What does science show on the link between beer consumption and type 2 diabetes?

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Beer and Health

THE 8TH EUROPEAN

BEER AND HEALTH SYMPOSIUM

Agenda

- How frequent is prediabetes and type 2 diabetes?
- Does alcohol and beer influence the risk of diabetes?
- How does moderate beer intake influence weight?
- How does moderate beer intake affect blood glucose?
- How does beer and alcohol influence CHD in diabetes?

Pre-diabetes = Metabolic Syndrome (MeS)

20 – 25 % of adults in Western countries have MeS

- Apple form (central obesity)

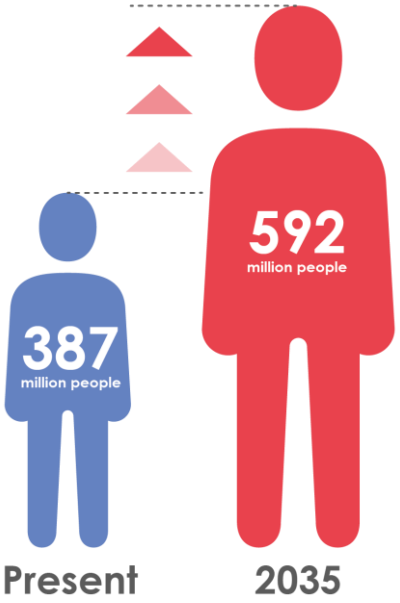
+ (two of the following 4 factors):

- Increased fasting Triglyceride
- Reduced HDL Cholesterol
- Increased blood pressure
- Increased fasting glucose

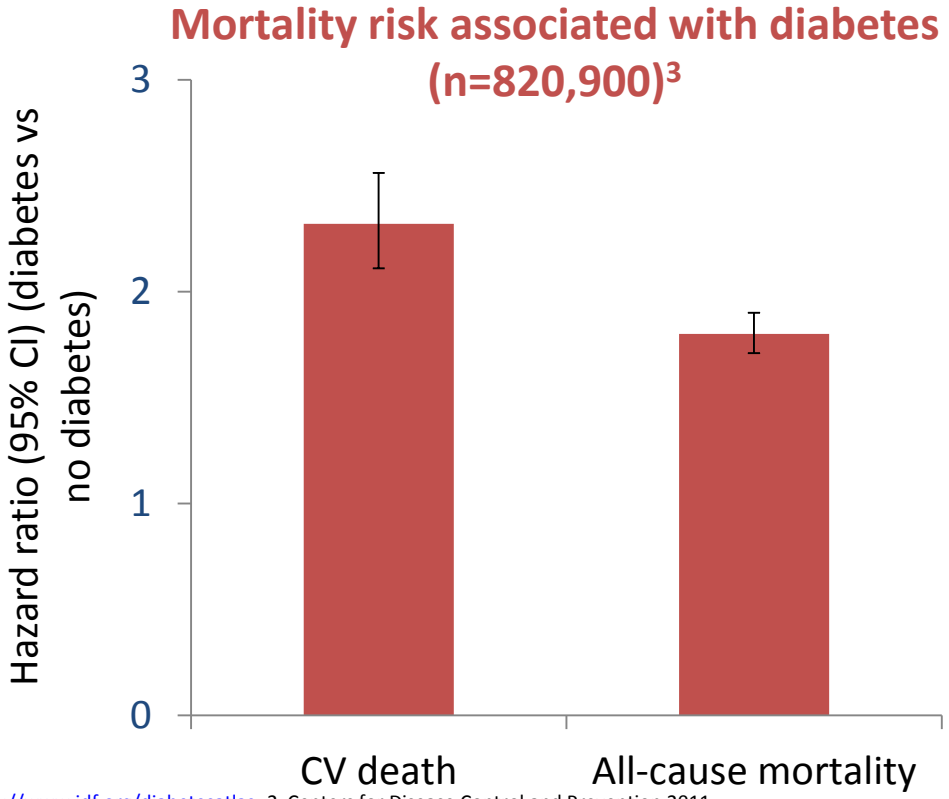
MeS increases the risk of CVD X 2 and T2D X 5

Type 2 diabetes is increasingly prevalent

- Globally, 387 million people are living with diabetes[1]
- At least 68% of people >65 years with diabetes die of heart disease[2]

