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# The outcome of integrated motivational interviewing and cognitive-behavioral therapy in Egyptian patients with substance use disorder

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## Abstract

**Objectives** The authors aimed to evaluate the outcome of combined motivational interviewing and cognitive-behavioral therapy (MICBT) for substance use disorder compared to the twelve-step facilitation (TSF) therapy in terms of retention in the treatment program, the number of relapses, and the period of abstinence after discharge, coping with craving, and modification of problematic behaviors.

**Method** This randomized controlled trial included 60 individuals with a substance use disorder. Participants were randomly allocated to equal groups. The MICBT group received 20 sessions of approximately 90 min of MICBT group therapy. The NA (control) group was assigned 20 narcotic anonymous (NA)-oriented TSF group therapy sessions. The assessment was conducted 3 and 6 months after the intervention.

**Result** The implementation of MICBT in a group setting leads to a significant decline in the number of days of drug use in 3 months of follow-up ( $P=0.006$ ) and 6 months of follow-up ( $P<0.001$ ), an increase in the number of days of abstinence in 3 months of follow-up ( $P=0.008$ ) and 6 months of follow-up ( $P<0.001$ ), a longer time to the first lapse ( $P<0.001$ ), and a higher percentage of attendance days for treatment ( $P<0.001$ ) in comparison to NA groups. MICBT intervention was a significant positive predictor of several urge-specific coping strategies and several general strategies for drugs ( $P<0.05$ ).

**Conclusion** Using MICBT in group settings presents several benefits in clinical contexts.

**Keywords** Motivational interviewing, Cognitive-behavioral therapy, Twelve-step facilitation, Substance use disorder

## Introduction

Treating addiction is vital for all professionals in health care, behavioral health, and other social services. The worldwide prevalence of addiction problems and the suffering caused by them would be enough reason. Substance use disorders (SUDS) are by far the leading preventable cause of death worldwide. More than 70% of these deaths are related to opioids, with over 30% caused by an overdose. Yet these very common, disabling, and high-mortality conditions often go unnoticed and untreated [1].

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There are several evidence-based psychological intervention models for treating addiction, and one important modality of being is motivational interviewing (MI). Over 1000 controlled clinical trials on MI have been published, many reporting significant positive effects across a broad range of problem behaviors, with some of the strongest evidence in addictive behaviors. MI has also been successfully applied to reduce drug-related risk through perceived peer norms [2], injection practices [3], and overdose. However, it is also clear that the effectiveness of MI varies greatly depending on the program and clinician who offers it [4, 5]. This suggests that MI is sensitive to the manner and context in which it is delivered. In this context, it is important to understand the “active ingredients” of MI and which aspects of it are most important in delivery. Closer adherence and dexterity of the counselor to the prescribed MI style predict greater change in the client’s addictive behaviors [6, 7].

Although MI alone can produce changes, combining the clinical style of MI with other treatment modalities has become common [8]. Virtually every other treatment described for addiction, including pharmacotherapies, can be delivered in an MI style. Many studies suggest that combining MI with cognitive-behavioral therapy (CBT) in many domains of addictive behavior such as substance use, alcohol use, and smoking is more effective than usual care [9]; often, but not always, more effective than MI alone and more effective than CBT alone [10].

The results concerning the efficacy of MI groups are promising regarding substance use, consequences, craving, adherence to treatment [11] propensity to quit smoking, dropout rates, and alcohol consumption [12] when compared with other group types. In addition, one study suggested a promise for group MI compared to individual MI in addictions. An important challenge that limits the significance of MI group studies is that there are varied procedures used to administer MI groups, and not all the authors detailed the specific format and procedure used when applying MI in groups [11].

Wagner and Ingersoll [13] described four phases of MI in groups: engaging the group (setting the environment/climate), exploring perspectives (exploring members’ perspectives on their lives and issues), broadening perspectives (expanding awareness of possibilities and developing resources and momentum for a change), and moving into action (defining, planning, and implementing changes). Velazquez et al. published another guide integrating MI with CBT based on a transtheoretical model. This guide defined how to facilitate moving through stages of change using change processes and strategies, connecting this approach to traditional CBT strategies, using motivation approaches through all

stages, and finally, putting it all together in group psychotherapy [14].

This study aims to evaluate the effectiveness of MICBT groups in an adult clinical population with SUD in Egyptians.

## Materials and methods

This interventional longitudinal comparative study was conducted on 60 patients with SUD recruited from the inpatient unit at the Addiction Treatment Unit of Shebin Elkom Mental Health Hospital, a hospital affiliated with the General Secretariat of Mental Health and Addiction Treatment, Ministry of Health, Egypt, after approval from Research Ethics Committee at Faculty of Medicine, Ain Shams University (Approval code: 284/2019). The setting includes inpatient and outpatient services. The study started in an inpatient setting where the intervention therapy was applied for 6 months and continued in outpatient as follow-up and daycare service for another 6 months. The study was done from September 2021 to September 2022.

## Participants

Sixty patients with SUD have been enrolled. The sample size was calculated by reviewing the literature of a similar study [15] using the STATA program-sample size calculation program. Using the Z test, this achieved 95% power and settled alpha error at 5% to show the relapse of 84% with the MICBT group and 36% with the NA group, determining the sample size to be 30 patients for the MICBT group and 30 patients for the NA group after adding six cases in each group to overcome dropout.

The diagnosis of current substance dependence was verified by quantitative urine toxicology and by fulfilling the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5) criteria of substance dependence which was verified by Structured Clinical Interview for DSM-5, research version (SCID-5-RV). The severity of addiction was assessed by applying the Arabic version of the Addiction Severity Index (ASI). The presence of comorbid personality disorders was verified by a Structured Clinical Interview for DSM-IV AXIS II personality disorders (SCID-II). Patients with current substance dependence, ages 18 to 50, were enrolled in the current study after giving informed consent and being detoxified from all illicit drugs. Detoxification was achieved by abstinence from drugs in a protective environment for 1 week.

We excluded patients with coexisting major psychiatric disorders (verified by Structured Clinical Interview for DSM-IV AXIS I [SCID-I]), concurrent organic brain disorders, or severe medical conditions interfering with cognitive abilities. The rationale for that exclusion is that

MICBT groups may not benefit such a population or that their style or issues may reduce the group's effectiveness for other members [16]. Patients who did not complete the addiction treatment program or could not be reached after 6 months of completion were considered as dropped out.

