

Case Report

The Role of Exercise Therapy as a Complementary Measure in the Addiction Treatment of a Multiply Impaired Alcohol-Dependent Client: A Case Report

Esther Sophia Giesen* and Wilhelm Bloch

Department of Molecular and Cellular Sport Medicine, German Sport University Cologne, Germany

***Corresponding author**

Esther Giesen, Department of Molecular and Cellular Sport Medicine, Institute of Cardiovascular Research and Sport Medicine, German Sport University Cologne, Am Sportpark Müngersdorf 6, 50933 Köln, Germany, Tel: 49-221-99875680; Fax: 49-221 4982 8370; Email: esther.s.giesen@gmail.com

Submitted: 18 September 2015

Accepted: 05 January 2016

Published: 06 January 2016

Copyright

© 2016 Giesen et al.

OPEN ACCESS**Keywords**

- Alcohol dependence
- Exercise therapy
- Residential treatment
- Recovery

Abstract

A 37 year old client is unable to cope with everyday life on his own due to his severe alcohol dependence syndrome with severe physical and psychosocial consequences and is therefore housed in a socio-therapeutic setting. Due to a severe alcohol intoxication (blood alcohol level: 3.06 g / l) and suicidal tendencies he had been formerly admitted to a General Hospital as an emergency. A four-week clinical detoxification therapy was followed by the stationary housing in the protected location of a residential setting. In the following 44 months he lives in this sheltered environment, recovering at the physical, psychological and social level. In addition to measures of socio-, work- and pharmacotherapy, exercise therapy represents a vital part of his treatment. Through regular participation in the exercise program of the institution, he manages to rebuild his extremely bad overall condition, restore his physical functioning as well as to start a viable therapeutic relationship. Results of activity monitoring also show a significant change in his lifestyle which is characterized by an increased level of physical activity, improved regeneration and sleeping patterns. The present case illustrates that sport-therapeutic interventions as a complementary measure in the addiction treatment for the rehabilitation process of severely affected clients (1), can be highly effective, and that (2), lifestyle modifications are feasible in the long-term. Since the systematic study of exercise therapy as a complementary measure in the addiction treatment is still in its infancy, large-scale clinical studies are urgently needed.

ABBREVIATIONS

ICD-10: International Statistical Classification of Diseases and Related Health Problems (10th Revision); **ICF:** International Classification of Functioning, Disability and Health; **SBP:** spontaneous bacterial peritonitis; **PNP:** Polyneuropathy; **RR:** blood pressure; **HR:** Heart rate; **BMI:** Body mass index

INTRODUCTION

The severe alcohol use disorder is characterized by a variety of physical, psychological and social consequences. Left untreated, it usually has a chronic recurrent course, which goes hand in hand with impoverishment, multimorbidity and premature death [1,2]. However, high termination and relapse rates demonstrate that

the usual therapy process for extreme addiction cases in Germany – consisting of stationary detoxification and alcohol rehabilitation as well as ambulant aftercare – is often not effective [3-5]. Therefore, for this clientele a permanent or temporary housing in a residential setting is appropriate, where they can slowly stabilize their condition again and find a protective, substance-free home. Even if so far exercise therapy as a complementary measure does not necessarily belong to standard treatment [6,7], due to its comprehensive and resource-oriented objectives it could significantly contribute to the rehabilitation process of multiply impaired alcohol-dependent patients: “exercise therapy wants to prevent damage and risk factors or rehabilitate impaired physical, mental and psychosocial (everyday life,

leisure and profession related) damages with suitable means of sport, physical activity and behavioral orientation [8].

