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Cognitive behavioral smoking cessation during alcohol detoxification treatment: A randomized, controlled trial

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ABSTRACT

Background: Among alcohol-dependent subjects tobacco smoking is very common and causes a variety of health risks. Therefore, it is necessary to reach this high-risk population early with appropriate smoking interventions.
Methods: Smokers in alcohol detoxification treatment were offered to participate in a smoking cessation study. A total of 103 patients was enrolled and randomly assigned to either the experimental group (EG) receiving a cognitive behavioral smoking cessation treatment (CBT) or the control group (CG) receiving autogenic training. Smoking outcomes were measured by self-report and carbon monoxide levels, directly after intervention and 6 months later, where additionally alcohol outcomes were recorded.
Results: There were no differences in smoking quit rates directly after intervention. However, patients in the EG were significantly more likely to reduce their daily cigarette use compared to CG ($p = .046$). Subgroup analyses revealed that heavy smokers (FTND score ≥ 7) seemed to profit most in the EG regarding cigarette reduction. After 6 months, these positive effects had leveled out. No evidence was found that smoking cessation might jeopardize alcohol outcomes.
Conclusions: Results suggest that alcohol-dependent smokers are interested in smoking interventions even during alcohol detoxification. CBT is promising in short-term smoking outcomes and in the approach of harm reduction, however, long-term effects are desirable. These findings underline the feasibility and the importance to provide smoking cessation interventions to patients in alcohol detoxification treatments.

1. Introduction

Tobacco smoking is related to a number of severe vascular health risks and carcinoma (Schmidt et al., 2006). Alcohol dependence on its own is harmful, but in combination with tobacco smoking health risks on the upper aero-digestive tract are synergistic (Pelucchi et al., 2006). Alcohol-dependent heavy smokers sustain a 35 fold higher risk to get carcinoma in pharynx or larynx (Zeka et al., 2003). Every alcohol-attributable death is accompanied by about 30 years of life lost (CDCP, 2004). Among alcohol-dependent patients 70–95% have a comorbid tobacco dependence (Batel et al., 1995; Bien and Burge, 1990; Burling and Ziff, 1988; John et al., 2003) compared to 25–30% in general population (WHO, 2011). Increased smoking is connected to increased alcohol drinking and vice versa (Barrett et al., 2006; Burton and Tiffany, 1997; Daeppen et al., 2000) indicating the strong interconnection of the two substances.

Despite these alarming consequences, this problem gained only little interest in research because of the myth that alcohol-dependent patients are less motivated to quit smoking. Literature gives evidence that alcohol-dependent smokers find it more difficult to stop smoking than smokers without an alcohol problem (Burling et al., 1997; Cooney et al., 2007; Hays et al., 1999; Hughes and Kalman, 2006). The assumption the difference may be the motivation to quit smoking can be denied. In a self-report study 81% of alcohol-dependents tried to quit smoking but succeeded in only 7% compared to 49% of smokers without an alcohol problem (DiFranza and Guerrera, 1990). Furthermore, tobacco smoking is suggested to be the lesser evil than alcoholism (Gulliver et al., 2006). In fact, tobacco smoking exhibits almost no harmful short-term consequences but most alcoholics die due to tobacco related long-term consequences (Hurt et al., 1996). Another myth is that smoking cessation is suggested to impede alcohol sobriety (Gulliver et al., 2006). However, literature predominantly concludes that there are no negative effects of smoking interventions for threatening abstinence (Cooney et al., 2007; Hurt et al., 1994; Metz et al., 2005a;

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Saxon et al., 2003). Smoking cessation can even have a preventive, beneficial effect on alcohol outcomes (Baca and Yahne, 2009; Batra et al., 2011; Bobo et al., 1998; Grant et al., 2007; Kohn et al., 2003; Prochaska et al., 2004; Tsoh et al., 2011).

Smoking cessation rates among patients with substance use disorders (SUD) in recovery are consistently higher than in addiction treatment centers (Prochaska et al., 2004). Studies with active interventions in comparable residential treatments reveal short-term cessation rates of 9–22% (Hurt et al., 1994; Kalman et al., 2001; Metz et al., 2005b; Saxon et al., 1997) and 6 months follow-up outcomes of 2–18% (Baca and Yahne, 2009; Burling et al., 2001; Gariti et al., 2002; Metz et al., 2005b).