Through assessment interviews, the demographic characteristics were collected, and details of substance dependence were obtained, including duration of intake, daily dose, periods of abstinence, and stage of change.

### **Randomization**

The patients were randomly allocated to one of 2 groups; the MICBT group (study group) that participated in integrated CBT and MI group therapy 20 sessions, and the NA group (control group) that participated in narcotic anonymous (NA)-oriented twelve-step facilitation (TSF) therapy. Randomization was done by computer-generated numbers. The study was double-blinded as patients, and outcome assessors were blinded.

### **Intervention**

#### ***The group therapy model***

In the study "MICBT" group, MI and CBT elements were integrated and adapted to the group. The MI spirits, four MI processes (engaging, focusing, evoking, planning), and different MI skills, especially OARS (open-ended questions, affirmation, reflective listening, summary, and eliciting change talk) were applied in initial motivational sessions and integrated with CBT elements (such as functional analysis, cognitive skills, relapse prevention and other behavioral skills training, and maintenance of change strategies) in all sessions. To apply this MICBT combination in a group format, our research model for the MICBT group has integrated the four stages model described by Wagner and Ingersoll [13] and the model of group therapy for addiction treatment based on the transtheoretical model described by Velazquez et al. [14]. We adapted and translated sessions in these manuals into the Arabic language.

#### ***Group format and structure***

In this study, we mixed the three motivational group formats described by Wagner and Ingersoll [13]: psychoeducational, supportive, and psychotherapeutic. We have imported elements of the three formats as needed. Some sessions were more structured, and others were less structured, beginning with a less structured format, then shifting to a more specific task focus, structured sessions.

The study MICBT group was divided into three groups. The size of each group was tailored to be from 8 to 12 members with an average of 10 members and 2 leaders to achieve the most benefit. Therapeutic groups were of closed type, with a long-term duration (20 sessions) and session length of about 90 min.

The MICBT therapeutic groups were homogenous concerning sharing the same diagnosis, similar struggles, and goals. All members were using opiates, but many were polysubstance users. Abstinence was the clear goal of our group. Groups were composed of individuals with near different stages of change; a pre-decision group included pre-contemplation/contemplation/preparation stages, and a planning/action group included preparation/action/maintenance stages.

#### ***Group facilitation style***

For the study group, therapists used the MI group facilitation style described by Wagner and Ingersoll. MICBT groups interweaved a focus on exploring individual issues with a focus on generalizing issues by linking them with others' concerns, then exploring those together. The MICBT facilitation relied on engagement in the group process, group cohesiveness, and mutual task involvement as key contributors to group success. The therapists used strategies to bring different members and topics into group discussions suggested by Sobell and Sobell (17). We had to deal with some inter-personal problems using strategies described also by Sobell and Sobell.

#### ***Therapists***

The MICBT groups were facilitated by two therapists; one therapist—a member of the Motivational Interviewing Network of Trainers (MINT)—played the role of the group leader, and the other therapist qualified in CBT played the role of co-leader. Both therapists are psychiatrists and have experience of more than 5 years in addiction treatment and group leadership and facilitation.

#### ***Treatment fidelity monitoring***

In the present study, an assessment of Motivational Interviewing Groups—Observer Scales (AMIGOS) was implemented for accomplishing fidelity monitoring to group MI. The AMIGOS includes three scales composed of 18 items documenting group processes, client-centered style, and motivational interviewing (MI) change focus. The AMIGOS shows promise as a reliable and valid measure of MI group leadership and group processes and could also be useful in measuring other group therapies. Supervisors applied AMIGOS on audiotaped records of sessions.

#### ***Control (NA) group***

TSF therapy was implemented in 20 sessions through the intervention for 6 months. The rate was one session weekly. TSF is delivered by a twelve-step NA-oriented counselor and is designed to help clients find, attend, and become comfortable and involved in NA meetings. The translated TSF manual was revised and adapted by supervisors.

**Outcome measures**

**Days of attendance to a 1-year treatment program**

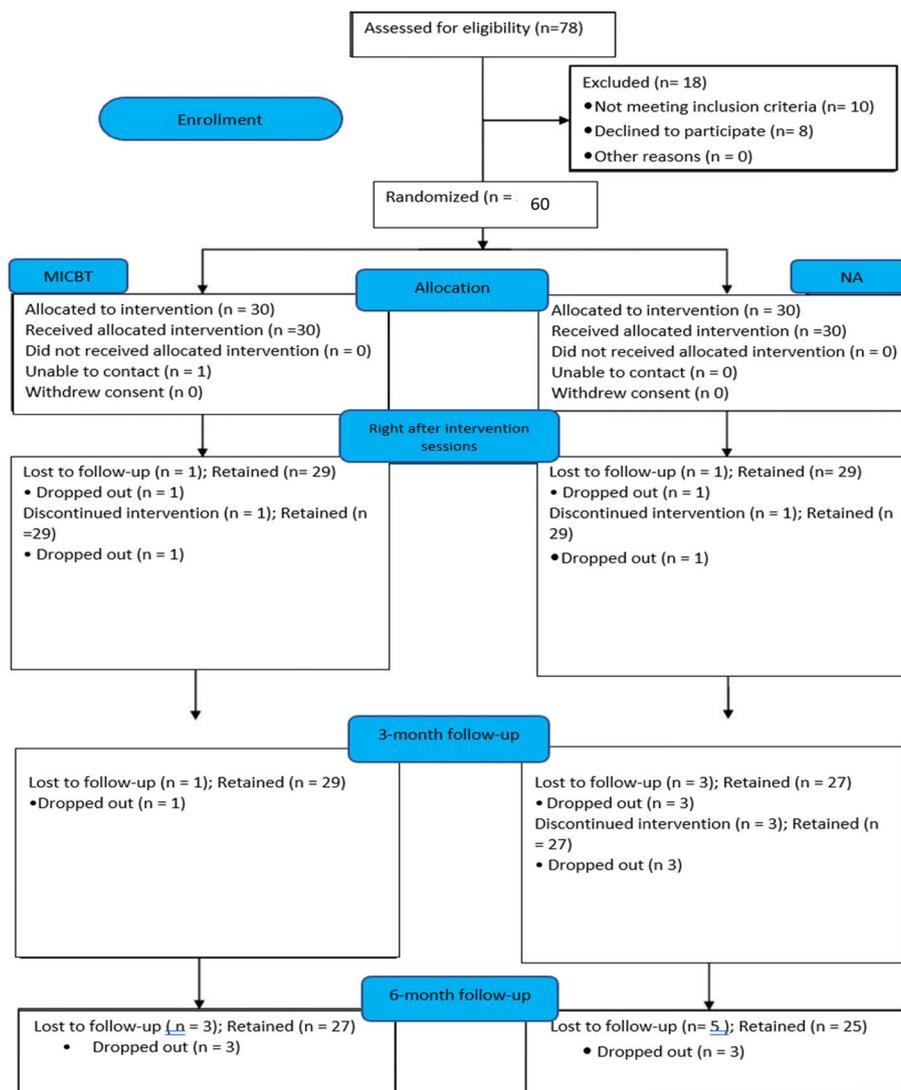
The percentage of days of attendance to treatment sessions throughout the year was calculated for each patient by attendance record for every session. The target days to be attended are 20 days (one session weekly) basic program through 6 months, 12 days of daycare through the first 3 months after the program, and another 12 daycare days the second follow-up 3 months.

