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ABSTRACT

Some adolescents are at great risk for early attrition from inpatient substance abuse treatment. We aimed to examine the effect of sociodemographic features, substance use patterns, childhood traumas and trauma-related psychopathology on the completion of an adolescent substance abuse inpatient treatment program in order to acquire information about adapting treatment strategies to enhance patient retention. Our study included 105 adolescents who were referred with a diagnosis of substance use disorder to our Child and Adolescent Substance Abuse Treatment Center's inpatient treatment program in Istanbul, Turkey from February to December 2017. The Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version, the Hamilton Depression Rating Scale, the Conners-Wells Adolescent Self Report Scale, the Childhood Trauma Questionnaire, the Childhood Abuse and Neglect Question List, the Dependency Profile Index-Practitioner Form and the Adolescent Dissociative Experiences Scale were administered to the study group. The treatment completion rate was 26.7%. The patients who did not complete the inpatient treatment program had more history of childhood emotional neglect and/or abuse. The most common type of psychosocial trauma was emotional neglect (34%). Early attrition from the inpatient treatment program was related to dissociative amnesia, more severe attention deficit hyperactivity disorder, depression and synthetic cannabinoids use ($p < 0.05$). Our findings indicate that childhood psychosocial trauma and related clinical characteristics were associated with attrition from the adolescent inpatient substance abuse treatment program. Substance abuse treatment programs should adopt early assessment tools to identify those at risk for early attrition from treatment and provide targeted interventions for them.

Introduction

Unfortunately, the completion rates of substance use disorder treatment remain low. Most of the studies have concluded that more than 50% of patients leave substance abuse treatment in first month (Stahler et al., 2016). The factors associated with attrition from substance use disorder (SUD) treatment include: being female, low socioeconomic and education levels, not living with parents, younger age, unemployment, having bad peer groups and not being willing to change peer groups, despair about treatment, criminal offenses and prison history (Darke et al., 2012; Evans et al., 2009; Martin et al., 2010; Neumann et al., 2010; Turan & Yargıc, 2012). Some researchers claim that there is no significant difference in attrition by gender (Greenfield et al., 2007). More severe substance use patterns and using opioid and cocaine, increased substance use before hospitalization and accompanying severe alcohol use are also associated with early attrition from treatment (Evans et al., 2009; Patton et al., 2011; Zanis et al., 2009). Studies have indicated opioid substitution treatment and naltrexone use increase the chances of completing treatment for heroin users (Doyle & Donovan, 2014). Although cannabis use has been associated with leaving treatment early in previous studies, this

correlation has been approached with caution in recent papers (Epstein & Preston, 2003).

Childhood history of abuse or neglect, especially sexual abuse, has been generally associated with failure to complete treatment of substance use disorders (Darke et al., 2012; Evans et al., 2009; Jaycox et al., 2004; Neumann et al., 2010; Sacks et al., 2008). Recently, studies have reported meaningful correlations between emotional abuse, physical and emotional neglect and substance/alcohol use disorders (Tucci et al., 2010).

Some studies have associated attrition from treatment for SUD most frequently with major depression, and attention deficit and hyperactivity disorder (ADHD), others indicate the opposite with regard to depression (Hersh et al., 2014; Neumann et al., 2010). In the presence of post-traumatic stress disorder (PTSD), poor prognoses have been reported for all types of substance abuse (Cacciola et al., 2009; Driessen et al., 2008; Tull et al., 2013).

There are not enough studies of children and adolescents' attrition from substance use disorder treatment. Most of the previous research on the predictors of attrition from SUD treatment has focused on outpatient treatment programs and been conducted with adult patients. Some of the previous studies of adolescents focused only on specific patient groups such as ADHD patients and heroin users. This study addresses gaps in the previous research by focusing on an inpatient treatment program and working with adolescent patients with all levels of SUD. Our primary purpose was to identify the factors that affecting the completion of treatment by adolescent inpatients at the Child and Adolescent Alcohol and Drug Addiction Treatment Center (CAADATC) in Istanbul, Turkey. By identifying these factors, patients who are at risk for attrition from treatment can be identified and targeted for early intervention to help them remain in treatment longer. A review of the literature led us to formulate this research hypothesis: patients who have more severe substance use patterns, more severe psychopathology, especially PTSD as a comorbidity, and more severe psychosocial trauma may be at greater risk of failing to complete inpatient treatment for SUD.