In the present study, we compared the efficacy of a cognitive behavioral smoking cessation (CBT) to that of autogenic relaxation training (AT) during alcohol detoxification treatment. First, we hypothesized that the CBT intervention would yield in significantly higher smoking quit rates than AT. Second, we hypothesized that the reduction of 50% or more would be higher in CBT than in AT. Both hypotheses were investigated directly after intervention and 6 months later. Finally, it was hypothesized that smoking cessation would not jeopardize alcohol outcomes 6 months later.

2. Methods

2.1. Study design and procedure

The study was a prospective, randomized, controlled clinical trial consisting of an intervention phase and a 6-month follow-up. Inpatients were screened for a smoking anamnesis and motivated to participate in a smoking cessation study simultaneous to alcohol detoxification treatment. Oral explanation and written study information was given to interested patients. After providing signed informed consent, patients were randomly allocated to either experimental group (EG) receiving cognitive behavioral smoking cessation (CBT) or control group (CG) receiving the relaxation technique autogenic training (AT). With patients in both groups baseline interview took place within the first week, followed by the intervention phase including five 30-min group-sessions in the last 2 weeks ending with a post interview. After 6 months all participants were invited to follow-up interview.

The EG received a modified version of a manual guided CBT program (Batra and Buchkremer, 2004) with additional information regarding the harm of concomitant use of alcohol and tobacco. The CBT program included regular CO-level measurements in every session, dealt with motivational processes, education about nicotine and its effects, psychological factors in addiction, a stop date if patients intended to quit and elements of relapse prevention. The CG practiced AT, a non-evidence based method regarding smoking cessation (Marques-Vidal et al., 2011). Both groups were clinically supervised and received treatment as usual. Patients intending to quit smoking were offered transdermal nicotine patches (NR-patch 21 mg) only during inpatient stay independent of group allocation. All assessments and intervention sessions were conducted by two psychologists trained in CBT with 3 years of experience in addiction treatment. The study was approved by the local ethic committee and registered in www.clinicaltrials.gov with the identification number NCT00963482.

2.2. Participants

Participants were recruited from a 21-day inpatient alcohol detoxification unit at the Psychiatric Clinic of the University of Basel, Switzerland from July 2007 to August 2010. The psychiatric hospital has a total smoking ban since 2007. Because the detoxification ward has locked doors, a smoking room without any chairs or comfort is available. Patients were eligible if they were alcohol-dependent according to ICD-10 criteria (Dilling et al., 2005), tobacco smokers, motivated to either stop or reduce their tobacco use, between 18 and 65 years old, and staying long enough to complete study intervention (>10 days). Participants were excluded if they took medication supporting smoking cessation (e.g., Varencline, Bupropion), simultaneously participated in another smoking cessation treatment, were pregnant, had insufficient German language knowledge or were mentally not capable to understand study information. Additional psychiatric disorders and SUD were not exclusion criteria as the sample was intended to be a convenience sample. As the trial was primarily designed to study the effectiveness of CBT, medication supporting smoking cessation was excluded in order not to be biased by smoking quit medication, but none of the participants had to be excluded for that reason.

2.3. Study assessment

The Fagerström test for nicotine dependence (FTND; Bleich et al., 2002) was used to assess the severity of tobacco dependence. Additionally, the number of smoked cigarettes per day and the parameter pack years, indicating the inhaled tobacco doses over the years, were asked. Alcohol dependence was classified by using the ICD-10 criteria. Alcohol use was measured by asking the amount of standard drinks per day prior treatment and by using the alcohol use disorder identification test (AUDIT; Saunders et al., 1993). To measure tobacco and alcohol craving at baseline visual analogue scales (VAS) ranging from 0 to 100 with the anchor "no craving at all" up to "the strongest craving I know" were used. Attitudes such as *importance* to quit and *self-efficacy* regarding smoking cessation were measured by VAS at baseline, after intervention and at follow-up. Moreover, questions regarding the stages of change model (Prochaska and DiClemente, 1983) concerning the stage *preparation* "Are you seriously planning to stop smoking soon?" and the stage *action* "Have you tried stop smoking lately?" were asked. Breath carbon monoxide (CO) level was measured using a portable Bedfont Smokerlyzer to corroborate smoking status at baseline, after intervention and at follow-up. A level of 10 ppm or more indicated a regular tobacco smoker, levels below 10 ppm referred to smoking abstinence. Urine samples to verify nicotine exposure by urinary cotinine (nicotine metabolite) were taken after intervention and at 6-month follow-up and to detect any alcohol use in the past 3 days the biomarker ethyl glucuronide (EtG) was determined in urine only at follow-up in urine.