**FORM 90 (19)**

Form 90 was used for measurement of the frequency and quantity of drug and alcohol use in the past 90 days. It was used for pretreatment evaluation and at 3 and 6 months of follow-up to estimate the number of days of substance use and abstinence as the outcome measure.

**Urge specific strategy questionnaire for drugs [17]**

The USS-D was adapted from the USS for alcoholics. In this study, the USS-D has been applied to evaluate specific coping strategies for high-risk situations and cravings in the last 90 days before follow-up evaluation. The present study did not use open-ended responses but aimed to elicit free recall before providing the closed-ended questions. Closed-ended questions listed 19 situation-specific coping strategies in a plain language taught in the study’s coping skill treatments, plus two commonly ineffective methods (willpower and self-punishment). For each, patients were asked, “When you had the urge to use the substance in the last 3 months and were trying to keep yourself from drinking, how often did you.” Patients rated their responses on a 7-point Likert scale from 1 (never) to 7 (all the time).



**Fig. 1** Flowchart for the study

**General strategies for drugs (GSD) (20)**

General strategies for drugs (GSD) have been applied to evaluate the modification of problematic behaviors and the use of general life strategies to prevent relapse in the last 90 days before follow-up evaluation.

**Statistical analysis**

Software programs used for processing were SPSS version 26 and R packages V4.2.2. All analyses were intended for treatment. Multivariate imputations by chained equations “mice,” a powerful package for imputation in R, were used.

**Table 1** Basic data

		MICBT	NA	Test	P value	
<b>Demographic data</b>						
<b>Age (years)</b>	<b>Range</b>	18–45	18–43	.313 b	.755	
	<b>Mean ± SD</b>	30.83 ± 7.742	30.23 ± 7.089			
<b>Education, n (%)</b>	<b>Illiterate</b>	7 <sub>a</sub> (23.3%)	5 <sub>a</sub> (16.7%)	7.062 <sup>a</sup>	.452	
	<b>Educated</b>	23 <sub>a</sub> (76.7%)	25 <sub>a</sub> (83.3%)			
	<b>Literacy education</b>					
	<b>Primary/prep</b>	4 (13.3%)	6 (20.0%)			
	<b>Technical</b>	3 (10.0%)	3 (10.0%)			
	<b>Secondary</b>	6 (20.0%)	5 (16.7%)			
	<b>Intermediate</b>	1 (3.3%)	2 (6.7%)			
	<b>High</b>	1 (3.3%)	6 (20.0%)			
	<b>Medical</b>	6 (20.0%)	2 (6.7%)			
<b>Employment, n (%)</b>	<b>Unemployed</b>	2 (6.7%)	1 (3.3%)	.606 <sup>a</sup>	.436	
	<b>Employed</b>	18 <sub>a</sub> (60.0%)	15 <sub>a</sub> (50.0%)			
<b>Marital, n (%)</b>	<b>Single</b>	12 <sub>a</sub> (40.0%)	15 <sub>a</sub> (50.0%)	.662 <sup>a</sup>	.718	
	<b>Married</b>	8 (26.7%)	7 (23.3%)			
	<b>Divorced</b>	13 (43.3%)	11 (36.7%)			
<b>Clinical characteristics of patients</b>						
<b>Personality Disorders, n (%) (SCID II)</b>	<b>No personality disorder</b>	9 (30.0%)	11 (36.7%)	1.891 <sup>a</sup>	.944	
	<b>Borderline</b>	3 (10.0%)	2 (6.7%)			
	<b>Depressive</b>	6 (20.0%)	5 (16.7%)			
	<b>Dependent</b>	4 (13.3%)	4 (13.3%)			
	<b>Avoidant</b>	6 (20.0%)	4 (13.3%)			
	<b>Obsessive</b>	1 (3.3%)	1 (3.3%)			
	<b>Paranoid</b>	1 (3.3%)	3 (10.0%)			
<b>Age at onset (years) (FORM 90)</b>	<b>Range</b>	15–30	14–33	-1.794 <sup>b</sup>	.078	
	<b>Mean ± SD</b>	20.60 ± 3.645	22.87 ± 5.077			
<b>Lifetime duration of drug use (weeks) (FORM 90)</b>	<b>Range</b>	50–780	45–520	.958 <sup>b</sup>	.342	
	<b>Mean ± SD</b>	305.93 ± 194.780	263.80 ± 141.617			
<b>ASI (composite score)</b>	<b>ASI Psychiatry</b>	<b>Mean ± SD</b>	.39 ± .15	.35 ± .14	498.5 <sup>c</sup>	.460
		<b>Median</b>	.40	.40		
	<b>ASI MED</b>	<b>Mean ± SD</b>	.61 ± .17	.54 ± .16	561.00 <sup>c</sup>	.095
		<b>Median</b>	.60	.55		
	<b>ASI EMPL</b>	<b>Mean ± SD</b>	.54 ± .24	.50 ± .22	496.50 <sup>c</sup>	.488
		<b>Median</b>	.50	.45		
	<b>ASI DRUG</b>	<b>Mean ± SD</b>	.75 ± .14	.75 ± .12	455.00 <sup>c</sup>	.939
		<b>Median</b>	.80	.80		
	<b>ASI FAM</b>	<b>Mean ± SD</b>	.58 ± .20	.59 ± .23	441.5 <sup>c</sup>	.899
		<b>Median</b>	.60	.55		
	<b>ASI LEG</b>	<b>Mean ± SD</b>	.20 ± .09	.25 ± .13	368.5 <sup>c</sup>	.205
		<b>Median</b>	.20	.20		