CASE PRESENTATION

The patient is a 37 year-old divorced man with two children (7 and 15 years) from the former USSR. He has no school graduation and no certified vocational training. Since 1997, he lives in Germany, speaks German with an accent, is unemployed for 2 years and his long-lasting alcohol dependence background impairs him to a degree that makes his self-sufficiency impossible. In August 2011 the health condition of the client worsened to a life-threatening state. He had to be housed in a clinic and placed in an induced coma, diagnosed with the following symptoms: ethyl-toxic cirrhosis of the liver and acute liver failure, pancreatitis, Wernicke encephalopathy, type II diabetes, urinary tract infection with sepsis and SBP (spontaneous bacterial peritonitis). After this clinical treatment, in September 2011 Mr. A. came to a nursing home due to his poor general condition. As soon as Mr. A. was again sufficiently mobile to get access to alcohol, he suffered a serious relapse resulting again in his clinical admission by the end of October 2011 with a blood alcohol level of 3.06 g/l. A three-day stabilization was followed by a four-week detoxification treatment in a special clinic, where he was admitted among others because of acute suicidal tendencies and Wernicke encephalopathy. Finally, in December 2011 he was transferred to a rehabilitation facility for chronic multiply impaired addicts. Responsible for running this rehabilitation facility is the local social welfare which is at the bottom of the social welfare law book XII of the Federal Republic of Germany. The objective hereby is the reintegration into society.

Family and Addiction History

The client grew up in a poor region of the former Soviet Union. Both parents regularly consumed alcohol. The father was addicted to alcohol and died in 2009 following his alcohol-toxic cirrhosis of the liver. Mr. A. left school at the age of 15 and did not complete any vocational training either. At the age of 15, he drank alcohol (homemade liquor) for the first time. At the age of 19 he was called in for his military service where he regularly consumed alcohol and became delinquent. Subsequently, he spent two years in prison which was a rather traumatizing experience. Here he began to smoke more regularly. In 1997 he moved to Germany with his former wife. Up until two years before his alcohol induced collapse, Mr. A. performed heavy manual work at a construction company, for up to 12 hours per day and six days a week. In order to better cope with the extreme workload and the tensions within the family he first drank beer and continually increased the frequency and quantity of consumption, until the developed tolerance made him turn to hard alcohol. In the end Mr. A. was drinking two bottles of vodka per day. During the separation from his wife, two years before his serious collapse, he took part in an alcohol rehabilitation after which he stayed sober for three months. However, one evening he misjudged his condition as stable enough to drink a glass of wine with his dinner. During the same evening he suffered a serious relapse. After the divorce from his wife in 2010 Mr. A. finally lost control of his life completely. Apart from tobacco Mr. A. did not consume any other substances. Presently he smokes one pack of cigarettes per day.

Clinical findings

At his admission to the residential setting after taking into consideration his background of severe alcohol dependence syndrome, the main symptoms were determined and the treatment plan was structured according to the bio-psycho-social model of the International Classification of Functioning, Disability and Health (ICF) (Figure 1). Within the framework of the overall concept of the socio-therapeutic institution a combination of work, sport and drug treatment was provided for Mr. A. to focus on. In its remaining course the present case report will exclusively illustrate the actions of exercise therapy and the respective outcomes.

Exercise-related history and physical examination

In the admission interview, Mr. A. was initially skeptical and uncertain. He was afraid of not meeting the physical requirements for participation, but appeared principally interested. He stated to have been bedridden until recently, he had to learn walking once again with the help of a physical therapist and was therefore not fit. Mr. A. stated that for long he had been obese and weighed over 120 kg. During his collapse, he had lost very much weight - at the time he weighed 85 kg. He was last active in his childhood when he used to play football occasionally. The examination exhibited a very bad physical condition. An obvious postural weakness, muscle atrophies of the leg, arm, and core muscles, as well as a distinctive asymmetrical gait pattern alongside the given toxic alcohol polyneuropathy (PNP) were clearly visible. Furthermore, Mr. A. complained about severe pain especially in the lower back and the left shoulder, as well as paresthesia on both insteps, the front side of the lower leg and the thigh. Lifting the left arm above 90° was impossible because of the declared supraspinatus tendon syndrome which was the result of an alcohol-related fall. At the beginning of the exercise therapy treatment, Mr. A. had a BMI of 29; Blood pressure (RR): 138 / 96 and resting heart frequency (HF): 112.

