Risk of heart failure between different metabolic states of health and weight: a meta-analysis of cohort studies, Wang et al.

SUPPLEMENTAL MATERIAL

Tables S1–S4

Tables S1. Covariates adjusted in cohort studies.

Study	Covariates
Voulgari, 2011 [14]	Age, sex, fasting glucose, hypertension, lipids, baseline left ventricular hypertrophy and function, current cigarette smoking, and physical inactivity
Morkedal, 2014 [15]	Age, sex, smoking status, time since last meal, level of education, marital status, physical activity, and alcohol consumption
Caleyachetty, 2017 [18]	Age, sex, self-reported smoking status, and social deprivation
Cordola, 2021 [23]	Age, race/ethnicity, income, prevalent diabetes, ever smoking, total healthy eating index score, total energy expenditure from recreational physical activity, and total cholesterol
Itoh, 2021 [19]	Age, sex, blood pressure, Glucose, LDL-cholesterol, HDL-cholesterol, triglycerides, cigarette smoking, alcohol drinking
Kim, 2021 [20]	Age, sex, income, smoking, alcohol drinking, physical activities, total cholesterol, estimated glomerular filtration rate, medical history and comorbidities
Commodore-Mensah, 2021 [30]	age, sex and race-center, smoking status, physical activity, hs-CRP, eGFR, NT-proBNP
Zhou, 2021 [16]	age, sex, ethnicity, education, deprivation, smoking, alcohol drinking, television viewing, physical activity, and intake of fruit and vegetables, oily fish, red meat and processed meat
Bi, 2021 [31]	sex, education level, smoking status, alcohol drink status, physical activity, LDL-cholesterol and eGFR
Fauchier, 2021 [22]	age, sex and smoking status

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Table S2. Subgroup analysis according to sample size*.

	Small				Large			
	No. of studies	RR (95% CI)	I^2	P for heterogeneity	No. of studies	RR (95% CI)	I^2	P for heterogeneity
MHOW	3	1.08 (0.91, 1.21)	0	0.640	3	1.23 (1.08, 1.39)	61.1	0.08
MHO	4	1.63 (1.40, 1.89)	21.3	0.283	3	1.49 (1.37, 1.62)	94.0	<0.001
MUHNW	5	1.48 (1.24, 1.66)	15.2	0.318	2	1.35 (1.18, 1.55)	52.8	0.15
MUHOW	4	1.80 (1.52, 2.13)	59.4	0.080	2	1.83 (1.54, 2.16)	95.0	<0.001
MUHO	5	2.19 (1.84, 2.62)	82.5	0.030	4	2.38 (1.92, 2.95)	98.8	<0.001

MHOW: Metabolically healthy overweight group, MHO: Metabolically healthy obesity group, MUHNW: Metabolically unhealthy normal-weight group, MUHOW: Metabolically unhealthy overweight group, MUHO: Metabolically unhealthy obesity group.

*sample size less than 100,000 was regarded as small, while over 100,000 was large.

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Table S3. Subgroup analysis according to duration of follow-up.

	<10 years				>10 years			
	No. of studies	RR (95% CI)	I^2	P for heterogeneity	No. of studies	RR (95% CI)	I^2	P for heterogeneity
MHOW	5	1.26 (1.22, 1.30)	8.4	0.378	2	1.03 (0.88, 1.20)	0	0.761
MHO	4	1.63 (1.40, 1.89)	21.3	0.283	4	1.66 (1.46, 1.89)	32.1	0.219
MUHNW	5	1.89 (1.36, 2.10)	98.0	<0.001	4	1.36 (1.28, 1.45)	0	0.664
MUHOW	4	1.86 (1.82, 2.13)	90.7	<0.001	2	1.50 (1.31, 1.72)	0	0.418
MUHO	4	2.37 (1.89, 2.98)	98.4	<0.001	4	2.19 (1.85, 2.61)	73.9	0.009

MHOW: Metabolically healthy overweight group, MHO: Metabolically healthy obesity group, MUHNW: Metabolically unhealthy normal-weight group, MUHOW: Metabolically unhealthy overweight group, MUHO: Metabolically unhealthy obesity group.

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Tables S4. Results of sensitivity analyses by omitting one study in each turn and combining the remaining studies.

Exposure	Omitted study	Combined RR (95% CI)
Metabolic unhealthy normal weight		
	Voulgari	1.52 (1.26, 1.84)
	Morkedal	1.60 (1.32, 1.93)
	Caleyachetty (Men)	1.56 (1.27, 1.91)
	Caleyachetty (Women)	1.52 (1.23, 1.87)
	Bi	1.57 (1.29, 1.90)
	Commodore-Mensah	1.59 (1.31, 1.92)
	Cordola	1.55 (1.28, 1.87)
	Kim	1.60 (1.34, 1.91)
	Zhou	1.59 (1.31, 1.91)
	Fauchier	1.48 (1.32, 1.67)
Metabolic unhealthy overweight		
	Voulgari	1.71 (1.51, 1.94)
	Morkedal	1.81 (1.59, 2.05)
	Caleyachetty (Men)	1.77 (1.50, 2.08)
	Caleyachetty (Women)	1.66 (1.55, 1.79)
	Bi	1.76 (1.54, 2.02)
	Commodore-Mensah	1.79 (1.56, 2.04)
	Kim	1.78 (1.54, 2.06)
Metabolic unhealthy obesity		
	Voulgari	2.29 (1.96, 2.68)
	Morkedal	2.36 (2.02, 2.77)
	Caleyachetty (Men)	2.40 (2.16, 2.68)
	Caleyachetty (Women)	2.26 (1.89, 2.70)

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	Bi	2.24 (1.90, 2.64)
	Commodore-Mensah	2.26 (1.92, 2.66)
	Cordola	2.31 (1.97, 2.71)
	Zhou	2.25 (1.87, 2.70)
	Fauchier	2.21 (1.95, 2.51)
Metabolic healthy overweight		
	Voulgari	1.23 (1.17, 1.29)
	Morkedal	1.25 (1.20, 1.30)
	Caleyachetty (Men)	1.20 (1.11, 1.29)
	Caleyachetty (Women)	1.20 (1.12, 1.29)
	Bi	1.24 (1.18, 1.30)
	Commodore-Mensah	1.25 (1.19, 1.30)
	Itoh	1.24 (1.18, 1.30)
	Kim	1.22 (1.16, 1.28)
Metabolic healthy obesity		
	Voulgari	1.52 (1.41, 1.65)
	Morkedal	1.51 (1.39, 1.63)
	Caleyachetty (Men)	1.53 (1.38, 1.70)
	Caleyachetty (Women)	1.53 (1.38, 1.68)
	Bi	1.49 (1.38, 1.62)
	Commodore-Mensah	1.51 (1.39, 1.63)
	Cordola	1.53 (1.41, 1.66)
	Zhou	1.46 (1.36, 1.57)
	Fauchier	1.56 (1.44, 1.69)

RR: relative risk