<sup>a</sup> Chi-square

<sup>b</sup> t test

<sup>c</sup> Independent sample Mann–Whitney U

Student's *t* tests were used for continuous variables with normal distributions, while in independent samples, Mann–Whitney *U* test was used for continuous variables without normal distributions. Chi-square tests were used for categorical variables. Fisher's exact test helps determine the relationship among 2 qualitative variables when the expected count is <5% in >20% of the cells. Generalized linear models, specifically the zero-inflated negative binomial regression model, were used to examine associations between the treatment group and drug use days in the 90 days before the 3- and 6-month follow-up dates. The zero-inflated negative binomial model is useful when the outcome is a count (i.e., days of use) with overdispersion and inflation of zero values. It has two components, a count component for positive counts (e.g., days of use) and a logistic component that models the zero counts

and estimates the count outcome as a logistic (e.g., drug use vs. no drug use, with the logistic portion predicting no drug use). The Cox proportional hazards regression model estimated group differences in lapse to substance use during the 6-month follow-up. Repeated measures mixed models were used for estimating group effect on percentage days of treatment attendance. The target days to be attended are 20 days (one session weekly) basic program through 6 months, 12 days of daycare through the first three months after the program, and another 12 daycare days the second follow-up 3 months. The predictors were time (1=basic 6 months, 2=1st daycare 3 months, 3=2nd daycare 3 months, modeled linearly), group (1=MICBT, 0=NA), and the time×group interaction term. The baseline level of the outcome modeled was included as a covariate. We used an AR1 structure

**Table 2** Type of intervention, number of drug use days, and abstinent days using zero-inflated models

Parameter	Days of use among all participants (count portion)			Logistic portion predicting nonuse		
	B (SE)	P	IRR	B (SE)	P	OR
<b>3 months</b>						
Intercept	2.40 (0.61)	<.001**	10.72	4.66 (3.09)	0.13	105.9
Mode of treatment (MICBT)	−0.35 (0.13)	0.006*	0.71	2.55 (0.86)	0.003*	12.85
Age	0.013 (0.009)	0.15	1.01	0.06 (0.05)	0.23	1.06
Personality disorder	−0.22 (0.17)	0.21	0.79	2.45 (1.57)	0.12	11.62
Education, educated = 1	0.11 (0.14)	0.44	1.11	0.89 (1.10)	0.41	2.44
ASI severity of psychiatric problems	0.11 (0.05)	0.02*	1.11	−.65 (0.50)	0.19	0.52
ASI severity of medical problems	0.01 (0.04)	0.73	1.01	−.27 (0.37)	0.46	0.75
ASI severity of drug problems	−0.02 (0.06)	0.68	0.96	−.24 (0.40)	0.54	0.78
ASI severity of employment problems	−0.07 (0.04)	0.04	0.92	−.23 (0.25)	0.37	0.79
ASI severity of family problems	0.21 (0.03)	<.001**	0.96	−.70 (0.26)	0.009*	0.49
Log (theta)	2.60 (0.33)	<.001**				
<b>6 months</b>						
Intercept	3.15 (0.32)	<.001**	21.47	1.56 (3.06)	0.60	4.79
Mode of treatment MICBT = 1	−0.33 (0.07)	<.001**	0.70	2.83 (1.06)	0.008*	16.99
Age	0.002 (0.005)	0.73	1.001	0.06 (0.05)	0.26	1.06
Personality disorder	−0.31 (0.10)	0.002*	0.69	−0.67 (1.46)	0.64	0.50
Education, educated = 1	−0.05 (0.08)	0.47	0.94	1.67 (1.37)	0.22	5.32
ASI severity of psychiatric problems	0.08 (0.03)	0.006	1.09	−.10 (0.49)	0.83	0.89
ASI severity of medical problems	0.02 (0.02)	0.43	1.02	−.62 (0.46)	0.17	0.53
ASI severity of drug problems	0.007 (0.04)	0.85	1.01	−.032 (0.46)	0.94	0.96
ASI severity of employment problems	−0.004 (0.02)	0.85	1.001	0.18 (0.27)	0.50	1.20
ASI severity of family problems	0.12 (0.01)	<.001**	1.14	−.72 (0.32)	0.02	0.48
Log (theta)	3.81 (0.41)	<.001**				

*B*, the regression coefficient estimates. *B* can be interpreted as the amount of increase (or decrease, if the sign of the coefficient is negative) in the predicted log odds of the number of zero use days “abstinent days”/and increase (or decrease if negative) in days of use between substance users when using MICBT intervention holding all other predictors constant. OR (exp *B*), odds ratios. The OR can be interpreted as the increase (above 1.0) or decrease (below 1.0) in the odds of not using days between MICBT participants (with other predictors in the model held constant)

*IRR*, incidence rate ratio. The *IRR* can be interpreted as a percentage increase (above 1.0) or decrease (below 1.0) in drug use days with participants of the MICBT group

\* Significant *P* value (<0.05)

\*\* Highly significant *P* value (<.001)

to account for temporal correlations. We interpreted significant group main effects as overall differences due to randomized group assignment and significant interaction effects as differences in trends over time. As outcome variables (urge-specific coping strategies and general life coping strategies) are ordinal, generalized linear models, specifically ordinal regression, were applied. Baseline demographic and clinical data were included as covariates with group factors in the linear and survival analyses.

## Results

Figure 1 shows the number of patients enrolled and followed. Of 60 allocated for an intervention study, 96% ( $n=58$ ) completed the 6-month intervention treatment. 6.6% ( $n=4$ ) and 13.3% ( $n=8$ ) dropped out from 3 and 6 months of assessments, respectively.

There was no statistically significant difference between patients of both groups regarding age, educational status, employment, marital state, and clinical characteristics (Table 1).

