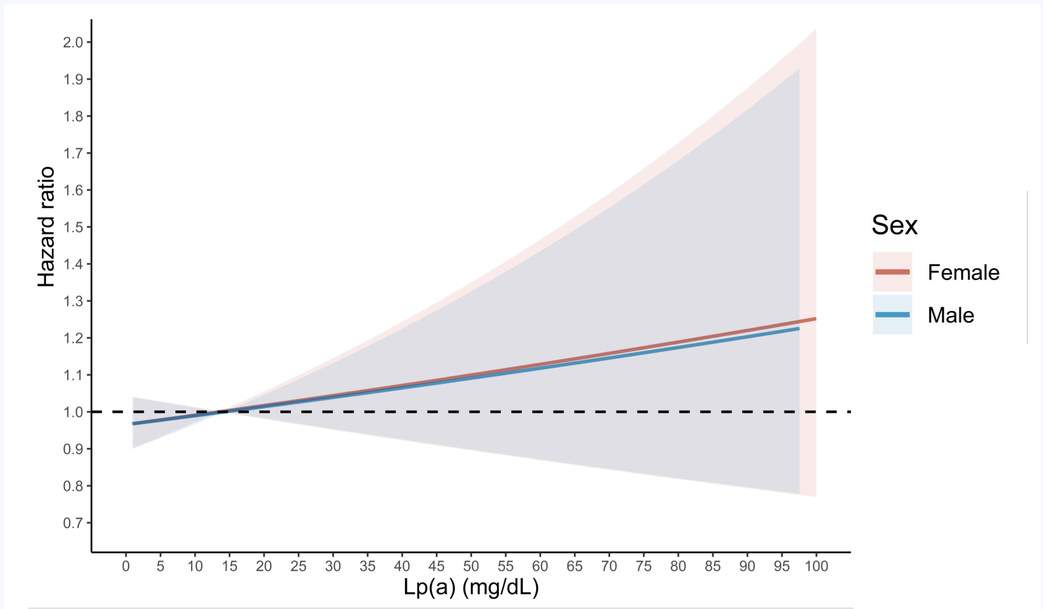


Figure 1 Relationship between Lp(a) concentrations and hazard ratio for major adverse cardiovascular events (MACEs) one-year incidence

a. Multivariable cox models were adjusted for age, sex, hospital tiering, baseline LDL-C, HDL-C, TG, TC, diabetes mellitus, hypertension, heart disease, atrial fibrillation and dyslipidemia, with the median of Lp(a) levels as the hazard ratio reference.
b. ASCVD patients are at an increased risk of MACEs as the Lp(a) increases.

Figure 2 Distribution of Lp(a) concentrations among Chinese ASCVD patients

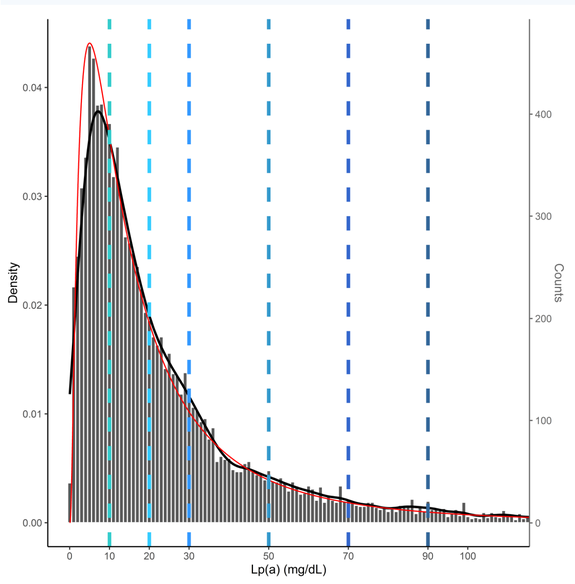


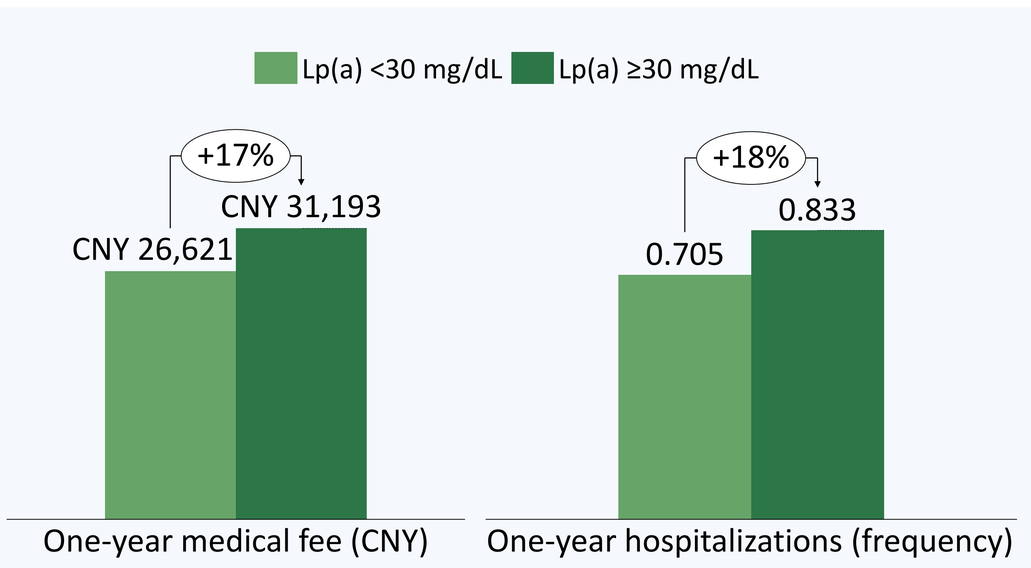
Table 2 Number and proportion of ASCVD patients in each Lp(a) concentration subgroup