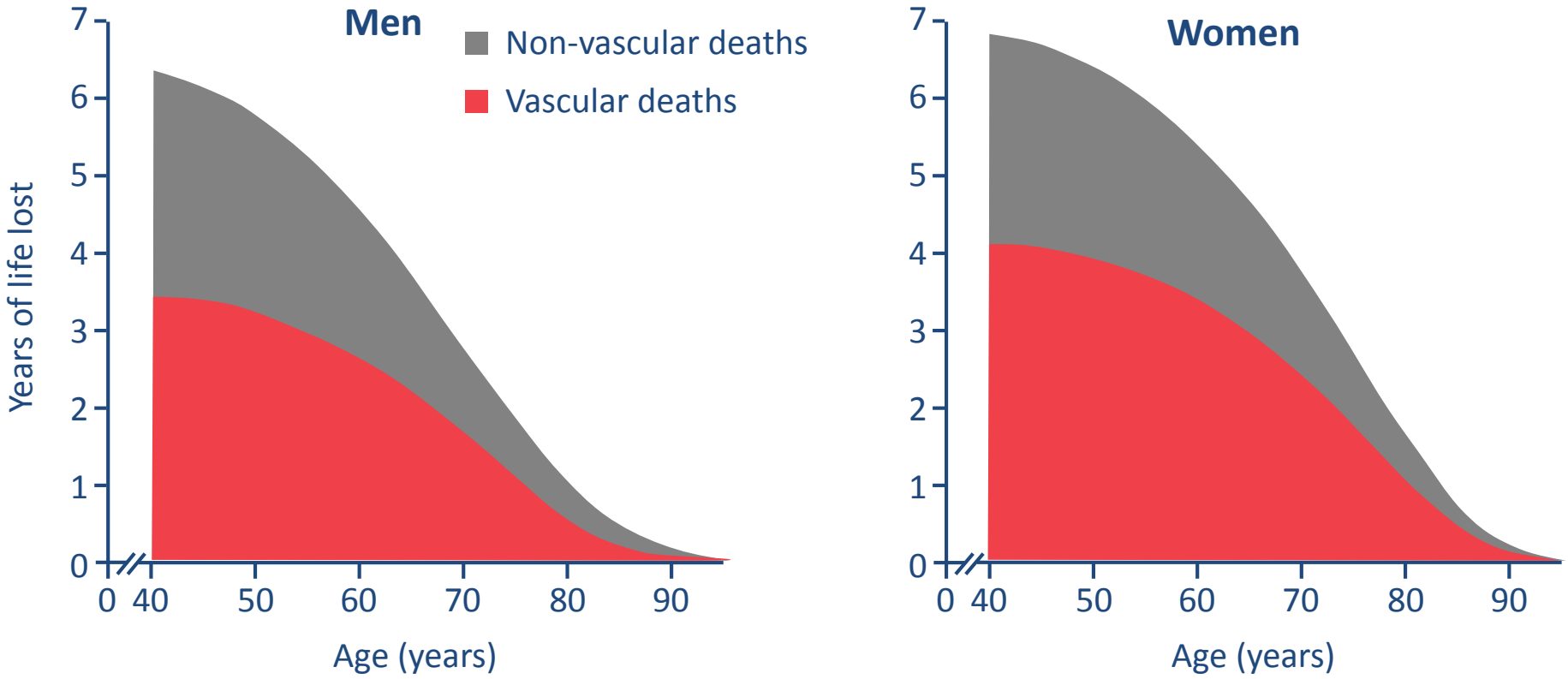


This will rise to 592 million by 2035[1]



1. IDF Diabetes Atlas 6th Edition 2014 http://www.idf.org/diabetesatlas; 2. Centers for Disease Control and Prevention 2011; 3. Seshasai et al. N Engl J Med 2011;364:829-41

Diabetes is associated with significant loss of life years



On average, a 50-year-old individual with diabetes and no history of vascular disease will die 6 years earlier compared to someone without diabetes

Seshasai et al. N Engl J Med 2011;364:829-41

Agenda

- Does alcohol and beer influence the risk of diabetes?

Light alcohol consumption and risk of diabetes

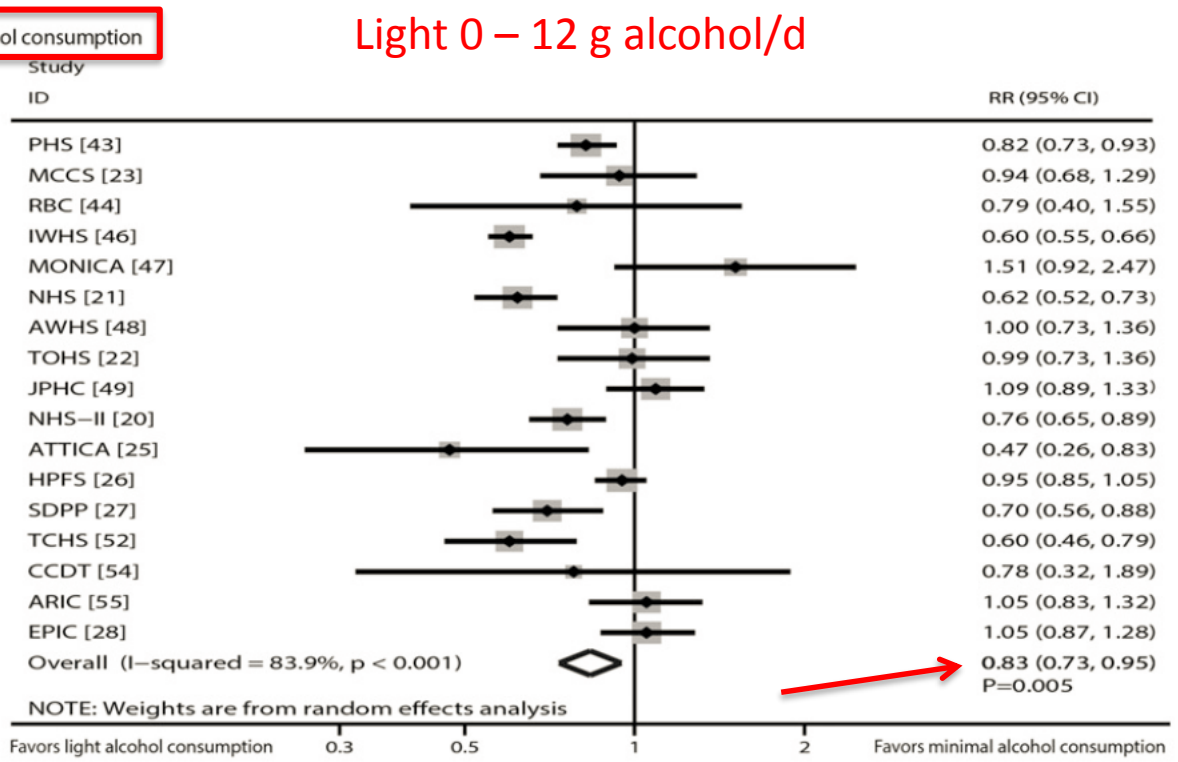
Association between alcohol consumption and the risk of incident type 2 diabetes: a systematic review and dose-response meta-analysis[1]

Xiao-Hua Li,[2,5] Fei-fei Yu,[4,5] Yu-Hao Zhou,[3] and Jia He[4]**

Am J Clin Nutr 2016;103:818–29.