### Associations between the type of intervention (MICBT vs. NA) and number of drug use days and abstinent days

Using the logistic portion of GLMs zero-inflated models, treatment modality significantly affected the probability of abstinence from drug use. MICBT participants, as compared with NA participants, had a significantly higher probability of abstinence from drug use in 3 months ( $B=2.55$ ,  $SE=0.86$ ,  $OR=12.85$ ,  $P=0.003$ ) and 6 months ( $B=2.83$ ,  $SE=1.06$ ,  $OR=16.99$ ,  $P=0.008$ ) of follow-up. When using the zero-inflated model, treatment modality had a significant main effect on the number of drug use days among all participants ( $P<0.05$ ). Among all participants, the MICBT participants, compared with the NA participants, reported 29% and 30% fewer days of substance use in the first 3 months ( $B=-0.35$ ,  $SE=0.13$ ,  $IRR=0.71$ ,  $P=0.006$ ) and 6 months ( $B=-0.33$ ,  $SE=0.07$ ,  $IRR=0.70$ ,  $P<0.001$ ) successively (Table 2).

### Group differences in lapse to substance use during the 6-month follow-up (survival analysis)

As evidenced by hazard ratios (i.e., risk of lapse given the treatment condition and other covariates). After controlling for other covariates, the mode of treatment and marital status variables. Compared with the NA group, the MICBT group showed more than 90% decreased risk of relapse to drug use ( $B=-2.46$ ,  $SE=0.60$ ,  $HR=0.08$ ,  $CI=[0.026-0.27]$ ,  $P<0.001$ ) (Table 3; Figs. 2 and 3).

### Attendance to the treatment program

There was a significant main effect of the treatment group ( $F(176.56)=87.15$ ,  $P<0.001$ ), time level

**Table 3** Group differences in lapse to substance use during the 6-month follow-up (survival analysis)

	B (SE)	P	HR (95.0% CI for HR)
Mode of treatment	-2.46 (.60)	< .001**	.08 (.026–.27)
Age	-.037 (.10)	.729	.96 (.78–1.19)
Employment	-.67 (1.03)	.516	.51 (.067–3.89)
ASI medical	-.02 (.27)	.925	.97 (.57–1.66)
ASI employment	.02 (.21)	.919	1.02 (.66–1.57)
ASI drugs	.15 (.36)	.673	1.16 (.57–2.36)
ASI family	.26 (.21)	.217	1.30 (.85–1.97)
ASI legal	.27 (.266)	.300	1.31 (.78–2.22)
Lifetime weeks	.001(.004)	.809	1.001(.99–1.008)
Age onset	.07 (.10)	.490	1.07 (.87–1.31)
Personality disorder	-.32 (.81)	.693	.72 (.14–3.55)
Educated	-.57 (.68)	.402	.56 (.14–2.15)
Married	-2.76 (.76)	< .001**	.06 (.014–.28)
Divorced	2.08 (.93)	.026*	8.06 (1.28–50.74)

B, The regression coefficients predict the hazard of relapse. A positive coefficient indicates a positive relationship between the covariate and the hazard for the relapse (higher values on the covariates are associated with less survival time). A negative coefficient indicates a negative relationship between the covariate and the hazard for the terminal event. Higher values on the covariate are associated with longer survival time. HR hazard ratio. Hazard ratios less than 1 are associated with negative regression slopes, whereas values greater than 1 are associated with positive slopes. A hazard ratio of 1 indicates no change in the hazard per unit change on the covariate

\* Significant  $P$  value ( $<.05$ )

\*\*Highly significant  $P$  value ( $<.001$ )

( $F(2126.67)=116.77$ ,  $P<0.001$ ), and group $\times$ time interaction ( $F(2126.67)=37.98$ ,  $P<0.005$ ). Attendance days percentage is higher in MICBT than NA group ( $b=12.96$ ,  $SE=1.39$ ,  $t=9.26$ ,  $P<0.001$ ,  $CI$  from 10.20 to 15.73). The marginal means of attendance days % in baseline intervention sessions, 1st 3 months of follow-up daycare, and 2nd 3 months of follow-up daycare are respectively 52.55 (95% CI from 50.60 to 54.50), 51.54 (95% CI from 49.58 to 53.49), and 44.54 (95% CI from 42.58 to 46.49) for the MICBT group and 52.29 (95% CI from 50.34 to 54.24), 37.40 (95% CI from 35.45 to 39.35), and 31.57 (95% CI from 29.61 to 33.52) for NA groups (Fig. 4, Table 4).

### Group differences in urge specific coping strategies and general behavioral changes

MICBT intervention was a significant positive predictor of several urge-specific coping strategies ( $B$  is positive,  $OR>1$ , and  $p<0.05$ ), such as thinking about the negative consequences of drug use, alternate behavior, thinking about positive consequences of keeping abstinent, mastery of stress, distracting thoughts, using problem-solving skills on facing a problem, using refusal skills when being offered, challenge the negative thoughts, thinking through a behavior chain, delaying waiting it out, using relaxation techniques