The main variable of interest was the smoking cessation rate, defined as smoking zero cigarettes and having a breath carbon level of less than 10 ppm. At 6-month follow-up self-report of smoking in the last 7 days (7-day point-prevalence), CO-level and cotinine were used to verify tobacco abstinence. Reduction rate was defined as reducing the amount of cigarettes by 50% or more compared to initial use.

2.4. Data analysis

For comparison of nominal data such as drop-outs or dichotomous variables Chi^2 calculations were used. All comparisons of continuous data were calculated using one-way ANOVAs or independent *t*-tests. Within-group comparisons of continuous variables were performed using dependent *t*-tests or repeated measurement ANOVAs, as used for sub-group analyses. Because the sample size was too small to detect a statistical difference effect sizes were calculated to confirm the clinical significance, i.e. clinical advantage according to the formula $\varepsilon = xu - x1/\sigma u$ (Bortz, 2005). An effect size of $\varepsilon \geq 0.80$ indicates a strong effect, $\varepsilon \geq 0.50$ a medium effect and $\varepsilon \geq 0.20$ a weak effect. All tests of significance were reported as two-tailed using alpha level of 0.05. All calculations were held as intention-to-treat analysis if not other specified. Statistical analyses were calculated by using the software SPSS version 19.0 for Windows.

3. Results

3.1. Recruiting process and baseline characteristics

Of 237 eligible alcohol-dependent patients 103 patients (43.5%) gave their written informed consent (Fig. 1). The intervention phase was completed by 87 patients (84.5%). The follow-up interview was attended by 58 patients (56.3%; EG: $n = 25$, CG: $n = 33$) without any group difference ($Chi^2 = 3.708$, $p = .054$). No difference in drop-outs was observed at any time. Baseline characteristics were similar in both groups (Table 1). The only trend was, that EG referred to smoke 25.5 cigarettes compared to CG with 30.5 cigarettes per day, without reaching statistical significance ($p = .066$). According to the first item of the FTND 'smoking the first cigarette within 30 min of awaking' (Pomerleau et al., 1990) 80.6% were defined as physical highly nicotine dependent.

3.2. Smoking outcomes after intervention (short-term outcomes)

After the intervention 6 patients (5.8%) achieved the status smoke-free, without any group difference (EG: $n = 4$ (7.5%) vs. CG: $n = 2$ (4%)) as presented in Fig. 2. All six patients were male and their breath carbon monoxide level was on average 2.5 ppm, corroborating smoking abstinence. Five out of 6 patients made use of the NR-patch offer. After the intervention 25 patients (24.3%) achieved the 50 percent reduction of tobacco use (EG: $n = 17$ (32%) CG: $n = 8$ (16%)) reaching statistical significance ($Chi^2 = 3.617$, $p = .046$; Fig. 2). CO-levels did not differ between the groups reaching reduction (EG = 13.2 ppm vs. CG = 13.3 ppm). The 6 smoke-free patients were also included in the smoking reduction analysis.

Though in both groups a decrease of the number of cigarettes was observed ($t(86) = 7.193$, $p < .001$), the EG reduced their daily cigarettes significantly more than the CG (16.4 vs. 23.4;