706,716 subjects
39% men and
61% women
31,621 T2D cases

Light 0 – 12 g alcohol/d

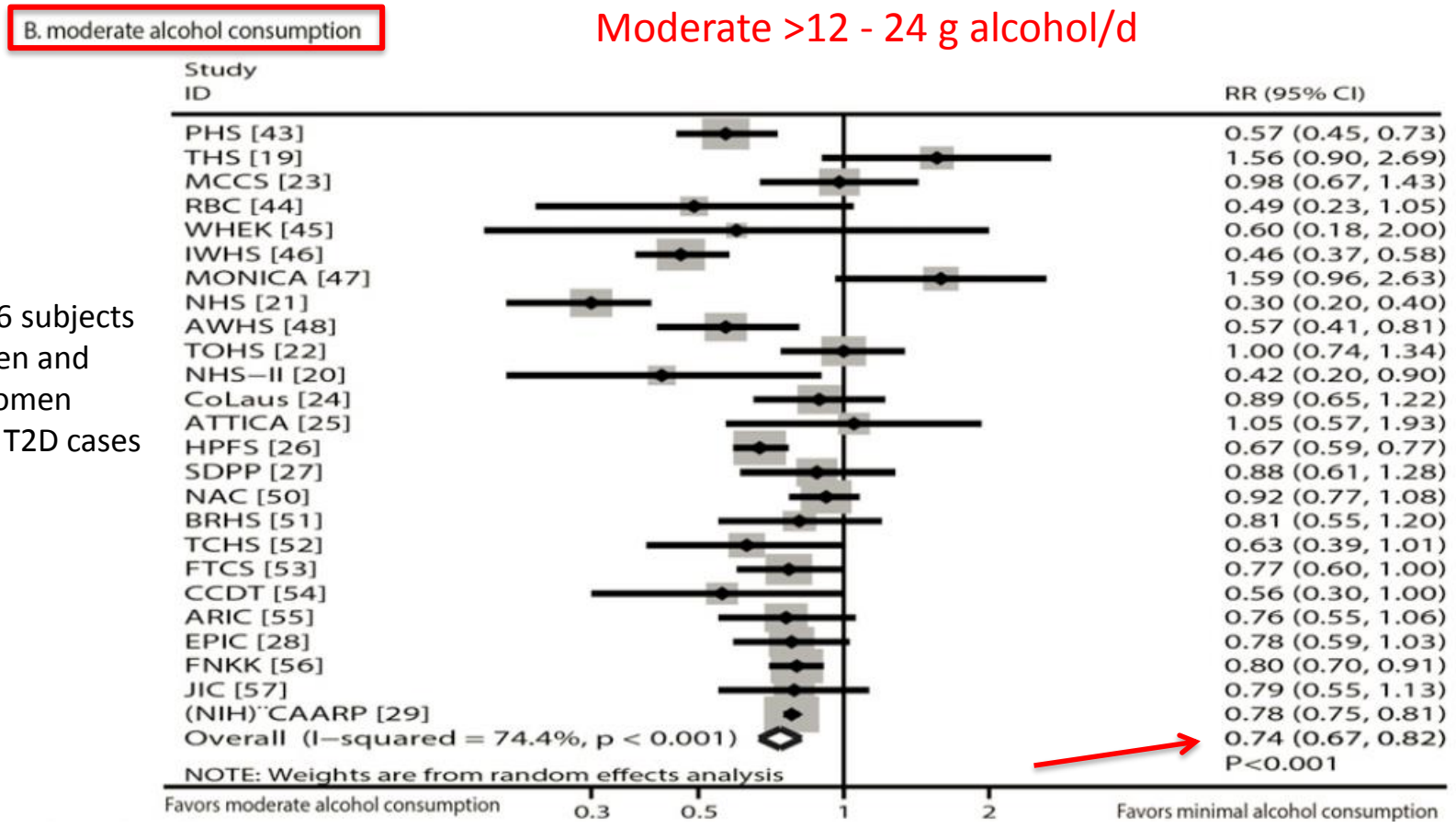


RR 17% ↓

Li H-X et al Am J Clin Nutr 2016;103:818-29

Moderate alcohol consumption and risk of diabetes

706,716 subjects
39% men and
61% women
31,621 T2D cases

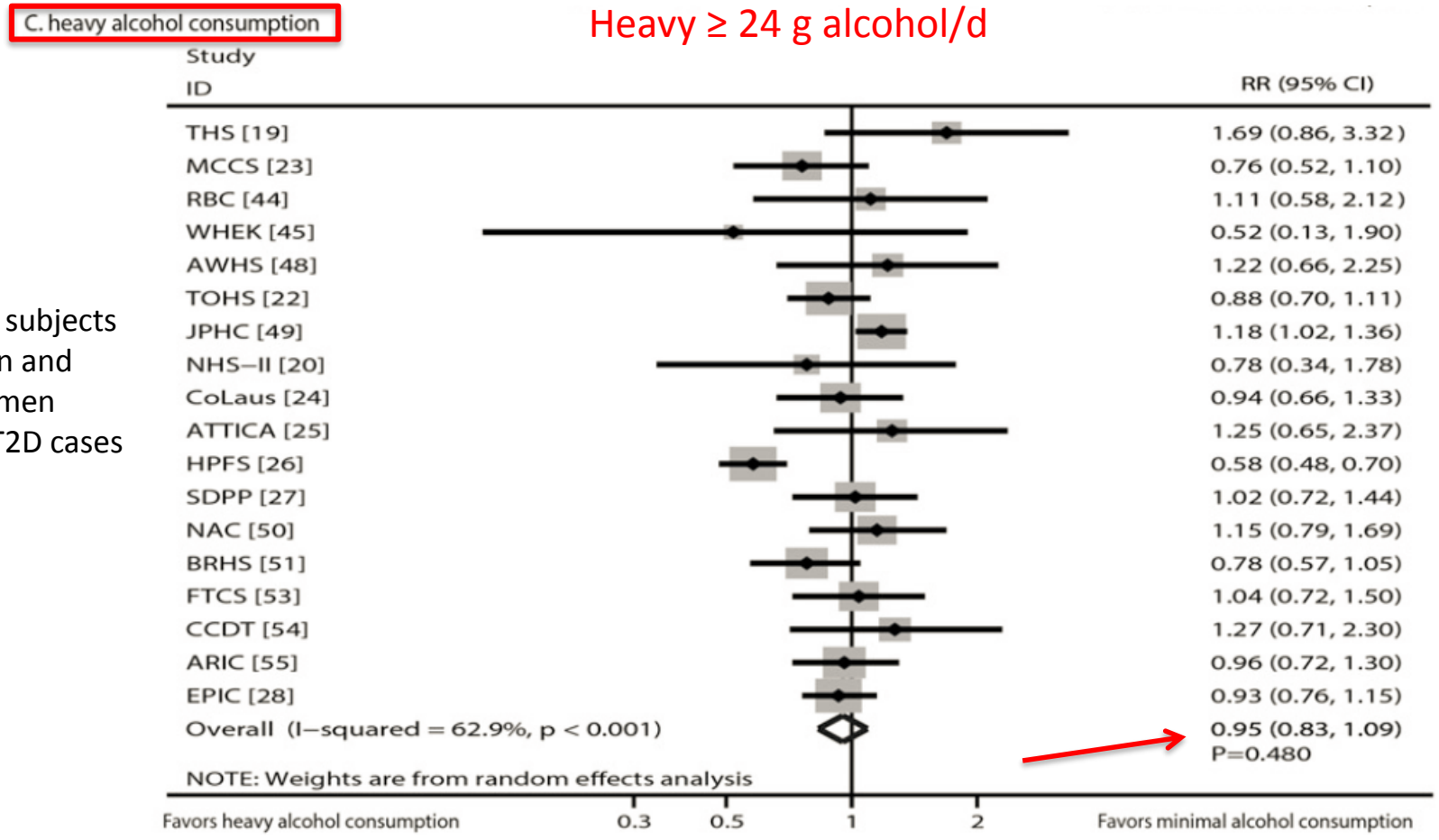


RR 26%↓

Li X-H et al Am J Clin Nutr 2016;103:818-29

Heavy alcohol consumption and risk of diabetes

706,716 subjects
39% men and
61% women
31,621 T2D cases



Li X-H et al Am J Clin Nutr 2016;103:818-29

JDI Journal of Diabetes Investigation Open access
Official Journal of the Asian Association for the Study of Diabetes
ORIGINAL ARTICLE

Specific types of alcoholic beverage consumption and risk of type 2 diabetes: A systematic review and meta-analysis

Jin Huang[1], Xiuling Wang[2], Yadong Zhang[1]*

Results: A total of 13 prospective studies were included in this meta-analysis, with 397,296 study participants and 20,641 cases of type 2 diabetes.

Huang J et al
J Diabetes Investig. 2017 Jan;8(1):56-68

Types of alcoholic beverages and risk of type 2 diabetes

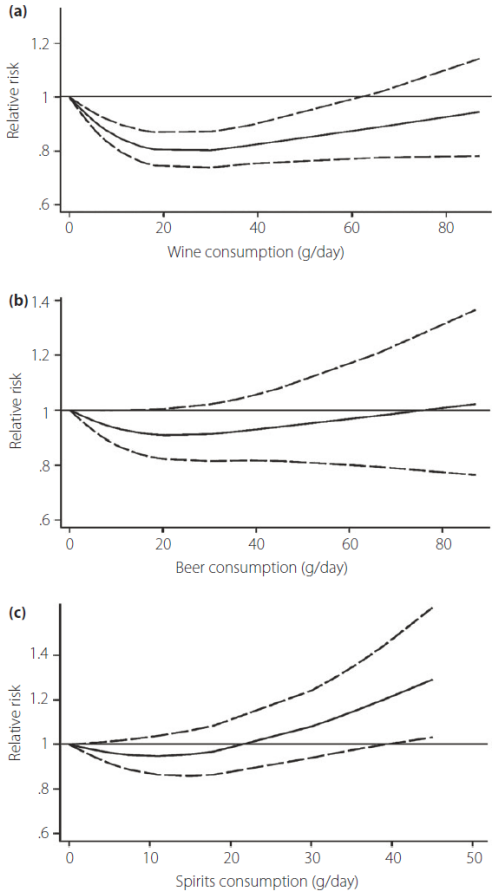


Figure 6 | Dose–response analysis of the association between specific types of alcoholic beverages and type 2 diabetes. (a) The dose–response relationship between wine and type 2 diabetes. (b) The dose–response relationship between beer and type 2 diabetes. (c) The dose–response relationship between spirits and type 2 diabetes.

Wine For wine, the lowest risk of type 2 diabetes was present between the 20–30 g alcohol/day with an average decrease of 15%.

Beer For beer, the lowest risk of type 2 diabetes was present between the 20–30 g alcohol/day level, with a decrease of 9%. Pooled data led to an average 4% reduction in type 2 diabetes.

