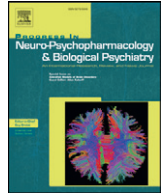




Contents lists available at ScienceDirect

Progress in Neuro-Psychopharmacology & Biological Psychiatry

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



The metabolic syndrome in patients with alcohol dependency: Current research and clinical implications



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ARTICLE INFO

Article history:

Received 25 November 2015
 Received in revised form 3 May 2016
 Accepted 5 May 2016
 Available online 9 May 2016

Keywords:

Alcohol dependency
 Metabolic syndrome
 Leptin
 Type 2 diabetes mellitus
 Hypertension

ABSTRACT

The relationship between alcohol dependency and disorders such as liver disease and cancer has been thoroughly researched. However, the effects of alcohol on cardiometabolic health remain controversial. Several reports found low to moderate alcohol consumption to be associated with a lower risk for cardiometabolic disorders. In contrast, excessive alcohol consumption has been related to an increased risk. Most of these studies were performed in non-clinical populations, therefore limiting the explanatory power to non-dependent patients. Only a few studies examined cardiovascular disorders and cardiovascular risk factors, in particular the metabolic syndrome (MetS), in alcohol dependent patients. We here present a narrative review of studies performed so far on the MetS in alcohol dependency, and provide current hypotheses on the association of alcohol dependency, appetite regulation and the development of the MetS.

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1. Introduction

The metabolic syndrome (MetS) is a cluster of risk factors defined by abdominal obesity, hypertension, dyslipidemia and elevated fasting glucose (Ford et al., 2002). It is estimated that the prevalence of the MetS in the world's adult population is around 20–25%, although individual components of the MetS may vary among populations and population age (Cameron et al., 2004), and although different definitions have

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been provided (see Table 2). Data from the National Health and Nutrition Examination Survey (NHANES) III and NHANESs 1999–2006 show an increase of the MetS from 29.2 to 34.2% in the U.S. adult population (Mozumdar and Liguori, 2011). This increasing trend has also been observed in other regions such as Asian countries and Latin America (Lim et al., 2011; Nestel et al., 2007; Rojas et al., 2010). Therefore, the MetS poses a major challenge for public health professionals and policy makers, and recommendations for healthy lifestyle habits and effective treatment strategies are necessary.

The association of alcohol consumption with the MetS is still controversial. Both, protective and detrimental factors have been reported (Fan et al., 2006, 2008a; Freiberg et al., 2004; Yoon et al., 2004). For example, a population based study in Shanghai adults reported lower prevalence of the MetS in subjects consuming alcohol irrespective of the amount of alcohol intake (Fan et al., 2008b). In contrast, a large study in Korean adults suggested adverse effects of alcohol consumption on all components of the MetS, except for lower concentrations of high density lipoprotein cholesterol (Yoon et al., 2004).

Several epidemiological studies and meta-analyses have described statistically significant associations between low-to-moderate alcohol consumption and cardiovascular disorders (Poli et al., 2013). The beneficial effects of alcohol have mainly been explained by its actions on lipid metabolism and blood coagulability. Serum high-density lipoprotein (HDL) cholesterol levels are higher, and low-density lipoprotein (LDL) cholesterol levels are lower in drinkers compared to non-drinkers (Castelli et al., 1977). Platelet aggregation is inhibited by alcohol, and levels of blood coagulation factors including fibrinogen are lower in drinkers than in non-drinkers (Tozzi Ciancarelli et al., 2011; Rubin, 1999). Insulin sensitivity has been shown higher in drinkers than in non-drinkers (Schrieks et al., 2015).

Different patterns of alcohol consumption have also been associated with a different risk for developing MetS. Light drinking has been demonstrated to be beneficial, while habitual heavy drinking, also known as binge-drinking, is known to be associated with increased cardiovascular risks (Britton and Marmot, 2004; Mukamal et al., 2005). Concerning the association between alcohol consumption and the MetS, a recent meta-analysis demonstrated an inverse association between light-to-moderate alcohol consumption (women: <20 g/d; men: <40 g/d) (Alkerwi et al., 2009). This advantage may be outweighed by the slight

but significant increase risk of cancers of the upper respiratory tract, gastrointestinal tract and breast cancer in otherwise healthy drinkers with moderate alcohol intake.