Therapy and process

Under consideration of the physical condition at admission, a training plan for Mr. A. was created with the aim of restoring the musculoskeletal system, stabilizing the posture, improving gait as well as cardiopulmonary performance (Table 1). Exercise therapy mostly took place in group settings (6-10 people) while at the beginning there were also some individual therapies. At first it cost Mr. A. a lot of strength to carry out the exercise program. He struggled before each session but in spite of chronic pain, pronounced craving, depression, and sleep disorders, he managed to regularly take part in the program. In the first four weeks there was already significant progress in training, allowing Mr. A. to gradually start with the occupational therapy (assisting activities at the construction) in January 2012. In the wake of increasing physical activity, the pain caused by the sedentary lifestyle slowly weakened, while the insomnia and paresthesia in the feet and legs remained further. The continuing mood changes and sleep disorders were concomitantly treated with Doxepin (Figure: 2). Temporary craving - which was very strongly noticeable in the first year - was moderated by motivational and client-centered interviewing, physical training, as well as through a short-term adjustment of medication (Figure: 2). It

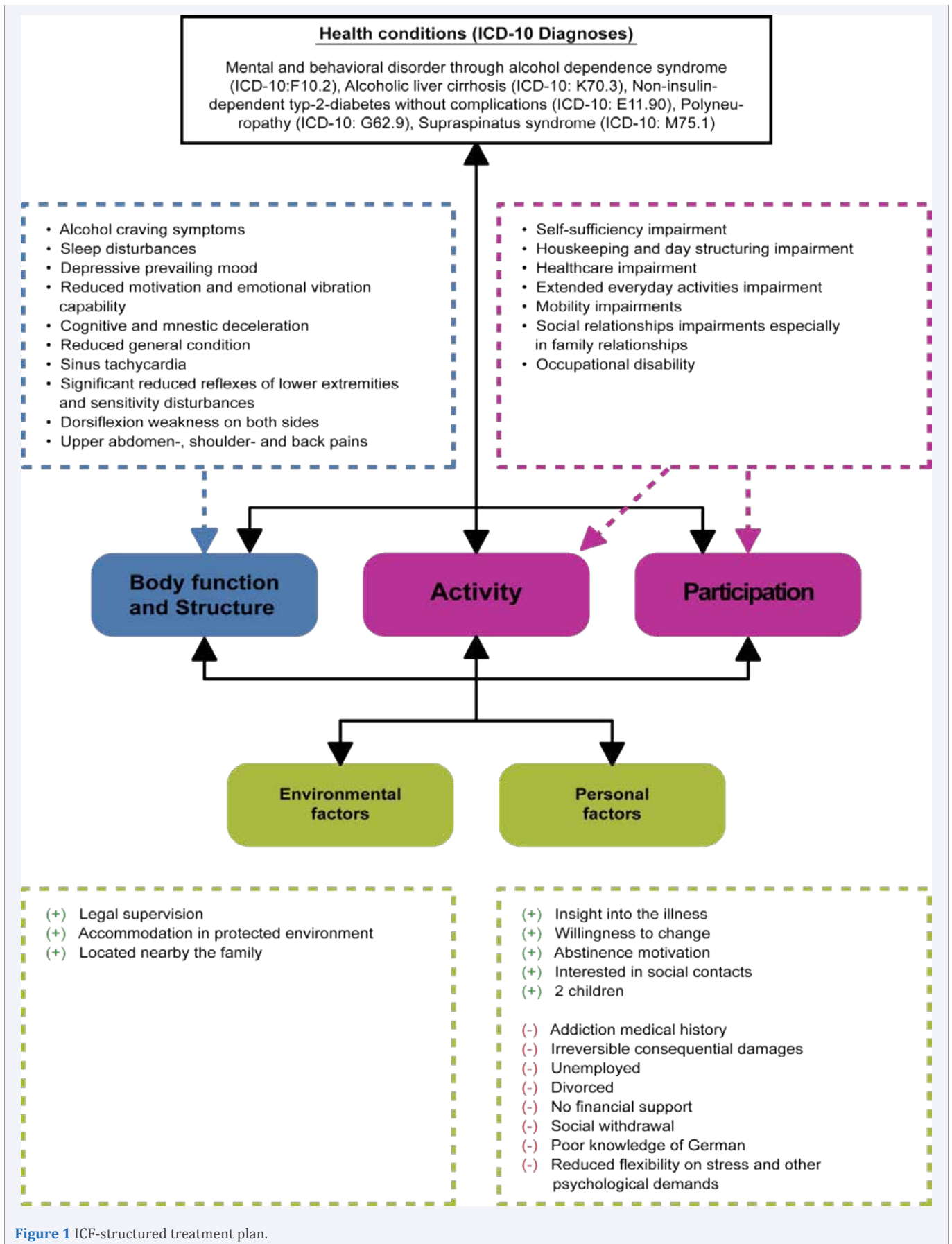


Table 1: Exercise therapy program and progression.

Endurance Training	Beginning until 12. Week	4.-9. Month	10.-16. Month	17.-40. Month
Sports	Walking/Swimming	Indoor-/Aquacycling	Indoor-/Aquacycling	Indoor-/Aquacycling
Exercise Volume	2-4 km/500-1000 m	distance profile with 3-5 increases		
Exercise Duration	20-60 min	60 min	60 min	60 min
Exercise Frequency	1-2 times/week	2-3 times/week		
Exercise Intensity	40-60% of HRmax	65-85% of HRmax	60-85% of HRmax	60-85% of HRmax
Technique	Nordic/Front- and Back	Sitting/Seated climb	Sitting/SSC*	Sitting/SSC*/Jumps
Exercise Density	extensive duration method	extensive intervals	intensive Intervals	intensive Intervals + HIT**
Strength Training	Beginning until 12. Week	4.-9. Month	10.-16. Month	17.-40. Month
Sports	low intensity strength training	progressive strength training		
Exercise Volume	6-10 exercises for all main muscle groups			
Exercise Duration	20-60 min	60 min	60-90 min	90 min