Spirits No significant risk reduction with spirits

Huang J et al
J Diabetes Investig. 2017 Jan;8(1):56-68

Types of alcoholic beverages and risk of type 2 diabetes

Conclusion

RESEARCH ARTICLE

Relationships between Diet, Alcohol Preference, and Heart Disease and Type 2 Diabetes among Americans

Michael K. Adjemian[1]*, Richard J. Volpe[2], Jennifer Adjemian[3,4]

PLOS ONE | DOI:10.1371/journal.pone.0124351 May 11, 2015

U.S. households measuring retail purchases.
Scanner equipment used for reporting (2010-2012).

the table represent percentages

*** $P<0.01$
** $P<0.05$
* $P<0.1$

Table 1. Variable Means for the 2010 MedProfiler Survey Population Households, Stratified by Alcohol Type Preference[a].

	All Participants *N = 49,377* (> 21 yrs)	Wine 31% *N = 15,452*	Beer 23% *N = 11,317*	Liquor 20% *N = 9,731*	Non-Drinkers *N = 12,894* 25%
High Cholesterol	36.1	37.6***	34.3*	36.6*	35.6
High Blood Pressure	33.4	33.8	31.1***	34.8	34
Heart Disease[b]	9.8	9.8*	9.1***	9.9	10.4
Type 2 Diabetes	10.8	9.7***	10.1***	10.4***	13
Smoker	25	21	33***	31***	20

Conclusion

- Light and moderate alcohol consumption was associated with a lower risk of type 2 diabetes, whereas heavy alcohol consumption was not related to such a risk.
  Li X-H et al Am J Clin Nutr 2016;103:818-29

- For beer, the lowest risk of type 2 diabetes was present between the 20–30 g/day level, with a decrease in type 2 diabetes of about 9%.
  Huang J et al J Diabetes Investig. 2017 Jan;8(1):56-68

- Many types of alcohol-related purchases were associated with a lower prevalence of type 2 diabetes. Those who purchased the greatest volume of beer were 40% less likely to being diagnosed with type 2 diabetes than non-drinkers.
  Adjemian MK et al PLoS One. 2015 May 11;10(5):e0124351