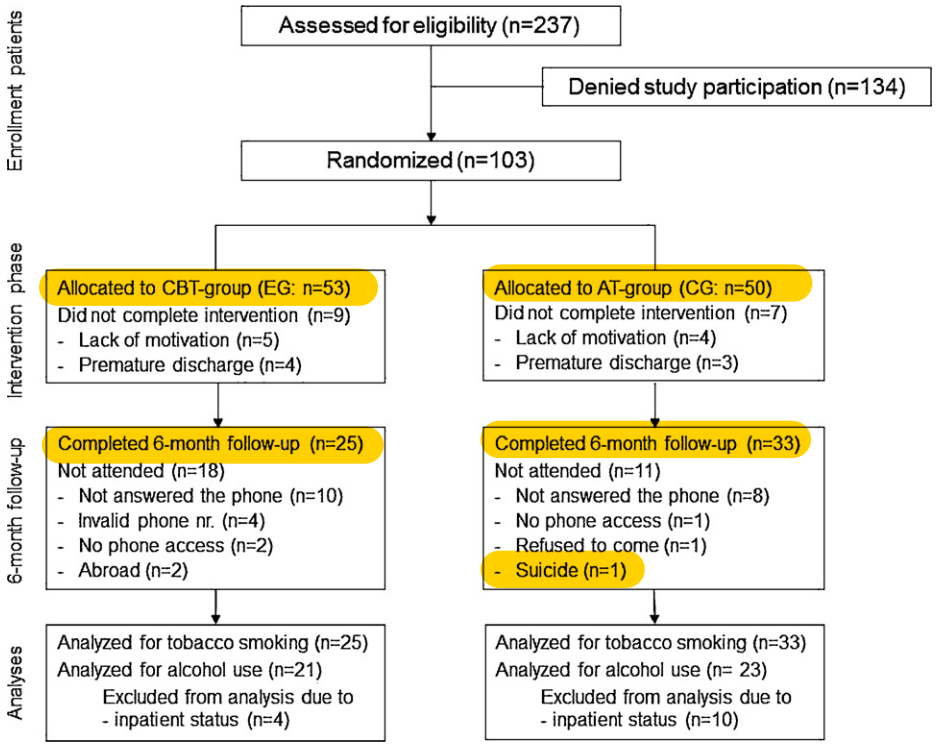

Fig. 1. Recruiting process according to CONSORT.

$t(86) = -2.317$, $p = .023$; Fig. 3). Calculated effect sizes for successful cigarette reduction revealed a strong effect in the EG with $\varepsilon = 0.77$ and a medium effect in the CG with $\varepsilon = 0.49$.

CO-levels decreased significantly over time ($t(85) = 5.272$, $p < .001$), with a trend in favor of the EG ($p = .076$) but without significant difference between both groups (Fig. 4). Effect sizes regarding CO-levels showed stronger effects in the EG ($\varepsilon = 0.74$) than in the CG ($\varepsilon = 0.30$). Totally 24 patients (23.3%) used NR-patches (EG: $n = 14$, CG: $n = 10$), between 1 and 10 days (EG: $n = 9$, CG: $n = 9$) and between 21 and 63 days (EG: $n = 5$, CG: $n = 1$).

3.3. Smoking outcomes at 6-month follow-up (long-term outcomes)

At 6-month follow-up 3 patients (2.9%) reported tobacco abstinence during the last 7 days corroborated by a mean CO-level of 3 ppm. These 3 patients (1 female) belonged to the CG (6%). The woman was smoke-free, but reported to use 7 nicotine gums a day. One man just stopped smoking the week before follow-up by using NR-patches and the other man was smoke-free since the intervention using NR-patches continuously. This was the only one with a cotinine level of 0 ng/l. Three other patients (EG: $n = 2$, CG: $n = 1$) reported smoke-free days in the last week. In total 16 patients (15.5%) showed a successful smoking reduction 6 months later, of which 6 patients belonged to the EG (11.3%) and 10 patients to the CG (20%) without significant difference (Fig. 2). CO-levels corroborated the smoking reduction rate, with a mean CO-level of 14.9 ppm for patients reporting successful reduction compared to 31.8 ppm for patients failing a reduction ($F(1,56) = 16.339$, $p < .001$).

The number of cigarettes at 6 months was similar in both groups (EG = 21.8, CG = 25.4), corresponding to effect sizes of $\varepsilon = 0.33$ and $\varepsilon = 0.36$ compared to study start (Fig. 3). Repeated measurement

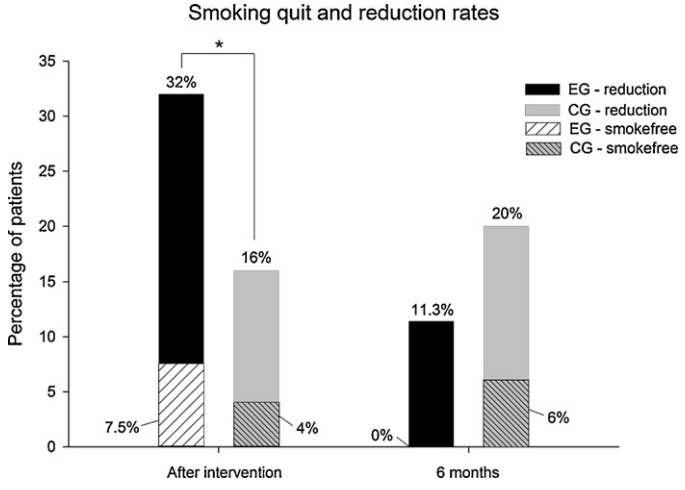

Fig. 2. Smoking quit and reduction rates according to treatment groups after intervention and after 6 months. *$p = .046$; EG, experimental group; CG, control group.