Exercise Frequency	1-2 times/week	1-2 times/week	2-3 times/week	3 times/week
Exercise Intensity	40-50% of max. weight	50-60% of max. weight	60-70% of max. weight	60-70% of max. weight
Exercise Density	2-3 min	1-2 min	1 min	1 min
Sets	1-2 Sets	2 Sets	3-4 Sets	3-4 Sets
Contraction forms	eccentric/ concentric			
Repetitions	15-20 rep.	10-15 rep.	10-15 rep.	10-15 rep.
Pace	low	low-moderate	low-moderate	moderate

Abbreviations: *SSC=seated and standing climb; **HIT=high intensive strength training

Table 2: Physical activity level and physical functioning.

Senior-Fitness-Test	units	t1*	t2**
Chair-uptest	30-sec rep.	13,00	25,00
Arm curls	30-sec rep.	13,00	28,00
Lower limb flexion	cm	-15,50	-27,00
Upper limb flexion	cm	9,00	4,50
Timed-up-and-go test	sec	4,78	3,10
Six-min walktest	meter	610,00	691,00
Seven-day-ADL-Assessment			
physical activity level	kcal	19151	26814
physical activity duration***	hour	13,15	24,39
step count	count	48145	69473
MET	hour	8,92	11,63
Lying duration	hour	53,68	66,49
Sleep duration	hour	45,20	58,03

Abbreviations: ADL= activities of daily living; MET= metabolic equivalent of task; *= after three months of intervention; **= after 21 months of intervention; ***= physical activity >3MET

was striking that the craving occurred mainly after increased workload, interpersonal tensions and acute depressiveness. The first effects of exercise therapy on physical functioning and the level of physical activity appeared three months after the beginning of the training in a submaximal fitness test[9] as well as in a 7-day-activity measurement using a Sensewear Bracelet (multi-sensor device of the company body media, Table 2). The vital signs RR: 145 / 85 and resting HR: 76 had also regulated. The weekly alcohol breath tests were all negative.

After three months and since Mr. A. reacted very well to the exercise therapy and the training process also improved his mental condition, the workload was increased from initially 3 to between 5 or 6 units per week (Figure: 2). Mr. A. was now more resilient and fulfilled preconditions for participation in physically demanding sports like indoor- and aquacycling, as well as circle training with and without equipment. After increasing the frequency and amount of the training, slowly its intensity could also be increased (Table 1).