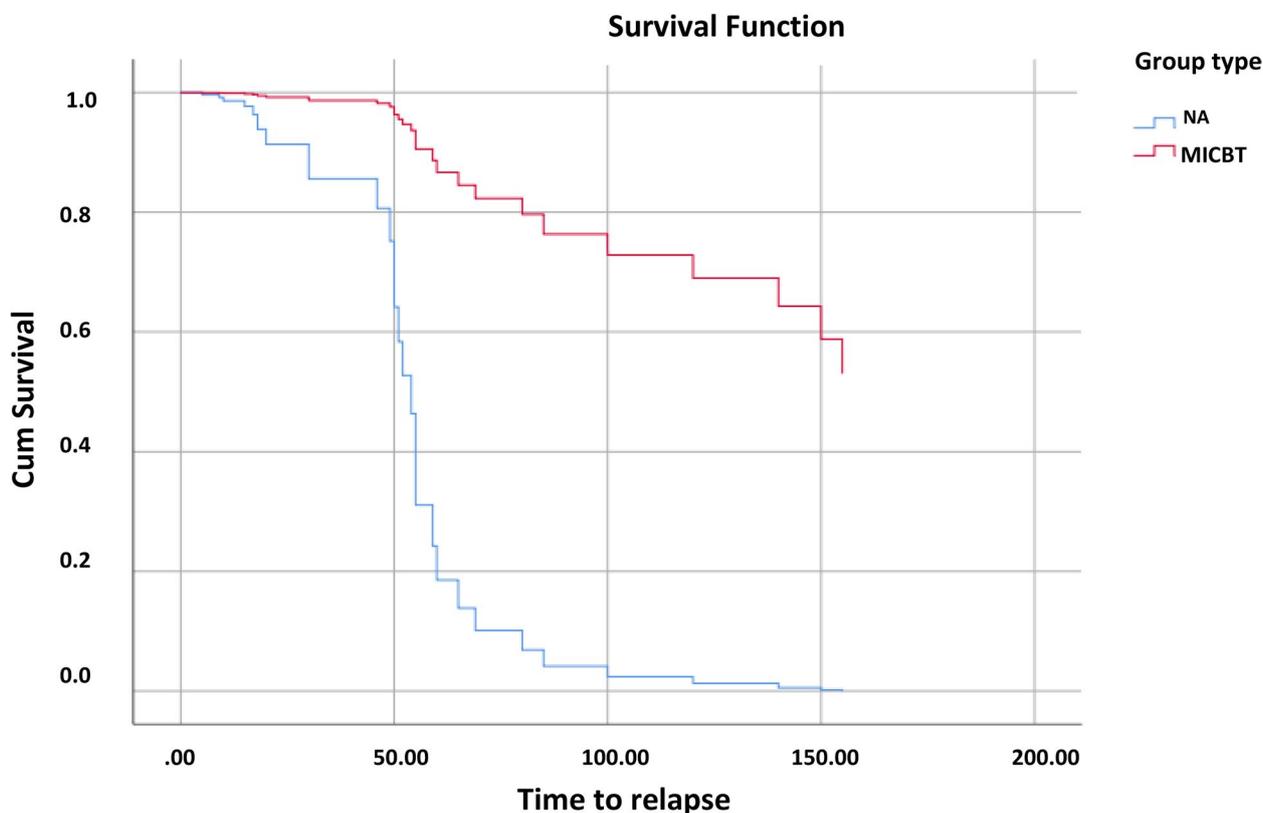


Fig. 2 Survival functions for participants of MICBT and NA groups

and meditation, resolving the problem with the person, substitution by food or drink. MICBT was a significant -ve predictor for other urge-specific strategies, such as cigarette substitution and thinking what the therapist would say (*B* estimate is negative,  $OR < 1$ , and  $p$  value  $< 0.05$ ). This indicates that the subjects in the MICBT group, compared to the NA group, were likelier to indicate lesser cigarette smoking use and thinking about what the therapist would say as coping strategies. General Strategies for Drugs (GSD) was used as an indicator for modification of problematic behavior to maintain recovery. MICBT intervention was a significant positive predictor of several general strategies for drugs (*B* is positive,  $OR > 1$ ,  $p < 0.05$ ), such as keeping in contact with other social support people, sober ways for a good time, practicing relaxation or meditation regularly, keeping self busy, healthy food, sleep, etc., avoiding tempting situations, working toward future goals, regularly reminding self “you’re a sober person,” talking over feelings with others, working on problems regularly, recognizing and challenging negative thoughts, exercise regularly, living with clean/sober people, and never keep much money (Table 5).

### Discussion

This study showed that combined MI and CBT in groups seem to significantly increase the likelihood of abstaining without lapses through 6 months, delay first lapse onset after the intervention, and decrease the number of days of drug use among participants who still use substances compared with NA self-help groups. These data are good predictors for longer-term abstinence and increased likelihood of engaging in recovery. Other research also supported combining MI and CBT to enhance further outcomes related to substance use and addictive behaviors [17].

Several supposed factors predict the effectiveness of the treatment model. Some of the findings of this research may point to some of these factors. For example, improved attachment to treatment is a prominent finding in the MICBT group, manifested by increased attendance days percentage and decreased dropout through 1 year of basic treatment and daycare follow-up. This finding supports other studies that demonstrated the role of MI groups in increased adherence to treatment [14].

From this finding in our study and other studies, we can deduce the importance of group cohesion, empathic listening, mutual respect, and collaboration as substantial