Three things to fear in type 2 diabetes: weight gain and…

Agenda

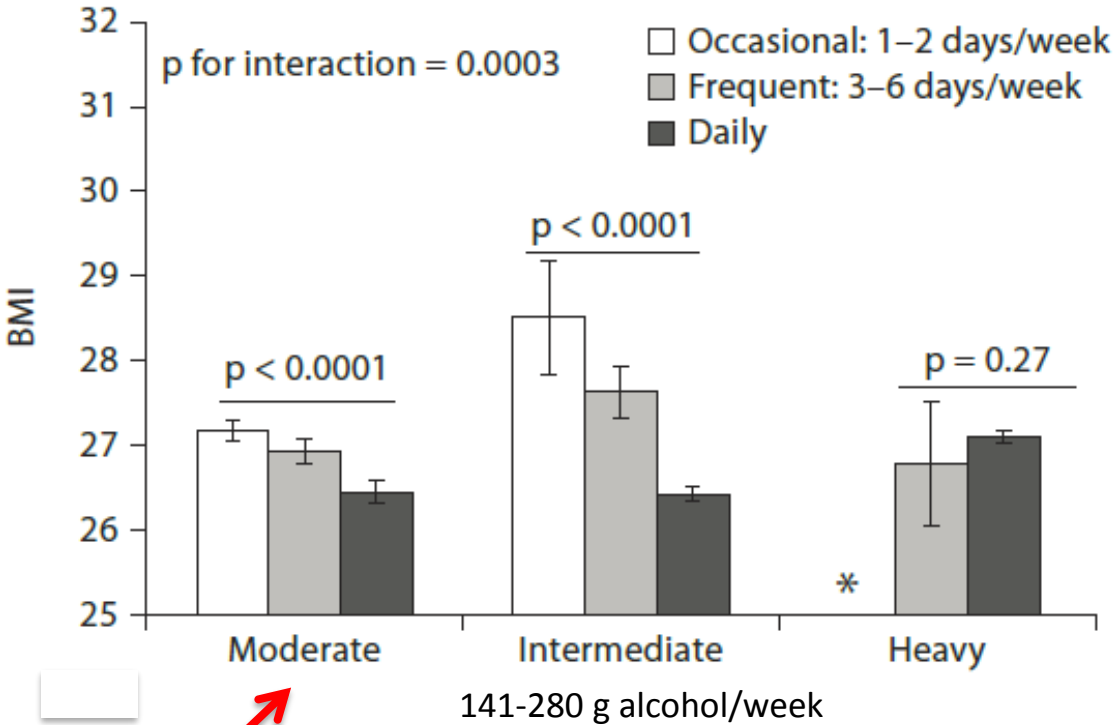
- How does moderate beer intake influence body weight?

  Weight gain a feared complication in type 2 diabetic subjects

Alcohol Consumption Patterns and Body Weight

Dumesnil C et al. Ann Nutr Metab 2013;62:91-97

N = 7,855 men
50 – 59 yrs
France



0-140 g alcohol/week

141-280 g alcohol/week

> 281 g alcohol/week

Alcohol Consumption Patterns and Body Weight

Dumesnil C et al. Ann Nutr Metab 2013;62:91-97

Cross-sectional study in 7,855 men (50 – 59 yrs). 75 % were daily consumers.

Table 3. Mean adjusted BMI and waist circumference by beverage intake and frequency of consumption

		Frequency of alcohol consumption			p interaction	p for frequency
		occasional 1–2 days/week	frequent 3–6 days/week	daily 7 days/week		
BMI						
Wine, g/week	<30	27.5 ± 0.3	27.0 ± 1.2	26.3 ± 2.5		0.3256
	30–100	27.7 ± 0.3	27.0 ± 0.3	26.7 ± 0.3	0.0465	<0.0001
	>100	28.7 ± 1.1	27.7 ± 0.5	27.2 ± 0.2		<0.0001
Beer, g/week	<30	27.1 ± 0.2	27.2 ± 0.5	26.1 ± 2.0		0.5675
	30–100	27.6 ± 0.4	27.4 ± 0.3	26.9 ± 0.4	0.0183	0.0105
	>100	29.0 ± 1.6	27.7 ± 0.6	27.1 ± 0.2		0.0006
Waist circumference						
Wine, g/week	<30	98.3 ± 0.8	98.4 ± 3.3	95.9 ± 7.0		0.714
	30–100	99.5 ± 0.9	97.3 ± 1.0	96.0 ± 0.9	0.0052	<0.0001
	>100	101.2 ± 3.1	99.5 ± 1.3	98.0 ± 0.5		<0.0001
Beer, g/week	<30	97.5 ± 0.7	98.1 ± 1.5	97.5 ± 5.6		
	30–100	98.8 ± 1.2	98 ± 0.8	97.4 ± 1	0.1066	0.0589
	>100	103.6 ± 4.6	99.2 ± 1.7	98.2 ± 0.7		

Conclusion: For a given alcohol intake, the frequency of beer drinking was inversely related to BMI and waist circumference.

Lead Article

NUTRITION REVIEWS

Is beer consumption related to measures of abdominal and general obesity? A systematic review and meta-analysis

Nathalie T Bendsen, Robin Christensen, Else M Bartels, Frans J Kok, Aafje Sierksma, Anne Raben, and Arne Astrup