The endurance sessions (indoor- and aquacycling) were carried out not only at light and moderate intensity with the extensive duration method (40-60% of the age-estimated HRmax), but increasingly also for the extensive or intensive interval method (65-85% of the age-estimated HRmax). The strength training was also introduced in a progressive manner regarding both intensity and volume: from initially one session per week at 40-50% of the maximum achievable weight, to 2-3 sessions per week at 60-70% (Table 1). The sessions took place in a group setting (6-10 persons) with motivating music playing. An additional incentive for regular participation in the training was an in advance presented bicycle tour in August 2012.

In the following time, Mr. A. developed into one of the strongest and most adherent participants of the institution. He increasingly seemed to gain self-confidence and was capable of emotional vibration again. He also communicated more open about his mental state and his needs and grew into a sociable and helpful member of the group. Already in August 2012 Mr. A. felt mentally robust enough and physically fit enough to take part in a one week-long bicycle tour (120 km). Group cycling in nature became so valuable to Mr. A. that he made it into his own hobby. In addition to the guided workouts, which he regularly attended at least five times a week, Mr. A. now expanded his sports activities with separate training units on the weekend. He argued that he used sports activities for psychophysical regulation, i.e. to improve his health and well-being, in order to better deal with temporary feelings of loneliness and/or boredom. He then trained in a similar way to the one he was taught in exercise therapy or he undertook an extended cycling tour. In addition to the actual training sessions, interim talks were held at regular intervals, with the intention of, on the one hand adjusting training objectives and setting milestones, and on the other hand for psychoeducational purposes.

One year after the admission of Mr. A., the progress of his health was noted in the care plan with the following statement: "From a medical point of view it is absolutely amazing how quickly Mr. A. has physically recovered". While symptoms like back or shoulder pain and craving only rarely appeared, Mr. A. continued to suffer from Paresthesia, sleep disturbances and temporary mood downturns. These were treated with further adjustments to the medication and an ambulant psychotherapy (15-session behavioral therapy). The combination of psycho-, pharmaco-, occupational and exercise therapy developed into an effective complex treatment under which Mr. A's condition stabilized. In May 2013 (t2), the follow-up examination of the fitness test showed that (1) he could continue improving his physical performance significantly and (2) the activity of daily living (ADL)-Monitoring revealed an evident physically active lifestyle (Table 2). The latter is described by a clearly better activity profile combined with a better compliance with the recovery times. This becomes particularly obvious when referring to the average sleep duration. As the treatment continued, even subjectively Mr. A. expressed significantly reduced symptoms regarding his sleep and his depression. Additionally, the PNP-related discomforts which were initially noticeable from the feet up to the front side of the thighs, were now only slightly noticeable in the instep and toe areas.

In autumn 2013, Mr. A. seemed increasingly motivated to prepare himself for an independent life outside the institution. On his own initiative and with the assistance of the institution, he applied for several jobs in the primary labor market and thus discovered his full physical and mental strength. In addition, he successfully participated in a language course to improve his German but therefore had to adjust his high participation rate in exercise therapy to 2-3 times per week, or even a complete break due to a full-time internship (Figure: 2). It was remarkable that during the time he was exposed to higher workloads (e.g. 45 hours/week internship) and did not participate in exercise therapy, he responded with increased depressive symptoms and sleep disorders. Thus, it became clear for Mr. A. that (1) he would not be able to become as professionally active as he was prior to his illness and (2) apart from his working hours, he would have to find enough free time to exercise his physical activities, relax and regenerate. Mr. A. recognized that participation in exercise therapy and independently-run recreational physical activity constituted essential stabilizers for him. During an interim interview in November 2014, he noted that a lifestyle which would no longer allow him to perform sporting activities due to time constraints would be a risk to relapse. A general objective of therapy was (1) to find a job for Mr. A. in the first or second labor market (occupational reintegration) that would respect his limited mental capacity and offer sufficient free time and (2) to find an apartment that would allow him to have an extensively independent lifestyle under ongoing ambulant supervision (social reintegration). In spring 2015 Mr. A. undertook a further internship at a construction company and completed the exercise therapy in a physically fit nutritional and overall condition. Apart from an irreversible mobility limitation of the left shoulder and minor residual symptoms of the PNP in the toes, the physical symptoms stated in the beginning had retreated. The depressive concomitant disease of Mr. A. as well as the PNP, were still treated with medication. Since June 2015, Mr. A. has been working within the framework of a 4-day workweek at a construction company and has been living since September 2015 in an own apartment. He is still being supervised by the socio-therapeutic institution as an outpatient.