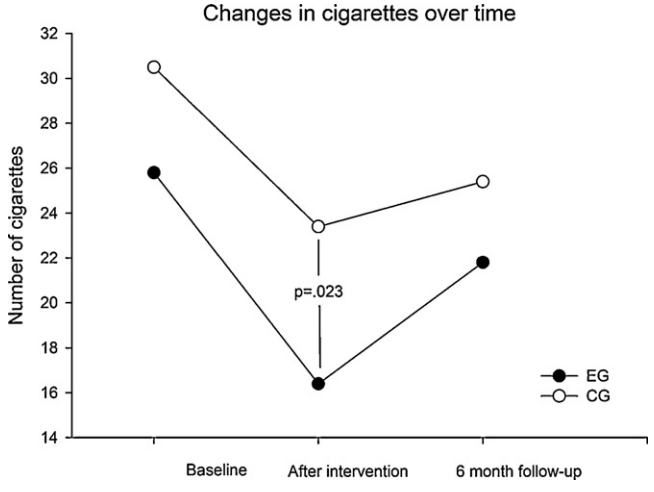

Fig. 3. Changes in the number of daily smoked cigarettes over study time. EG, experimental group; CG, control group.

Table 1
Baseline characteristics.

	Experimental group (EG, $n = 53$) N (%)	Control group (CG, $n = 50$) N (%)
Female	16 (30.2)	14 (28.0)
Marital status		
Unmarried	29 (59.2)	19 (41.3)
Married	11 (22.4)	16 (34.8)
Divorced/separated	9 (18.4)	11 (23.9)
Education		
Standard school (9 years)	9 (18.4)	14 (30.4)
Job training after school	24 (49.0)	17 (37.0)
Secondary school (≥12 years)	15 (30.6)	14 (30.4)
Something else	1 (2.0)	1 (2.2)
Positive family history of alcohol dependence		
Fathers	12 (26.1)	15 (34.9)
Mothers	3 (6.3)	4 (9.1)
Positive family history of tobacco dependence		
Fathers	30 (65.2)	34 (79.1)
Mothers	16 (33.3)	12 (27.3)
Additional substance use disorders (SUD)[a]	22 (41.5)	27 (54.0)
Daily alcohol consumption before entry	39 (81.3)	39 (84.8)
Abstinent episode from alcohol		
0–1	18 (45.0)	15 (40.5)
2–5	15 (37.5)	10 (27.0)
>5	7 (17.5)	12 (32.4)
	Mean (SD)	Mean (SD)
Age (years)	44.0 (11.0)	44.0 (9.0)
BDI	14.1 (10.2)	11.6 (7.4)
Age of onset smoking (years)	17.8 (5.8)	18.0 (5.8)
Years of smoking total	25.7 (11.0)	24.9 (9.5)
FTND	6.2 (2.4)	6.4 (2.5)
Number of cigarettes	25.5 (12.1)	30.5 (14.2)
CO-level (ppm)	32.9 (15.8)	32.8 (18.6)
Pack years	33.9 (20.0)	34.0 (18.2)
Nicotine craving (VAS)	50.8 (24.2)	57.1 (28.0)
Age of onset of the alcohol problem	32.2 (9.8)	30.7 (10.7)
Duration of alcohol problem (years)	11.75 (9.5)	13.95 (9.9)
AUDIT	24.3 (9.3)	23.8 (8.1)
Standard drinks per day	19.5 (13.3)	20.2 (15.0)
Alcohol craving (VAS)	13.3 (21.6)	11.3 (18.0)

[a] For additional SUD's current and remitted SUD's were counted, misuse patterns were excluded. BDI, Beck Depression Inventory; FTND, Fagerström test for nicotine dependence; ppm, parts per million; VAS, visual analogue scale (0–100); AUDIT, alcohol use disorder identification test.