Methods

Participants

Of the 107 patients who visited the CAADATC and were hospitalized with an SUD diagnosis from February to December 2017, 105 with SUD with different clinical severity were included in this study. The criteria for exclusion included: patients with active psychoses, bipolar affective disorders or autism spectrum disorder diagnosis, intellectual disability, illiterate patients and those who did not wish to participate voluntarily. This study excluded one patient who was illiterate and another who withdrew his consent after inclusion. This research was approved by the Istanbul Bakirkoy Prof. Dr. Mazhar Osman Mental Health and Neurology, Neurosurgery Research and Training Hospital's Ethics Committee (document number: 2017/600) and meets all ethical considerations according to the 1964 Declaration of Helsinki and its later amendments. Prior to the patients' inclusion in the study, oral and written information was given to them, and their written consent was obtained.

Procedure

The patients' sociodemographic characteristics, substance use patterns and family characteristics were determined using a sociodemographic data form prepared by the researchers and collected by the first author who has a degree in child and adolescent psychiatry and has received training in interviewing with the Schedule for Affective Disorders and the Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL). The first author administered the K-SADS-PL, the Childhood Abuse and Neglect Inventory, the Hamilton Depression Rating Scale and the Addiction Profile Index-Practitioner Form (API) to the participants. These self-reporting scales: the Conners-Wells' Adolescent Self-Report Scale-Long Form, the Childhood Trauma Questionnaire and the Adolescent Dissociative Experiences Scale were completed by all the participants. We defined treatment completion as finishing the two-month treatment program at the CAADATC's inpatient service.

Data collection tools

The schedule for affective disorders and schizophrenia for School-Age Children-Present and Lifetime version (K-SADS-PL)

This schedule was developed by Kaufman et al. (1997) to determine the past and present psychopathology of children and adolescents according to DSM-IV diagnostic criteria (Kaufman et al., 1997). The validity and reliability study of its Turkish version was performed by Gokler et al. (Gokler et al., 2004).

The Hamilton Depression Rating Scale (HAM-D)

This scale was developed to measure the severity of depression (Williams, 1988). The validity and reliability study of its Turkish version was conducted by Akdemir et al. (1996). The HAM-D is intended for use with 12–18 year-old adolescents (Tutkunkardas & Kılıncaslan, 2011).

The Conners-Wells' Adolescent Self-Report Scale-Long form (CASS-L)

This form was developed by Conners et al. to determine adolescents' behavioral problems, the severity of ADHD symptoms, levels of anger and aggression, and other forms of psychopathology (Conners et al., 1997). The validity and reliability study of its Turkish version was conducted by Kaner et al. (Kaner et al., 2011).

The Childhood Trauma Questionnaire (CTQ)

This questionnaire was developed to determine the presence of childhood emotional, physical, sexual abuse and neglect, and to measure their severity (Bernstein et al., 1994). The shortened form consists of 28 items. The validity and reliability study of its Turkish version was conducted by Sar et al. (Sar et al., 2012).

The Childhood Abuse and Neglect Inventory

This semi-structured inventory was developed by Yargıc et al. in Turkey. It consists of nine questions about childhood physical abuse, physical neglect, emotional abuse, emotional neglect and sexual abuse. Patients who respond affirmatively to the questions are asked to explain the circumstance of their traumas, and their responses are used to decide whether abuse and/or neglect is present or not (Yargıc et al., 1994).

The Addiction Profile Index-Practitioner form (API):

This scale is used to determine the characteristics of adolescents' substance use. The scale development, validity and reliability study of its Turkish version was performed by Ogel et al. (Ogel et al., 2012).