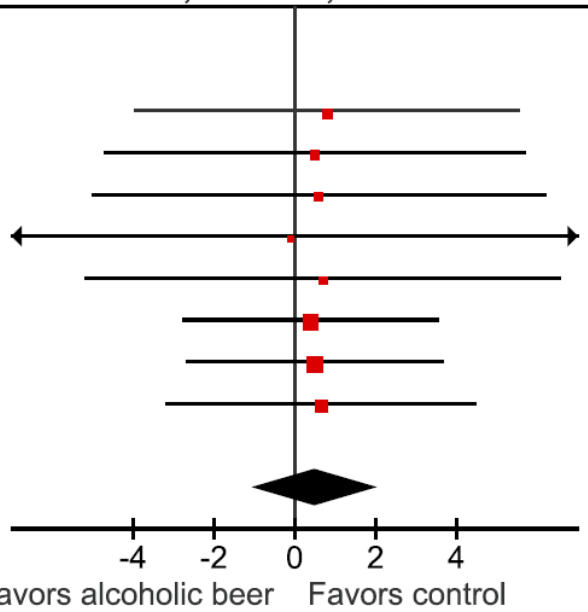
Nutrition Reviews 2013;71:67-87

A

Study or Subgroup	Mean Difference	SE	Weight	Mean Difference IV, Random, 95% CI
Addolorato_2008	0	0		Not estimable
Gorinstein_1998	0	0		Not estimable
Hartung_1983_inactive	0.8	2.427	10.5%	0.80 [-3.96, 5.56]
Hartung_1983_joggers	0.5	2.66	8.7%	0.50 [-4.71, 5.71]
Hartung_1983_runners	0.6	2.865	7.5%	0.60 [-5.02, 6.22]
Ka_2005_high_drinkers	-0.1	4.661	2.8%	-0.10 [-9.24, 9.04]
Ka_2005_low_drinkers	0.7	3.005	6.9%	0.70 [-5.19, 6.59]
Romeo_2008_men	0.4	1.617	23.7%	0.40 [-2.77, 3.57]
Romeo_2008_women	0.5	1.616	23.7%	0.50 [-2.67, 3.67]
Zilkens_2005	0.66	1.96	16.1%	0.66 [-3.18, 4.50]
Total (95% CI)			**100.0%**	**0.54 [-1.00, 2.08]**

Heterogeneity: Tau² = 0.00; Chi² = 0.05, df = 7 (P = 1.00); I² = 0%

Test for overall effect: Z = 0.68 (P = 0.49)



Effects of beer consumption versus no alcohol intake on body weight in experimental studies. Each square represents the individual study's mean difference, with the 95% confidence interval (95% CI) indicated by horizontal lines; square sizes are directly proportional to the precision of the estimate. "Favors control" refers to a lower body weight after no alcohol intake compared with intake of alcoholic beer.

Beer, alcohol and weight

Intake pattern of beer and alcohol and weight

For a given total alcohol intake the number of beer drinking episodes was inversely correlated with body mass index ($p < 0.0001$) and waist circumference ($p < 0.0001$). The more frequent drinking the less weight gain and the lower waist circumference. Drinking pattern is a risk indicator for obesity and should be taken into account in obesity prevention.

Dumesnil C et al. Alcohol consumption patterns and body weight
Ann Nutr Metab. 2013;62(2):91-7

Alcohol, beer and weight

The overall results do not conclusively confirm a positive association between alcohol consumption and weight gain. In general, most recent prospective studies show that light-to-moderate alcohol intake is not associated with weight gain while heavy drinking is more consistently related to weight gain. There is indadequate evidence to assess whether moderate beer intake (> 500 ml/d) is associated with general or abdominal obesity. The precise effect of beer and alcohol on body weight remains to be determined.

Sayon-Orea C et al. Alcohol consumption and body weight: a systematic review. Nutr Rev. 2011 Aug;69(8):419-31.

Bendsen NT et al Is beer consumption related to Abdominal and general obesity? A systematic review and meta-analysis. Nutr Rev 2013;71:67-87

Traversy G. Alcohol Consumption and Obesity: An Update. Curr Obes Rep. 2015 Mar;4(1):122-30.

Agenda

- Three things people with type 2 diabetes fears:

  Weight gain and low blood sugar and…

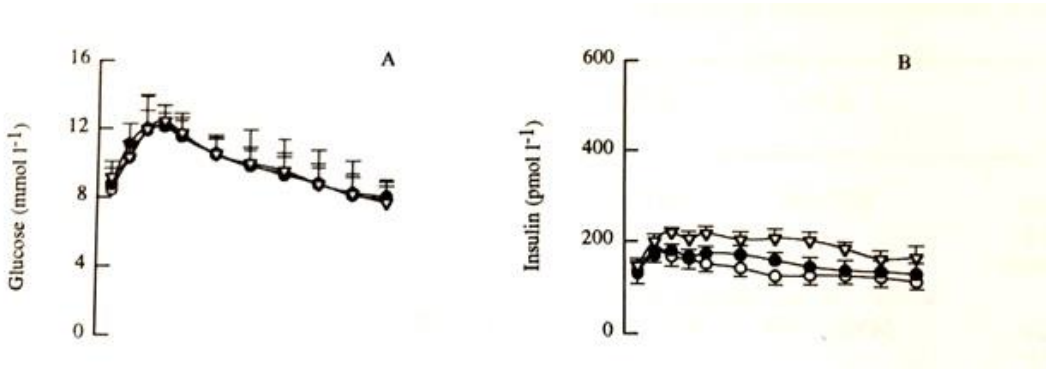
Acute effects of graded alcohol intake on glucose, insulin and free fatty acid levels in type 2 diabetic subjects.
Christiansen C, Thomsen C, Rasmussen O, Glerup H, Berthelsen J, Hansen C, Orskov H, Hermansen K.
Eur J Clin Nutr. 1993 Sep;47(9):648-52.

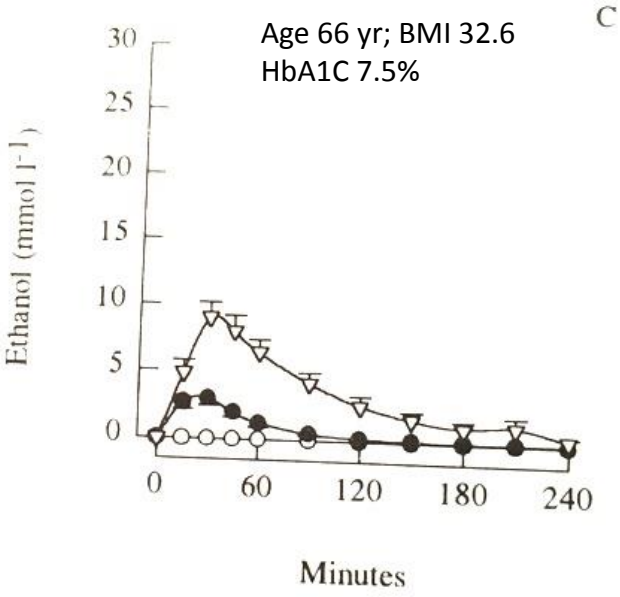
N = 10 subjects with type 2 diabetes (2 diet, 5 SU, 2 Met, 1 SU+Met)

▽ 500 ml beer with 5.4% alcohol

● 500 ml beer with 2.7% alcohol

○ 500 ml beer with 0% alcohol





Intake of small amounts of beer with alcohol does not acutely deteriorate the glycaemic control in type 2 diabetes.