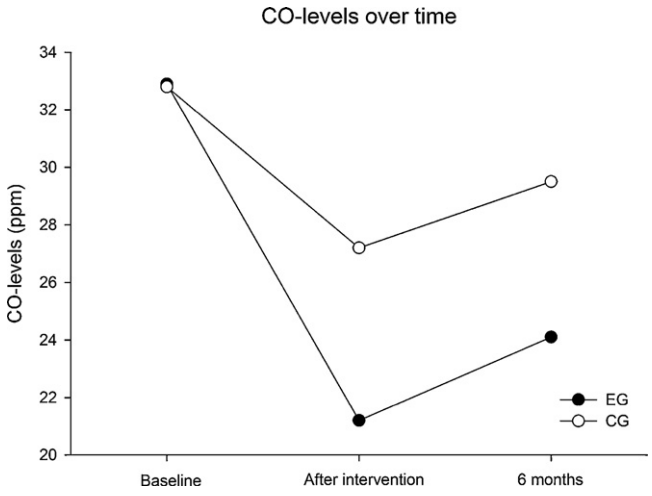

Fig. 4. Changes in CO-levels by treatment group over study time. EG, experimental group; CG, control group.

ANOVA revealed that in both groups the CO-level declined over time ($F(1,56) = 9.434$, $p < .001$), without any group difference (Fig. 4). Effect sizes of CO-levels showed a medium effect of $\varepsilon = 0.56$ for the EG and a small effect of $\varepsilon = 0.18$ for the CG.

3.4. Attitudes regarding smoking cessation

At study start variables such as *importance* and *self-efficacy* as well as *preparation* and *action* to quit smoking did not differ between EG and CG. Directly after the intervention, however, the EG rated the score *importance* to quit significantly higher than the CG (81.9 vs. 71.4, $t(83) = 2.107$, $p = .039$) and exhibited significantly higher self-efficacy scores compared to the CG (70.5 vs. 54.1, $t(83) = 2.775$, $p = .007$). After the intervention participants in the EG also were significantly more likely to agree being in the stage of *preparation* with 79.5% vs. 51.2% ($Chi^2 = 7.754$, $p = .005$) and approved having made significantly more attempts to stop smoking (stage *action*) compared to the CG (52.3% vs. 23.3%, $Chi^2 = 7.777$, $p = .005$). At 6 months follow-up, however, all these effects leveled out.

3.5. Subgroup analyses regarding smoking severity

Sub-group analyses were conducted to analyze if severity of tobacco dependence has an impact on smoking outcomes. According to the FTND score ≥ 7, 54 patients (52.4%) were classified as heavy smokers (EG: $n = 30$, CG: $n = 24$) and 49 patients (FTND < 7; 47.6%) as moderate smokers (EG: $n = 23$, CG: $n = 26$). Heavy smokers differed from moderate smokers in baseline variables, such as cigarettes per day (33.4 vs. 21.8; $F(1,93) = 22.162$, $p < .001$), CO-level (36.8 ppm vs. 28.5 ppm; $F(1,99) = 6.198$, $p = .014$), pack years (41 vs. 26.2; $F(1,93) = 16.691$, $p < .001$) and tobacco craving score (60.6 vs. 46.3; $F(1,93) = 7.552$, $p = .007$) confirming the validity of these group assignments. Heavy and moderate smokers differed neither in the number of additional SUD nor in the AUDIT score, but they differed significantly in the number of daily standard drinks prior to admission (24 vs. 15, $t = -3.32$, $p < .001$). Moderate smokers were significantly more likely to refer about a cessation attempt during the last 12 months (17 (34.7%) vs. 7 (13%), $p = .009$) and scored significantly higher in the *self-efficacy* score regarding a smoking quit (47 vs. 62, $F(1,101) = 6.061$, $p = .016$) at baseline compared to heavy smokers.

Generally, no differences in the smoking quit or reduction rate (≥50%) were found between heavy and moderate smokers. A repeated measurement ANOVA was computed to analyze the number of daily cigarettes by using heavy vs. moderate smokers as a covariate. The within-factor cigarette was significantly reduced over time ($F(1,84) = 20.827$, $p < .001$), the between-factor treatment group $F(1,84) = 7.004$, $p = .010$) and the covariate revealed significance ($F(1,84) = 20.811$, $p < .001$), indicating an important influence of the severity of tobacco dependence. Due to this finding repeated measurement models were calculated separately for each severity group. Among moderate smokers the within-factor number of cigarettes was significantly decreased ($F(1,39) = 24.253$, $p < .001$), without any group difference. However, among heavy smokers, not only the within-factor number of cigarettes ($F(1,44) = 27.902$, $p < .001$) but also the between-factor treatment group ($F(1,44) = 13.261$, $p = .001$) reached significance, indicating considerably higher likelihood to reduce cigarettes in the EG. After 6 months these effects were leveled out (Fig. 5).