2. Alcohol-dependency and the metabolic syndrome

However, the above mentioned data have been derived from studies with healthy participants, showing mostly higher HDL, lower LDL, and lower rates of the MetS in drinkers. In contrast, less is known about the MetS risk in clinical populations with alcohol dependence. Only few studies have highlighted on clinical groups, and only two of these studies were performed with a control group (Table 1) (Aneja et al., 2013; Glaus et al., 2013; Jarvis et al., 2007; Kahl et al., 2010; Mattoo et al., 2011, 2013; Teixeira and Rocha, 2007).

In the study by Teixeira and colleagues 170 inpatients from a psychiatric ward in Brazil were included, with 39 male patients fulfilling the criteria for alcohol dependency. In contrast to all other patients (bipolar disorder, major depression, schizophrenia, schizoaffective disorder and other psychiatric diagnoses), patients with alcohol dependency had a considerably low rate for the MetS. In this study, all other patient groups had MetS rates between 23 and 41%, with a preponderance in women. However, patients with alcohol dependency were solely men in this study, what might have influenced the results towards lower MetS rates (Teixeira and Rocha, 2007).

In the study by Mattoo et al., 69 male patients with alcohol dependency from a drug de-addiction center were assessed. The rate of the MetS in these study was 24%, which was slightly higher compared to the Jarvis et al. study who found a 22% prevalence among 46 males and females mostly comorbid with nicotine dependence in a residential drug treatment facility. However, the explanatory power of these studies is limited, since no control group was included (Mattoo et al., 2011, 2013).

In the study by Glaus et al. data from the population-based “PsycoLaus” study with a total of 6736 probands were used to determine cardiovascular risk factors. The risk for having the MetS was slightly, although not significantly higher in the 178 patients diagnosed with alcohol dependency. The risk for dyslipidemia was significantly higher in alcohol dependency, pointing to an influence of alcohol on lipid metabolism (Table 1) (Glaus et al., 2013).

In the study by Kahl et al. 197 patients with alcohol dependency were included and compared to a control group from the general population. Patients were recruited at a drug treatment facility after

Table 1
Studies examining the metabolic syndrome in patients with alcohol dependence.

Study	N	Control group	MetS definition	% Male	Age (y)	WC (cm)	BP (syst/diast; (mm Hg)	TG (mg/dL)	HDL (mg/dL)	FG (mg/dL)	% MetS
Teixeira and Rocha (2007)	39	Other psychiatric disorders	NCEP-ATPIII	100	47.5	88.5	119/71	145.3	58.9	105.3	5.1
Jarvis et al. (2007) ^a	46	None	NCEP-ATPIII	60.8	34.8	n.s. ^a	120/85	193	56	90	22
Kahl et al. (2010)	197	Matched controls	AHA/NHBLI	67.8	47.2	93.1	138/87	183	81	99	30.9 (increased)
Mattoo et al. (2011) ^b	69	None	IDF	100	37.4	87.8	119/79	189	55	103	24.6
Glaus et al. (2013) ^c	178	Healthy controls, other psychiatric disorders	NCEP-ATPIII	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	Increased dyslipidemia
Mattoo et al. (2013) ^d	97	Other psychiatric disorders	IDF	100	40.3	49.5%	36.1%/35.1%	55.7%	9.3%	9.3%	21.6
Aneja et al. (2013)	100	Healthy adults	IDF NCEP-ATPIII	100	41.6	89.5	122/81	158.2	53.1	98.6	IDF: 27 NCEP: 18 (decreased)

Legend: Few studies have determined the prevalence of the MetS in alcohol dependence. Most of these studies found disturbed lipid metabolism with hypertriglyceridemia and increased high density lipoprotein cholesterol. In studies with a control population, the prevalence of the MetS was found increased.

n.s.: not specified; N: number of alcohol dependent patients in the study; MetS: metabolic syndrome; WC: waist circumference; BP: blood pressure (systolic, diastolic); TG: triglyceride; HDL: high density lipoprotein; FG: fasting glucose; NCEP-ATPIII: MetS defined according to the National Cholesterol Education Program – Adult Treatment Panel III; IDF: International Diabetes Federation; AHA/NHBLI: American Heart Association/ National Lung, Heart and Blood Institute.

^a In the Jarvis et al. study 15% of women and 26% of men fulfilled the WC criterion.

^b In the Mattoo et al. study, MetS data were presented for both patients with alcohol dependence (N = 69) and with opioid dependence (N = 41). Both groups did not differ in MetS and MetS factors.

^c In the Glaus et al. study, dyslipidemia and an increased risk for MetS were observed.

^d In the Mattoo et al. (2013) study, percentages of patients fulfilling the single MetS criteria are given.

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