中文題目：血液透析病人使用β受體阻斷劑可透析度與死亡風險的影響:系統性文獻回顧與綜合分析

英文題目：Impact of type of dialyzable Beta-blockers on subsequent risk of mortality in patients receiving dialysis: A Systematic Review and Meta-Analysis

作　　者：涂冠杰[1,2]，葉子瑄[2]，陳銳溢[3]

服務單位：[1]奇美醫院心臟內科，[2]奇美醫院內科部，[3]奇美醫院腎臟內科

Background

Dialysis patients with beta-blockers (BBs) improved all-cause mortality and cardiovascular (CV) mortality compared with non-users. Nevertheless, the dialyzability of BBs are also concerned for dialysis patients. The diversity of molecular weight, protein binding capacity, and volume distribution determine the filtering ability from the artificial kidney membrane. Generally, high dialyzable BBs (HDBBs) consist of atenolol, acebutolol, metoprolol, bisoprolol, and nadolol, while carvedilol, labetalol and propranolol were classified as low dialyzable BBs (LDBBs). LDBBs were considered with a benefit on all-cause mortality, because the higher blood concentration achieved in dialysis patients. However, other studies indicated those with LDBBs were associated with higher risk of mortality because of the higher risk of intradialytic hypotension compared with individuals with HDBBs. As a result, the impact of the HDBBs/ LDBBs in the context of hemodialysis patients has not been undisputedly confirmed, so we conducted a systematic review and meta-analysis to provide comprehensive evidence of the HDBBs/LDBBs on selected outcomes for dialysis patients.

Methods

In this systematic review, we set the PICO as following, (a) Population: adult patients (≥ 18 year old) with end stage renal disease (ESRD) on maintenance dialysis receiving BBs; (b) Exposure group: patients receiving HDBBs; (c) Control group: patients receiving LDBBs (d) Outcome: risk of all-cause mortality, incidence of major adverse cardiovascular events, acute myocardial infarction and heart failure. We searched all relevant studies from PubMed, Embase, Cochrane and ClinicalTrials.gov before 28 February 2022. We used the Newcastle-Ottawa Scale to assess the risk of bias of included studies. For each eligible study, we extracted the clinical outcomes including risks of all-cause mortality, major adverse cardiovascular events, acute

myocardial infarction and heart failure. Data were pooled and analyzed via random effect model and effect size is expressed as the pooled odd ratio (OR) and 95% confidence interval (CIs). We rated the certainty of evidence according to Cochrane methods and the GRADE approach. Between-trial heterogeneity was determined by using I^2 tests and values >50% were regarded as considerable heterogeneity.