DISCUSSION

The case report demonstrates that a gradual and long-lasting therapy in the socio-therapeutic setting can offer remarkable development opportunities for severely alcohol-dependent clients. By living in a protected environment along with the feeling of being part of an accepting and respectful community, the conditions were created in which the client could recover slowly and lead an abstinent life. Moreover, after 44 months of treatment on a physical, psychological and social level, Mr. A. has stabilized his condition to a degree that allowed both his professional and social reintegration in the community. The question regarding the extent to which exercise therapy has contributed to the success of rehabilitation and what other factors have influenced this process is difficult to answer. Nevertheless, there are a number of influential factors that could have played an important role in the alcohol treatment of Mr. A.; firstly, it is well known that physical activity can effectively contribute to the physical and mental health of healthy and mentally ill people[10-12]. Regarding the comorbidities of Mr.

A., the effectiveness of exercise therapy in PNP[13] as well as in internal[14,15] and neuro-psychiatric [16,17] diseases should be pointed out. Secondly, there is preliminary evidence that alcohol-dependent patients can also physically and psychologically benefit from exercise therapy[18–22], even if interventions are carried out in a low-threshold setting[23,24].

Additionally, it is currently being discussed about the therapeutic potential of physical training on influential addiction-specific neurobiological factors. This is due to the findings of numerous pre-clinical studies, which indicate that physical activity can have a similarly rewarding effect – yet significantly weaker than the drug – on the neural regulatory cycle and consequently mitigate the desire for the favoring substance (in this case alcohol) [25,26]. On the other hand, it was proven that, in relation to mental disorders such as depressions – from which Mr. A. also suffered – there is also an exercise-induced antidepressant and anxiolytic effect [27–29]. However, the effectiveness of exercise therapy on the quality of sleep and the regeneration behavior of addicts is still largely unexplored. The case of Mr. A. underlined that the sleep disorders have improved significantly in the course of the treatment. It would be theoretically conceivable for example, that increased physical activity leads to greater mental and physical fatigue which could be subsequently realized as better sleep - as it appeared on the ADL-monitoring of Mr. A. In addition to the biologically explainable mechanisms, a series of further, exercise-induced psychological, motivational and social influential factors come into consideration, which have only been inadequately examined so far. For instance, there is evidence that self-efficacy and the self-concept can be improved through exercise therapy[30,31], which is a key competence in relation to behavior change. Furthermore, important coping skills were gained through physical training and became available for the client in potential relapse risk situations by means of an enhanced action competence. If an - at first - extrinsically motivated physical activity develops into an intrinsically motivated free time activity, as in the case of Mr. A, then this physical activity can become a sustainable relapse prevention strategy through exercise therapy[32,33]. A further, intensifying effect that exercise therapy effectively exploits is the group effect. The social support that a participant experiences in exercise therapy can not only positively affect adherence, but also promote the feeling of belonging to an abstinence-motivated community. Last but not least, it should be noted that sport always involves a certain risk of injury in its nature and is therefore not side effect free. If executed in a therapeutic manner[34,35] and under the condition that a medical sports health check is performed, exercise therapy is almost free of undesirable side effects. Nevertheless, eventually any activity may grow into a harmful addiction, which is why - in our eyes - the activities should therapeutically be supervised.

Mr. A. evaluated the exercise therapy as one of the most important stabilizers during his recovery process and once stated that, through his confrontation with his body and the physical training, he rediscovered strength and courage to face life for the first time after his collapse.