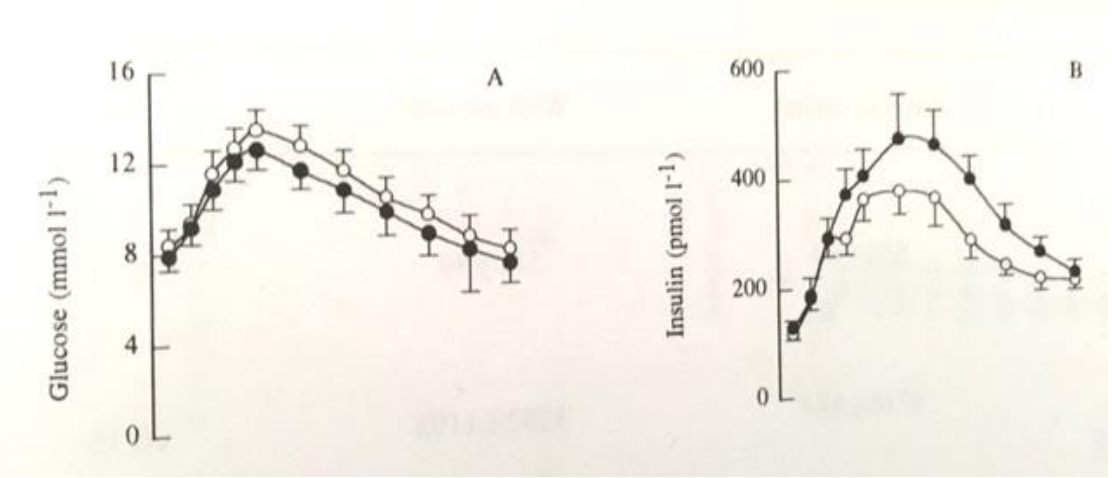
Beer with alcohol results in a dose-related elevation in insulin levels with unaltered blood glucose

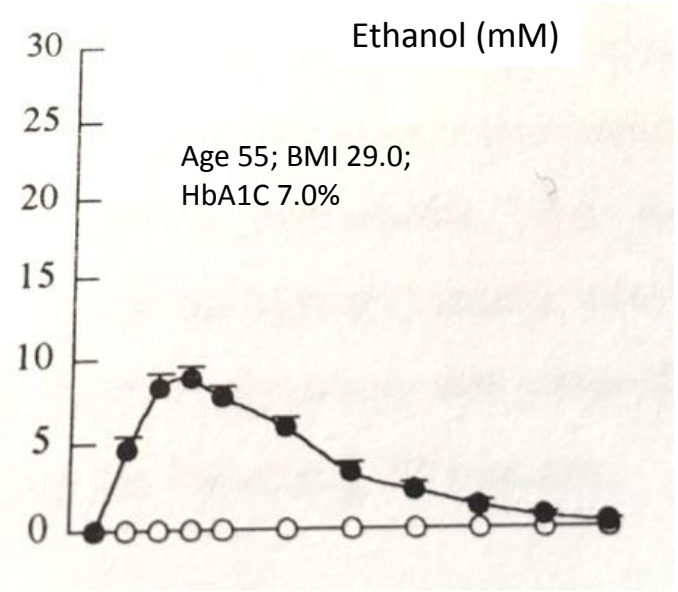
Effect of alcohol on glucose, insulin, free fatty acid and triacylglycerol responses to a light meal in T2D subjects.
Christiansen C, Thomsen C, Rasmussen O, Hauerslev C, Balle M, Hansen C, Hermansen K.
Br J Nutr. 1994 Mar;71(3):449-54

N = 10 subjects with type 2 diabetes (3 diet; 3 SU; 1 Met; 3 SU+Met)

● 500 ml beer with 5.4% alcohol taken with a light meal (1900 KJ)

○ 500 ml beer with 0 % alcohol taken with a light meal (1900 KJ)





A moderate amount of beer with alcohol can be taken with a meal without eliciting hypoglycaemia in type 2 diabetic subjects.

Alcohol intake and blood glucose in diabetes

Diabet Med. 2016 Sep 2. doi: 10.1111/dme.13259
DIABETICMedicine
DOI: 10.1111/dme.13259

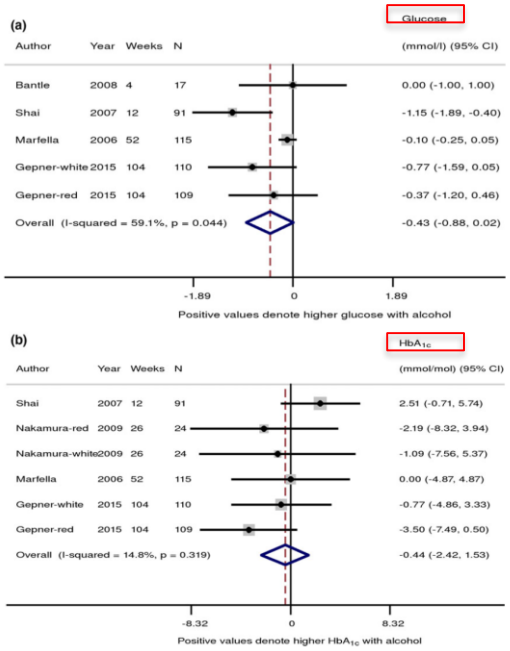
Systematic Review or Meta-analysis

Short- and medium-term effects of light to moderate alcohol intake on glycaemic control in diabetes mellitus: a systematic review and meta-analysis of randomized trials

J. A. Hirst[1], J. K. Aronson[1], B. G. Feakins[1,2], C. Ma[3], A. J. Farmer[1] and R. J. Stevens[1]

[1]Nuffield Department of Primary Care Health Sciences, [2]National Institute for Health Research, School for Primary Care Research, and [3]Department of Biomedical Sciences, University of Oxford, Oxford, UK

Pooled data showed no difference in blood glucose or HbA1c at the end of the study between those who drank 11-18 g alcohol/day (median 13 g/day) for 4-104 weeks and those who did not.