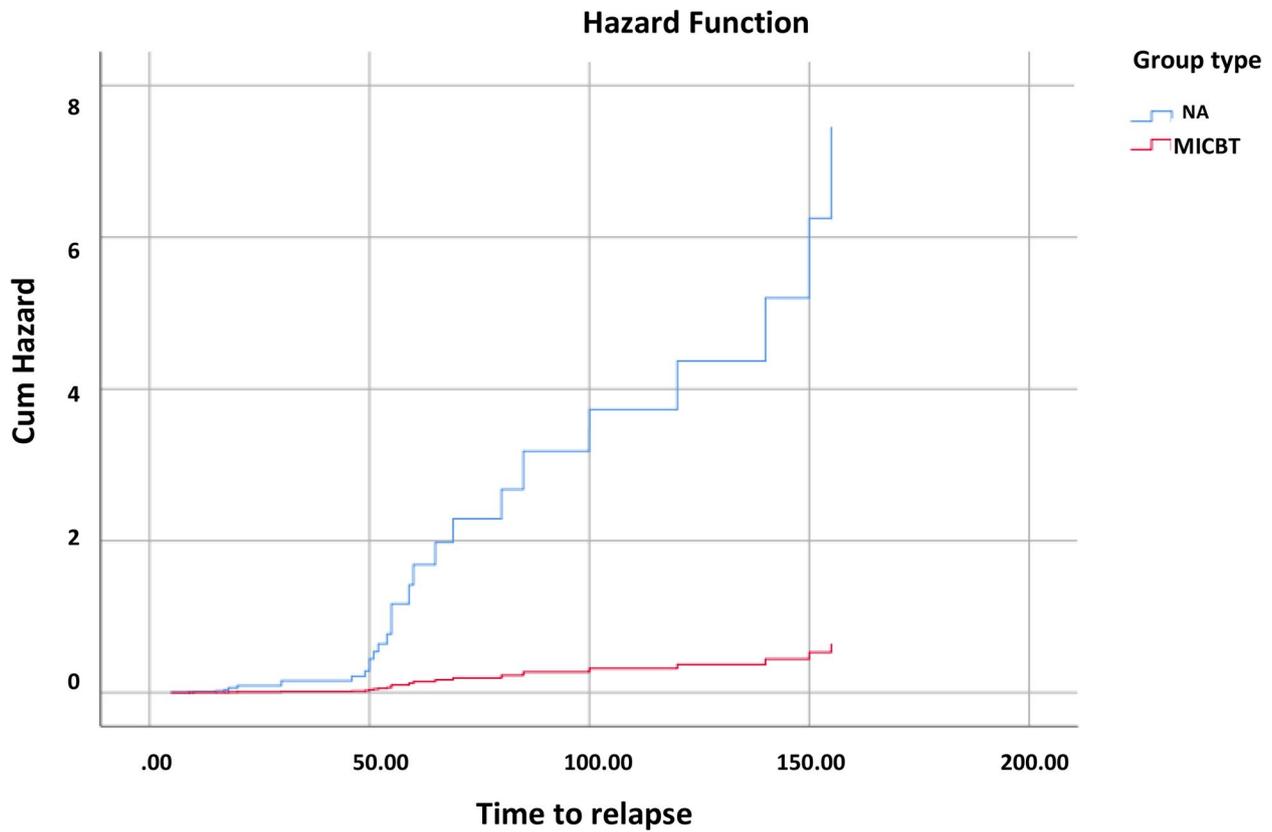


Fig. 3 Hazard functions for participants of MICBT and NA groups

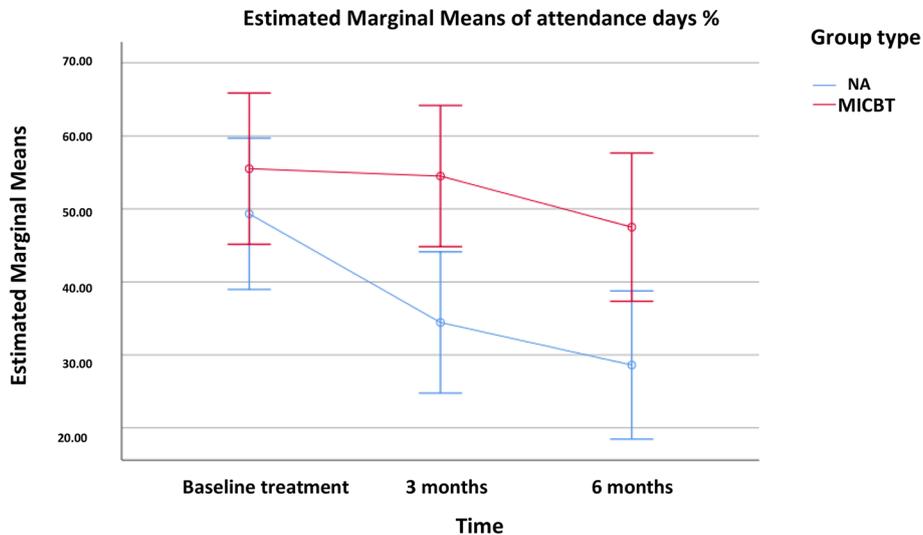


Fig. 4 Estimated marginal means of attendance days %, blue line (0) = NA group. Red line (1) = MICBT group

MI group factors for engaging with a group and, thus, treatment attachment. Coping strategies also can indicate the importance of coping skill learning and behavioral training as important factors in MICBT groups for

the outcome. Coping strategies training is more prominent and extensive in MICBT groups than in NA. Coping skill training concentrates on addressing weaknesses, replacement of ineffective coping strategies with effective

ones, and interpersonal and intrapersonal skill training. In agreement with other studies [18], this study demonstrated that MICBT groups have a more significant positive effect on strengthening some important coping strategies to urges and craving, such as thinking about the negative consequences of drug use, alternate behavior, thinking about positive consequences of keeping abstinent, mastery of stress, distracting thoughts, using problem-solving skills on facing a problem, using refusal skills when being offered, and challenging the negative thoughts.

Again, the positive changes in behavior that are more significantly prominent in MICBT groups may point to very important factors inherent in MI and CBT components. For instance, some MI factors, such as focusing on positive change, acceptance, instillation of hope, and strengthening commitment to change, may have a role in changing problematic behaviors. The same conclusion was demonstrated by other studies [19]. This study and other studies [17] demonstrated that some skill training strategies regarded as CBT factors, such as problem-solving, recognizing and challenging negative thoughts, self-assertiveness, and social skill training, may have a role in building new healthy behaviors for relapse prevention. In the expansion of this study, Dolan et al. [18] concluded that since some strategies taught in treatment are more

Using the group format in this study was not only for financial or resource issues but also for the supposed additive power of the group for a more positive outcome. The ever-increasing body of outcome studies provides strong empirical support for the therapeutic effectiveness of group psychotherapy across settings, diagnoses, and cultures. However, psychotherapy process research, those studies that explore mechanisms by which therapeutic change occurs, are less robust. More studies are needed to explore that change’s mediators, processes, or mechanisms (i.e., how the change came about) [20].

The research addresses an important gap in efficacy studies by using a robust model of Group MI, standardized measures, and implementation within a realistic care setting. This model that combined procedures validated by Wagner and Ingersoll and Velazquez et al. for MICBT in groups allows standardizing practice and reproducibility of the studies. The strength of this technique is to elicit group energy for change, bridging across different change targets by broadening focus and change processes in addition to specific content. It allows for promoting internal change talk through linking. In addition, the structure and format (closed groups) seem to facilitate group cohesion. The primary findings showed good feasibility, evidence of implementation success, better retention in the Group MI condition, and some impact on substance use.

**Table 4** Attendance days to treatment according to group and time factors

Parameter		Estimates of fixed effects <sup>a</sup>					
		<i>b</i>	SE	df	<i>t</i>	<i>P</i>	95% CI
<b>Attendance percentage baseline</b>		<b>.95</b>	<b>.01</b>	<b>79.08</b>	<b>55.34</b>	<b>&lt;.001**</b>	<b>.92–.99</b>
<b>Treatment group</b>	<b>MICBT = 0</b>	<b>12.96</b>	<b>1.39</b>	<b>157.96</b>	<b>9.26</b>	<b>&lt;.001**</b>	<b>10.20–15.73</b>
<b>Time</b>	basic	20.72	1.33	169.55	15.54	<.001**	18.09–23.35
	1st 3 months	5.83	1.17	118.97	4.98	<.001**	3.51–8.15
<b>Treatment group* time</b>	Basic* MICBT	–12.71	1.88	169.55	–6.74	<.001**	–16.43–8.98
	1st 3 months* MICBT	1.16	1.65	118.97	.70	.48	–2.11–4.44

MICBT group coded as 0, NA group coded as 1; basic 20 sessions coded as 0, 1st 3 months of follow-up daycare attendance code as 1, 2nd 3 months of follow-up daycare attendance coded as 2

\*\* *P* value is highly significant (<.001)

<sup>a</sup> Dependent variable: percentage days of attendance

<sup>b</sup> This parameter is set to zero because it is redundant

effective in preventing relapse than others, treatment may be improved by focusing on these specific strategies. Further studies are needed to determine the factors in MICBT groups (MI, CBT, and group factors) and their effect on outcomes.