Although validity of the presented case report is limited and results are not generalizable due to the study design, the case of Mr. A. shows that even if he suffered from a severe form of alcohol

dependence, rehabilitation was feasible and successful. The focus of further research questions should be the determination of dose-response relationships by indicating valid and reproducible key parameters of exercise performance such as VO₂ max, VO₂ kinetics, critical velocity, lactate threshold which are going far in excess of age-estimated measurements. Thus, the systematic evaluation of the exercise therapy approach in the context of large-scale clinical studies is urgently needed.

CLIENT CONSENT

Mr. A. provided written permission for publication of this case report

ACKNOWLEDGEMENT

We thank Christine Koliamitra for critical reading and providing language help.

REFERENCES

1. World Health Organization (WHO). Global status report on alcohol and health. Geneva. 2014.
2. Lawson AK, Wright CV, Fitzgerald LF. The evaluation of sexual harassment litigants: reducing discrepancies in the diagnosis of posttraumatic stress disorder. *Law Hum Behav.* 2013; 37: 337-347.
3. Agosti V, Nunes EV, O'Shea D. Do manualized psychosocial interventions help reduce relapse among alcohol-dependent adults treated with naltrexone or placebo? A meta-analysis. *Am J Addict.* 2012; 21: 501-507.
4. Dawson DA, Goldstein RB, Grant BF. Rates and correlates of relapse among individuals in remission from DSM-IV alcohol dependence: a 3-year follow-up. *Alcohol Clin Exp Res.* 2007; 31: 2036-2045.
5. Wienberg G. Die vergessene Mehrheit: Zur Realität der Versorgung alkohol- und medikamentenabhängiger Menschen [The forgotten majority: to the reality of the supply of alcohol and drug dependent people]. Bonn: Psychiatrie-Verl. 1992.
6. Steingass H. Soziotherapie chronisch Abhängiger: Ein Gesamtkonzept [Sociotherapy of chronic dependents: A total concept]. 2. Aufl. Geesthacht: Neuland; 2002.
7. Miller WR, Meyers RJ, Hiller-Sturmhöfel S. The community-reinforcement approach. *Alcohol Res Health.* 1999; 23: 116-121.
8. Deutscher Verband für Gesundheitssport und Sporttherapie (DVGS e.V.). Definition Sporttherapie [German Association of Health Sports and Sports Therapy. Definition of Sports Therapy]; 2014.
9. Rikli RE, Jones CJ. Development and validation of criterion-referenced clinically relevant fitness standards for maintaining physical independence in later years. *Gerontologist.* 2013; 53: 255-267.
10. Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee I et al. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Medicine and science in sports and exercise* 2011; 43:1334–1359.
11. Wolff E, Gaudlitz K, von Lindenberger BL, Plag J, Heinz A, Ströhle A. Exercise and physical activity in mental disorders. *Eur Arch Psychiatry Clin Neurosci.* 2011; 261:186-191.
12. Daley AJ. Exercise therapy and mental health on clinical populations: Is exercise therapy a worthwhile intervention? *Advances in Psychiatric Treatment.* 2002; 8: 262–270.
13. Streckmann F, Zopf EM, Lehmann HC, May K, Rizza J, Zimmer P, et al.