Results

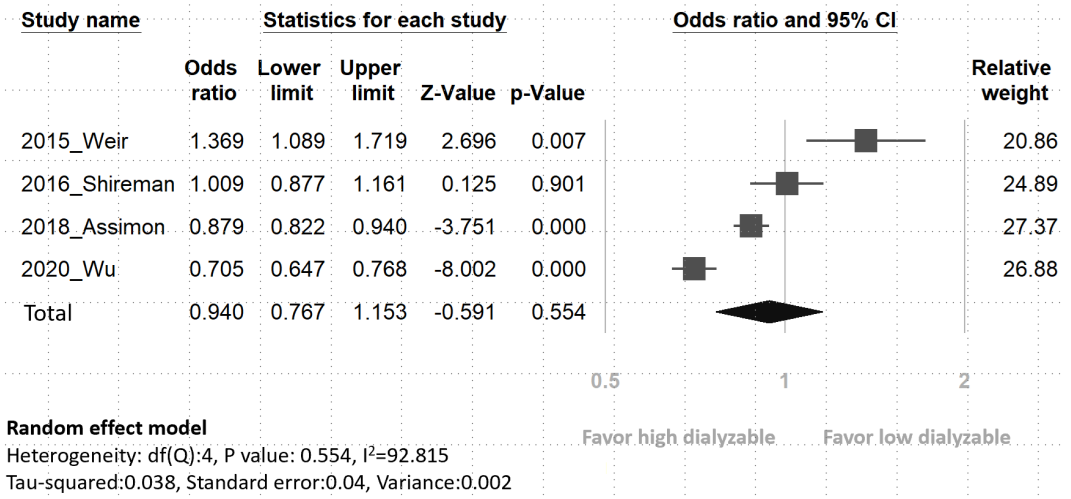
Total 75,193 dialysis patients from 4 included retrospective studies were analyzed. The overall all-cause mortality rate was 11.56%. All-cause mortality in HDBBs and LDBBs was 12.32% and 10.70% respectively. The pooled OR of mortality in dialysis patient between HDBBs and LDBBs is 0.94 [random effect, OR 0.94 (95% CI, 0.77–1.15), P = 0.55] (Figure A). The pooled odds ratio of MACE in dialysis patients between HDBBs and LDBBs is 1.03 [random effect, OR 1.03 (95% CI, 0.78–1.38), P = 0.82](Figure B). On the other hand, no significant difference of AMI [random effect, OR 1.02 (95% CI, 0.94-1.10), p = 0.66] for dialysis patients with HDBBs/LDBBs (Figure C). Nevertheless, the pooled OR of HF in dialysis patients between HDBBs and LDBBs is 0.87 [random effect, OR 0.87 (95% CI, 0.82–0.93), P < 0.01] (Figure D).

Conclusions

This meta-analysis demonstrated that there was no significant association with the risk of all-cause mortality, MACE and AMI for dialysis patients who had high/low dialysable BBs. However, high dialysable BBs were associated with significant reduction in HF for dialysis patients.

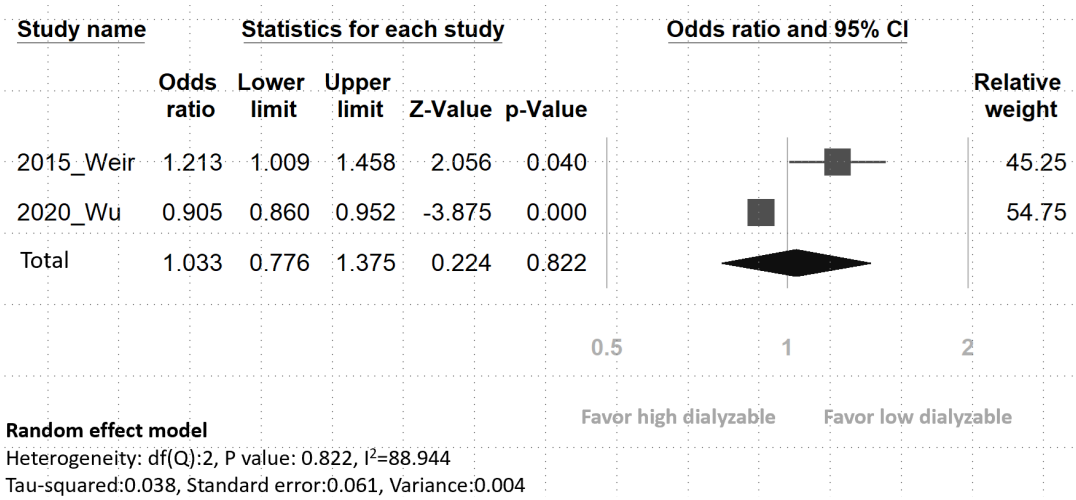
Forest plot showing the risk of (A) all-cause mortality, (B) MACE, (C)AMI (D) HF between HDBBs versus LDBBs

(A)