3.6. Alcohol outcomes at 6-month follow-up

Totally 44 out of 58 (75.9%; EG: $n = 21$, CG: $n = 23$) patients were included in the analyses of 6-month alcohol outcomes. The remaining 14 patients (24.1%) were excluded due to

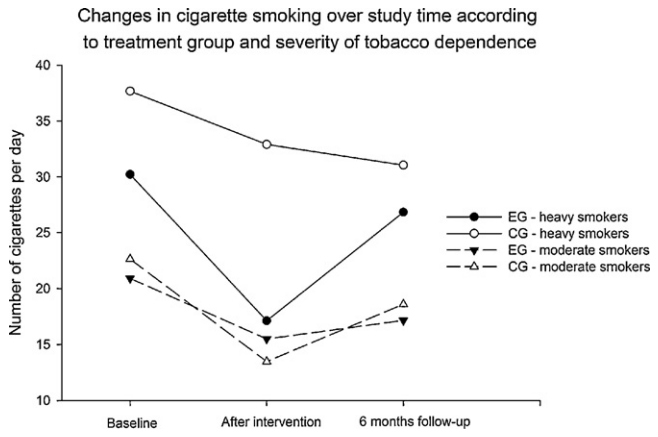

Fig. 5. Changes in number of cigarettes over study time according to treatment groups and severity of tobacco dependence. EG, experimental group; CG, control group.

re-hospitalization at this time, which would not reflect the natural history of alcohol use.

Urine samples (42 valid) revealed in 50% positive EtG results ($n = 21$) indicating alcohol use in the past 3 days. No difference in self-report regarding alcohol use was found, 19 patients (EG: $n = 10$, CG: $n = 9$) reported abstinence and 25 reported alcohol use (EG: $n = 12$, CG: $n = 13$) in the past 7 days. Combining these two variables resulted in 17 patients being verifiably abstinent from alcohol at follow-up. Per protocol analysis revealed a relapse rate of 61.4% (27/44) while an intention-to-treat analysis revealed a relapse rate of 80.5% (86/103) after 6 months. No difference in alcohol use regarding group allocation was found. Further calculations whether a successful smoking reduction might influence 6-months alcohol outcomes were made. Eleven out of 44 patients achieved a post treatment smoking reduction, 5 were abstinent and 6 were drinking alcohol again.

4. Discussion

The present study revealed short-term and 6-month follow-up cessation rates without any group difference. Thus, our primary hypothesis that the EG yielded in higher smoking quit rates could not be supported. Though modest, the 7-day point-prevalence quit rate of 2.9% after 6 months was in line with the literature reporting tobacco quit rates from 2 to 18% at 6 months (Baca and Yahne, 2009). It also was clinically significant since costs per treatment are very economical compared to health gains and prevention of premature death (West, 2007).

Focusing on the reduction rate directly after intervention there was a significantly higher proportion of patients achieving the reduction rate of ≥50% in the EG compared to the CG, suggesting superiority of CBT in near-term smoking outcomes. However after 6 months this effect was attenuated, confirming our second hypothesis of a superior smoking reduction outcome in CBT only partially, namely in near-term outcomes. The fact, that both groups achieved to reduce the number of cigarettes with a better outcome in CBT, may be explained by different factors. All patients enrolled in this study were motivated to change their smoking behavior. Furthermore, the placebo effect might have influence in both groups, namely if someone participates in a study *it has* to help. Finally, hospitalization per se might have played a role. In a 21-day detoxification treatment study (Olbrich et al., 2008) the active group receiving a smoking intervention reduced their cigarettes while the control group tended to increase their cigarettes. Another study found evidence that without any smoking intervention moderate smokers tend to increase and heavy smokers tend to decrease their amount of cigarettes smoking after detoxification treatment (Aubin et al., 1999). The present smoking reduction rate of 15.5% after 6 months is also clinically significant in the respect of harm reduction, which is thought to rather increase probability for future cessation attempts (Hughes and Carpenter, 2006).

In the present study heavy smokers reported of more standard drinks prior to admission than moderate smokers reflecting the strong interrelationship of both substances supporting Barrett et al. (2006) and Daeppen et al. (2000). In the relatively small follow-up sample no differences in alcohol outcomes at 6 months were found, suggesting that smoking interventions did not jeopardize alcohol outcomes. This was in line with other reports (Baca and Yahne, 2009; Prochaska et al., 2004) and supported our third hypothesis that smoking cessation have no negative impact on alcohol outcomes.