Further research should confirm these preliminary results. Regarding feasibility, there was extensive training for staff regarding MI, CBT, and group facilitation skills, and all sessions were translated into Arabic. The positive verbal feedback is reflected in the participants’ adherence to the MI groups, as the attrition rates are low.

**Table 5** Group differences in urge specific coping strategies and general life coping strategies

Urge specific coping strategies	B	SE	p	EXP B
Negative consequences thought	1.39	.50	.005*	4.03
Alternate behavior	1.96	.53	<.001**	7.14
Positive consequences thought	1.53	.50	.003*	4.62
Mastery stress	1.95	.53	<.001**	7.08
Distracting thoughts	1.90	.52	<.001**	6.74
Escape the situation	.69	.47	.146	2.006
Solve the problem	1.58	.50	.002*	4.88
Spiritual coping	.77	.48	.115	2.16
Spend time with sober supports	-.46	.49	.345	.62
Refuse the substance	1.54	.51	.003*	4.67
Challenge the thoughts	1.72	.53	.001**	5.62
Think through a behavior chain	1.52	.518	.003*	4.61
Delay, wait it out	2.02	.535	<.001**	7.56
Substitute a cigarette	-1.82	.52	.001**	.16
Relax or meditate	1.84	.53	.001**	6.33
Resolve conflict with a person	1.15	.49	.020*	3.18
Think what the therapist would say	-1.82	.52	.001**	.16
Substitute food or drink	1.56	.51	.002*	4.77
Meeting, sponsor, or counselor	.62	.48	.192	1.87
Self-punishment	.24	.46	.595	1.28
Willpower alone	.69	.48	.150	1.99
General life coping strategies	B	SE	p	EXP B
Negative consequence thoughts	1.36	.51	.008*	3.92
Positive consequence thoughts	1.23	.50	.014*	3.42
Sober ways for a good time	.96	.49	.051*	2.61
Relax or meditate regularly	1.31	.50	.009*	3.71
Keep self busy	1.11	.49	.025*	3.04
Healthy food, sleep, etc	1.20	.50	.016*	3.32
Avoid tempting situations	1.16	.50	.021*	3.19
Work toward future goals	1.14	.49	.020*	3.14
Remind yourself you are the sober person	1.01	.48	.036*	2.75
Connect with the spiritual side	.84	.48	.082	2.32
Other social support people	1.34	.50	.008*	3.83
Tell others you are not using	.51	.48	.288	1.66
Talk over feelings with others	1.64	.50	.001**	5.19
Work on problems regularly	1.10	.48	.023*	3.01
Recognize and challenge negative thoughts	.97	.49	.049*	2.63
Think about what is learned in treatment	.86	.48	.075	2.36
Meetings, aftercare, or counselor	.87	.48	.072	2.39
A job where a substance is not used	.96	.49	.052	2.61
Exercise regularly	1.16	.49	.019*	3.21
Live with clean/sober people	1.40	.51	.006*	4.08
Never keep much money	2.49	1.21	.040*	12.13

-B the regression coefficients and can be interpreted as the amount of increase (or decrease if the sign of the coefficient is negative) in the predicted log odds of being in a higher level of general strategies for drugs when using MICBT intervention

MICBT, educated persons, persons with personality disorder are scored with 1; NA, illiterate persons, and persons without personality disorder are scored with 0). OR odds ratios. The OR can be interpreted as the increase (above 1.0) or decrease (below 1.0) in the probability of being at a higher level on the GSD scale with MICBT participants (with other predictors in the model held constant)

\* Significant p value (<.05)

\*\* Highly significant p value (.001)

There were some limitations in this study. First, the sample was somewhat small when compared to some other studies. This was due to limitations in resources and trained staff. Second, about 3.3% of our participants in the MI condition dropped out, indicating that all participants did not accept treatment. According to a meta-analysis, 19.7% of study participants drop out in randomized-controlled trials [21]. The dropout rate in the current study was lower, and treatment acceptability can be considered satisfactory. Third, we could not assess the effects of MI in groups over a longer term since only a posttest at 3 and 6 months was possible for practical reasons. Future studies are needed to assess the effects of MI in groups at more for longer periods (e.g., at 1 or 2 years after the treatment). Another limitation concerning MICBT group fidelity assessment since the Assessment of Motivational Interviewing Group—Observer Scales (AMIGOS) could assess group factors and MI factors but has no parameters for the assessment of CBT factors. Adding another instrument to assess CBT fidelity in the next studies is recommended.

**Conclusion**

The findings of this study are promising in support of the effectiveness of MICBT groups for treatment in terms of decreased days of substance use, increased abstinence days, more attachment to treatment, improved coping to craving, and positive behavioral changes.

**Abbreviations**

- MICBT Motivational interviewing and cognitive-behavioral therapy
- TSF Twelve-step facilitation
- NA Narcotic anonymous
- SUDS Substance use disorders
- MI Motivational interviewing
- CBT Cognitive-behavioral therapy
- ASI Addiction Severity Index
- SCID-II Structured Clinical Interview for DSM-IV AXIS II
- MINT Motivational Interviewing Network of Trainers
- AMIGOS Motivational Interviewing Groups—Observer Scales
- GSD General strategies for drugs

**Acknowledgements**

Not applicable.

**Authors' contributions**

MHE and NM conceived and supervised the study; AAA, LAA, and YAE were responsible for the data collection. AAA analyzed and interpreted the data. All authors provided comments on the manuscript at various stages of development. All authors read and approved the final manuscript.

**Funding**

No.

**Availability of data and materials**

Data and material are available on a reasonable request from the author.

## Declarations

### Ethics approval and consent to participate

It was approved by the ethics committee of the Faculty of Medicine, Ain Shams University, and it was started from September 2021 to September 2022. Informed written consent was obtained from the participants.

### Consent for publication

All authors give their consent for publication in the journal.

### Competing interests

The authors declare that they have no competing interests.

Received: 21 August 2023 Accepted: 22 October 2023

Published online: 18 December 2023

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