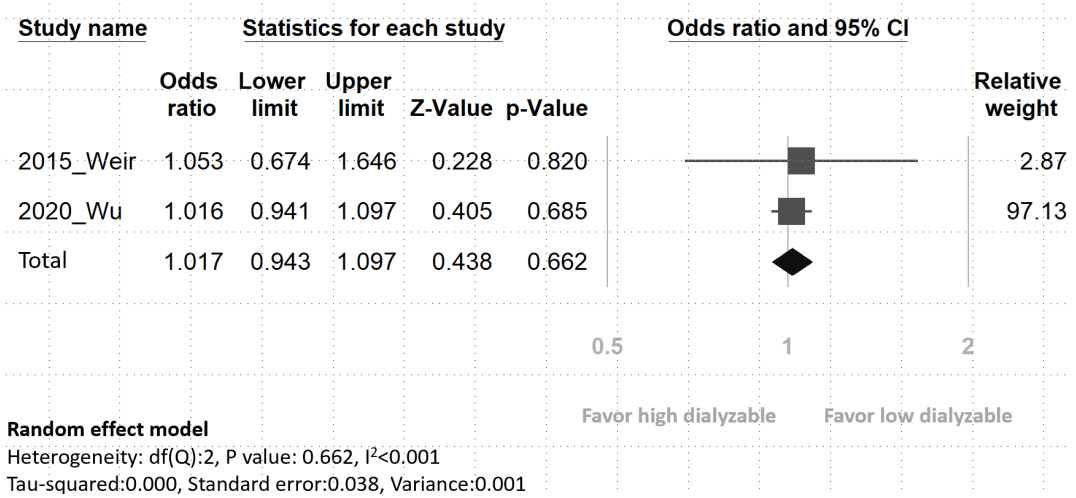
Random effect model
Heterogeneity: df(Q):4, P value: 0.554, I^2=92.815
Tau-squared:0.038, Standard error:0.04, Variance:0.002

(B)



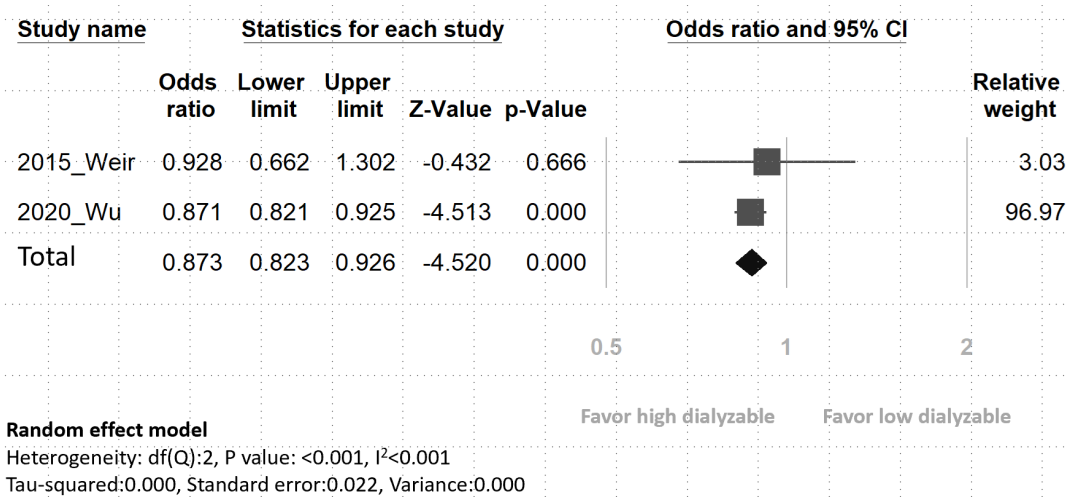
Random effect model
Heterogeneity: df(Q):2, P value: 0.822, I^2=88.944
Tau-squared:0.038, Standard error:0.061, Variance:0.004

(C)



Random effect model
Heterogeneity: df(Q):2, P value: 0.662, I^2<0.001
Tau-squared:0.000, Standard error:0.038, Variance:0.001

(D)



Abbreviations: AMI, acute myocardial infarction; HDBBs, High dialyzable beta-blockers; LDBBs, Low dialyzable beta-blockers; MACE, major adverse cardiac events