B-glucose

Positive values denotes higher glucose with alcohol

HbA1C

Conclusions

- Studies to date have not provided evidence that drinking light to moderate amounts of alcohol, with or without a meal, affects any measure of glycaemic control in people with Type 2 diabetes.

  Christiansen C et al Eur J Clin Nutr. 1993 Sep;47(9):648-52.

  Christiansen C et al Br J Nutr. 1994 Mar;71(3):449-54

  Hirst JA et al Diabet Med. 2016 Sep 2. doi: 10.1111/dme.13259.

- These results suggest that current advice – "that people with diabetes do not need to refrain from drinking moderate quantities of alcohol/wine/beer" - does not need to be changed; risks to those with type 1 diabetes remain uncertain.

  Alcohol recommendations: Moderate use of alcohol (up to 10 g/day for women and 20 g/day for men) is acceptable for those with diabetes who choose to drink alcohol.

  Mann JI, De Leeuw I, Hermansen K et al Nutr Metab Cardiovasc Dis. 2004 Dec;14(6):373-94.

Agenda

- Three things people with type 2 diabetes fears:

  Weight gain, low blood sugar and heart disease.

- How does beer intake influence risk of heart disease?

How does alcoholic beverages influence on CHD in diabetes?

RESEARCH ARTICLE

Relationships between Diet, Alcohol Preference, and Heart Disease and Type 2 Diabetes among Americans

Michael K. Adjemian[1]*, Richard J. Volpe[2], Jennifer Adjemian[3,4]

PLOS ONE | DOI:10.1371/journal.pone.0124351 May 11, 2015

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Smoker	25	21	33***	31***	20

Meta-analysis of the relationship between alcohol consumption and coronary heart disease and mortality in type 2 diabetic patients

Koppes LLJ et al Diabetologia 2006;49:648-652

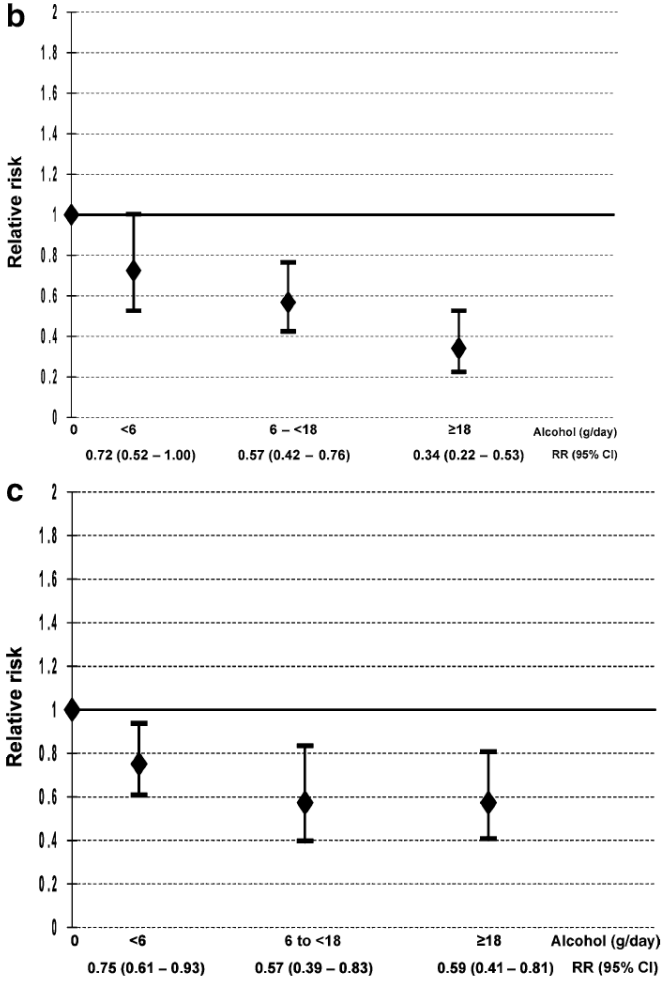

Fig. 1 Pooled relative risk estimates with corresponding 95% CIs of total mortality (**a**), CHD mortality (**b**) and incident CHD (**c**) for the three alcohol consumption categories with non-consumers as the reference category

Coronary Heart Disease Mortality

Incident Coronary Heart Disease

How does alcoholic beverages influence on CHD in diabetes?

L. L. J. Koppes · J. M. Dekker · H. F. J. Hendriks ·
L. M. Bouter · R. J. Heine

Meta-analysis of the relationship between alcohol consumption and coronary heart disease and mortality in type 2 diabetic patients

Diabetologia (2006) 49: 648–652

- In type 2 diabetic patients moderate consumption of alcohol is associated with a lower risk of incident CHD
- In type 2 diabetic patients moderate consumption of alcohol is associated with a lower risk of CHD mortality

Conclusions:

Nutrition, Metabolism & Cardiovascular Diseases (2010) 20, 366–375

available at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/nmcd

Nutrition, Metabolism & Cardiovascular Diseases

REVIEW

Alcohol and type 2 diabetes. A review

A. Pietraszek*, S. Gregersen, K. Hermansen

- Light and moderate alcohol and beer consumption reduce the incidence of type 2 diabetes.
- Moderate intake of beer with alcohol does not increase the risk of low blood glucose in subjects with type 2 diabetes. We do not know how insulin or the newer antidiabetics influence the risk of hypoglycaemia.
- There is indadequate evidence to assess whether moderate beer intake is associated with general or abdominal obesity. The precise effect of beer and alcohol on body weight remains to be determined.
- Long-term moderate alcohol use is associated with increased adiponectin levels, increased insulin sensitivity, reduced fasting insulin plus anti-inflammatory effects and reduced risk of heart diseases.
- Moderate use of alcohol and beer is acceptable for those with diabetes.
- There is a need for more investigations e.g. on metabolic effects of beer as part of the diet in healthy and type 2 diabetic subjects on the newer antidiabetic agents (DPP-4 i, GLP-1RA, SGLT-2i).

Relieved……

THANK YOU FOR YOUR ATTENTION