The present participation rate of 43.5% is comparable to other inpatient settings addressing tobacco smoking in substance abusers, ranging from 24 to 40% in SUD patients (Batra et al., 2011; Saxon et al., 1997). This rate reflected a high interest and feasibility of smoking interventions even in alcohol detoxification treatment and underline the statement "offering smoking interventions in substance use disorder treatments is an obligation" (Prochaska, 2010), and ought to be a moral responsibility in health care systems (West, 2007).

The benefit of CBT in this study was predominantly seen in near-term smoking reduction outcomes, but it was also reflected by positive changes of attitudes regarding a smoking stop. Short-term outcomes showed increased values of *importance* and *self-efficacy* regarding a smoking stop in EG compared to CG. The CBT program seemed to activate motivational processes probably due to an active discourse about smoking behavior. The lack of effect after 6 months can be explained by the fact that measuring attitudes is a picture of a particular moment and that patients who just tried to quit and failed are frustrated as reflected in the scores of motivational processes.

The severity of tobacco dependence has an influence on smoking cessation because patients with low FTND scores are more likely to quit smoking by themselves (Bobo et al., 1996; Karam-Hage et al., 2005). Calculated sub-group analyses in this study revealed that heavy smokers in the EG reduced their daily cigarette use significantly more compared to all other groups, while moderate smokers in both groups reduced their daily cigarettes slightly. It might be speculated that moderate smokers who are motivated do not need intense support. However, after alcohol detoxification without smoking intervention heavy smokers tend to reduce their smoking while moderate smokers increase their smoking (Aubin et al., 1999). Against this background it could be expected that heavy smokers would reduce their cigarettes after detoxification, but it was the CBT that helped heavy smokers in the EG to reduce smoking significantly more than those in the CG. On the other hand moderate smokers in the present study also achieved to reduce their daily cigarettes, reflecting the support of the study or patients' motivation.

The 6 months quit rate of 2.9% and the result with zero % in the EG was rather low. However, as the study population was a convenience sample, open for almost all alcohol-dependent patients, regardless of psychiatric comorbidities or severe somatic diseases the sample had a high burden of morbidities. Smoking cessation in a detoxification ward with locked doors is difficult. One influencing factor is that there are patients staying involuntarily who may affect the group dynamic negatively. Another factor is that patients often report that cigarette smoking helps them to cope with stress due to withdrawal symptoms. Nevertheless in the study course CBT showed superiority in short-term reduction outcomes, especially in heavy smokers and in increasing motivational processes. It might be speculated, that the positive effects of CBT only

sustain, when patients are in active CBT treatment and that positive effects of CBT were just lost some time before follow-up. It might be speculated that even as non-evidence based method AT have helped a subgroup of smokers, e.g., stress-relief smokers and thus elevated the smoking cessation rate in CG. Nevertheless the present results show successful near-term but not long-term smoking outcomes which is in line with recently published data (Carmody et al., 2012; Prochaska et al., 2004). Moreover it underlined the problem that smoking interventions in SUD have a lack of long-term success (Baca and Yahne, 2009; Burling et al., 1997; Cooney et al., 2007).

In conclusion, the present results revealed a high acceptance and interest of patients in smoking cessation even during an alcohol detoxification treatment. The smoking reduction rate and motivational processes regarding a smoking quit were significantly increased after intervention in the EG compared to the CG indicating a successful harm-reduction intervention by CBT. Especially alcohol-dependent heavy smokers profited from cognitive-behavioral smoking cessation offers. CBT is a promising approach in short-term outcomes, but further research is needed to achieve similar benefits regarding long-term outcomes.

The high proportion of patients interested in smoking cessation during alcohol detoxification treatment and the fact that it seems not to influence alcohol outcomes should encourage clinical practitioners to offer both treatments to their patients and that a detoxification treatment can be seen as a window of opportunity for smoking interventions.

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Contributors

Gerhard Wiesbeck and Sylvie Petitjean designed the study and wrote the protocol for the FOPH. Sylvie Petitjean and Sandra Mueller planned and organized the study. Bigna Degen and Sandra Mueller were responsible to run the study. Sandra Mueller undertook the statistical analyses and wrote the first draft of the manuscript. All authors made substantial contributions and approved the final manuscript.

Conflict of interest

No conflict declared.

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