- Exercise intervention studies in patients with peripheral neuropathy: a systematic review. *Sports Med.* 2014; 44: 1289-1304.
14. Heran BS, Chen JM, Ebrahim S, Moxham T, Oldridge N, Rees K, et al. Exercise-based cardiac rehabilitation for coronary heart disease. *Cochrane Database Syst Rev.* 2011; : CD001800.
 15. Morris JN, Everitt MG, Pollard R, Chave SP, Semmence AM. Vigorous exercise in leisure-time: protection against coronary heart disease. *Lancet.* 1980; 2: 1207-1210.
 16. Knöchel C, Oertel-Knöchel V, O'Dwyer L, Prvulovic D, Alves G, Kollmann B, Hampel H. Cognitive and behavioural effects of physical exercise in psychiatric patients. *Prog Neurobiol.* 2012; 96: 46-68.
 17. Gorczyński P, Faulkner G. Exercise therapy for schizophrenia. *Cochrane Database Syst Rev.* 2010.
 18. Giesen ES, Deimel H, Bloch W. Clinical exercise interventions in alcohol use disorders: a systematic review. *J Subst Abuse Treat.* 2015; 52: 1-9.
 19. Zschucke E, Heinz A, Ströhle A. Exercise and physical activity in the therapy of substance use disorders. *ScientificWorldJournal.* 2012; 2012: 901741.
 20. Linke SE, Ussher M. Exercise-based treatments for substance use disorders: evidence, theory, and practicality. *Am J Drug Alcohol Abuse.* 2015; 41: 7-15.
 21. Vancampfort D, De Hert M, Stubbs B, Soundy A, De Herdt A, Detraux J, et al. A systematic review of physical activity correlates in alcohol use disorders. *Arch Psychiatr Nurs.* 2015; 29: 196-201.
 22. Wang D, Wang Y, Wang Y, Li R, Zhou C. Impact of physical exercise on substance use disorders: a meta-analysis. *PLoS One.* 2014; 9: 110728.
 23. Muller AE, Clausen T. Group exercise to improve quality of life among substance use disorder patients. *Scand J Public Health.* 2015; 43: 146-152.
 24. Burling TA, Seidner AL, Robbins-Sisco D, Krinsky A, Hanser SB. Batter up! Relapse prevention for homeless veteran substance abusers via softball team participation. *J Subst Abuse.* 1992; 4: 407-413.
 25. Lynch WJ, Peterson AB, Sanchez V, Abel J, Smith MA. Exercise as a novel treatment for drug addiction: a neurobiological and stage-dependent hypothesis. *Neurosci Biobehav Rev.* 2013; 37: 1622-1644.
 26. Smith MA, Lynch WJ. Exercise as a potential treatment for drug abuse: evidence from preclinical studies. *Front Psychiatry.* 2012; 2: 82.
 27. Wipfli BM, Rethorst CD, Landers DM. The anxiolytic effects of exercise: a meta-analysis of randomized trials and dose-response analysis. *J Sport Exerc Psychol.* 2008; 30: 392-410.
 28. Cooney GM, Dwan K, Greig CA, Lawlor DA, Rimer J, Waugh FR, et al. Exercise for depression. *Cochrane Database. Syst Rev.* 2013; 9: CD004366.
 29. Batalla A, Bhattacharyya S, Yücel M, Fusar-Poli P, Crippa JA, Nogué S, et al. Structural and functional imaging studies in chronic cannabis users: a systematic review of adolescent and adult findings. *PLoS One.* 2013; 8: e55821.
 30. McAuley E, Courneya KS, Lettunich J. Effects of acute and long-term exercise on self-efficacy responses in sedentary, middle-aged males and females. *Gerontologist.* 1991; 31: 534-542.
 31. Ermalinski R, Hanson PG, Lubin B, Thornby JI, Nahormek PA. Impact of a body-mind treatment component on alcoholic inpatients. *J Psychosoc Nurs Ment Health Serv.* 1997; 35: 39-45.
 32. Marlatt GA. Lifestyle modification. In: Marlatt GA, Gordon JR, editors. *Relapse Prevention: Maintenance Strategies in the Treatment of Addictive Behaviors.* 1st ed. New York: Guilford Press; 1985: 280-344.
 33. Murphy TJ, Pagano RR, Marlatt GA. Lifestyle Modification With Healthy Alcohol Drinkers: Effects of Aerobic Exercise and Meditation. *Addictive Behaviors* 1986; 11:175-86.
 34. Meyer T, Broocks A. Therapeutic impact of exercise on psychiatric diseases: guidelines for exercise testing and prescription. *Sports Med.* 2000; 30: 269-279.
 35. Brown RA, Abrantes AM, Read JP, Marcus BH, Jakicic J, Strong DR, et al. Aerobic exercise for alcohol recovery: rationale, program description, and preliminary findings. See comment in PubMed Commons below *Behav Modif.* 2009; 33: 220-249.

Cite this article

Giesen ES, Bloch W (2016) The Role of Exercise Therapy as a Complementary Measure in the Addiction Treatment of a Multiply Impaired Alcohol-Dependent Client: A Case Report. *J Subst Abuse Alcohol* 4(1): 1041.