Lp(a) (mg/dL)	[0,10)	[10,20)	[20,30)
ASCVD	3552 (33.34%)	2810 (26.37%)	1576 (14.79%)
	Lp(a) <30mg/dL		**7938 (74.50%)**

Lp(a) (mg/dL)	[30,50)	[50,70)	[70,90)	≥90
ASCVD	1392 (13.06%)	637 (5.98%)	320 (3.00%)	368 (3.45%)
	Lp(a) ≥30mg/dL		**2717 (25.5%)**	

Total one-year medical fee (CNY) for Lp(a) ≥30mg/dL patients was higher than Lp(a) <30mg/dL (31,193 ± 63,397 vs. 26,621 ± 35,965; *P* =0.008).

Total one-year hospitalizations (frequency) of Lp(a) ≥30mg/dL patients were more than Lp(a) <30mg/dL (0.833 ± 1.184 vs. 0.705 ± 1.037; *P* <0.0001). Continuous increase in Lp(a) concentrations is also associated with an increase in hospitalizations (*P* <0.0001) and total medical costs (*P* <0.0001).



As the Lp(a) concentration increases, the health expenditures for ASCVD patients tends to grow (*P* <0.0001).

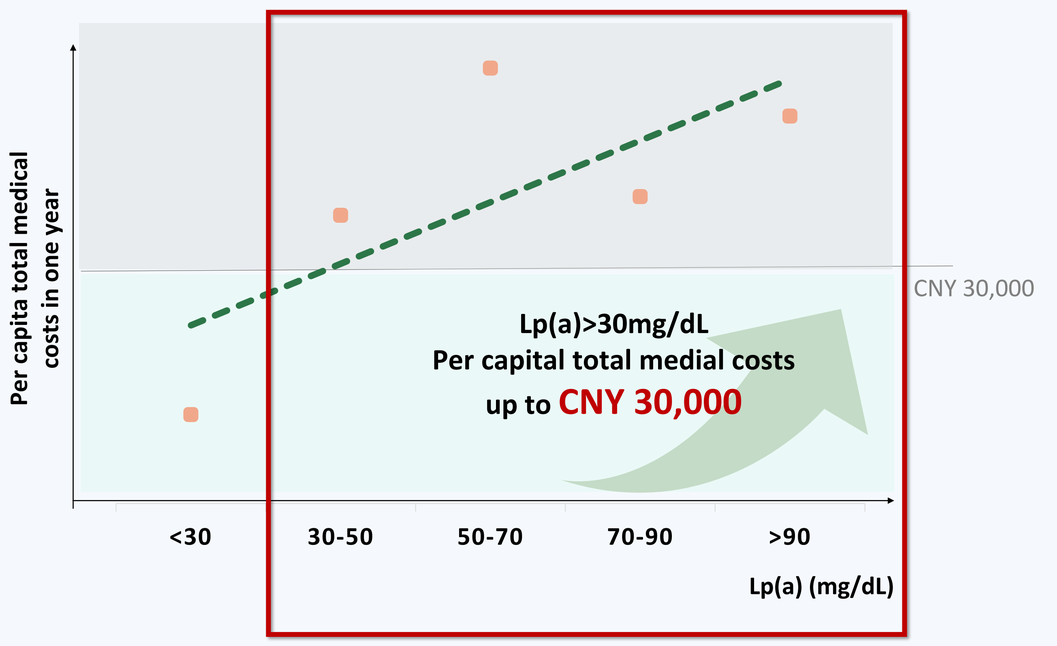


Figure 3 Per capita total medical costs in one-year follow up of ASCVD patients according to different Lp(a) concentrations

CONCLUSIONS

Higher Lp(a) is associated with greater MACEs risk, more HCRU, and higher medical costs. Lp(a) lowering is beneficial for Chinese ASCVD patients in a secondary prevention setting.