The Adolescent Dissociative Experiences Scale:

This scale was developed to determine the dissociative symptoms of 11–17 year-old adolescents (Armstrong et al., 1997). It was adapted to Turkish by Zoroglu et al. (Zoroglu et al., 2002).

Statistical analysis

Statistical analysis was performed using SPSS 18 software. A descriptive analysis was done in order to determine the distribution of the treatment completers and the dropouts' sociodemographic and clinical data, and the chi-square independence test was used. Comparison of the two groups' completion of the inpatient treatment used the independent samples t-test or the Mann-Whitney U test depending on the distributions of the continuous variables. To determine the exact relationship between hospitalization time and the independent variables that are significantly associated with the length of hospital stay, we used linear regression analysis. This study's threshold for statistical significance was $p < 0.05$.

Results

Of the patients ($n = 105$), 26.7% ($n = 28$) completed their inpatient treatment, 37.1% ($n = 39$) left treatment by requesting to do so, and 36.2% (n = 38) were prematurely discharged from inpatient treatment because of noncompliance issues (e.g., fighting, supplying drugs, using drugs or encouraging their use). The patients' mean age was 16.9 ± 1.07. A comparison of the treatment completers and non-completers' sociodemographic data is shown in Table 1. Of the treatment non-completers, 72.4% were unemployed ($p = 0.041$). There were no significant differences

Table 1. Comparison of the treatment completers and non-completers' sociodemographic data.

	Treatment completers n (%)	Treatment non-completers n (%)	p Value
Gender			
Female (n = 33)	7 (25)	26 (33.8)	>0.05
Male (n = 72)	21 (75)	51 (66.2)	
Being employed	14 (50)	22 (28.6)	0.041
History of migration	9 (32.1)	32 (41.6)	>0.05
Education level			
Only literate	2 (7.1)	2 (2.6)	>0.05
Completed primary school	7 (25)	19 (24.7)	
Completed middle school	18 (64.3)	55 (71.4)	
Graduated from high school	1 (3.6)	1 (1.3)	
Family structure			
Nuclear family	19 (67.9)	55 (71.4)	>0.05
Extended family	1 (3.6)	0	
Fragmented family	6 (21.4)	15 (19.5)	
Orphanage	2 (7.1)	7 (9.1)	
	Mean ± SD	Mean ± SD	
Age	17.1 ± 0.8*	16.8 ± 1.1*	>0.05

*Years.

Table 2. Comparison of the treatment completers and non-completers' substance use patterns and API scores.

	Treatment completers Mean ± SD	Treatment non-completers Mean ± SD	p Value
Total duration of substance use (days)	1584.29 ± 770	1395.78 ± 669	>0.05
Most recent substance use (days)	16.04 ± 23	20.12 ± 51.4	>0.05
Number of substances used	5.11 ± 1.8	5.34 ± 1.9	>0.05
Number of nights spent on the street	14.54 ± 29.4	68.05 ± 24.5	>0.05
Age at first use*	12.59 ± 2	12.84 ± 1.7	>0.05
Longest period of substance use abstinence (days)	45.82 ± 52	60.99 ± 74.5	>0.05
API total	6.9 ± 1.14	7.27 ± 1.33	>0.05
API total (females)	7.17 ± 0.76	7.21 ± 1.36	>0.05
API-motivational subscale (females)	1.71 ± 0.4	1.96 ± 0.1	0.047
API total (males)	6.81 ± 1.24	7.3 ± 1.34	>0.05

*Years. API: addiction profile index-practitioner form.

between the two groups by age, gender, education level or family structure. Their mean age at first drug use was 12.8 ± 1.5 years (min: 9, max: 15). Of the patients: 43.8% used heroin, 28.6% used synthetic cannabinoids, 14.3% used ecstasy-MDMA, 4.8% used inhalant-solvents, 2.9% used cannabis, 2.9% used cocaine, 2.9% used methamphetamine. There were no significant differences between the treatment completers and non-completers based on their drug of choice, except for the synthetic cannabinoids users and the heroin users. Of the latter, 37% completed treatment, while 18.6% of the patients who did not use heroin completed treatment ($p = 0.035$). The mean hospital stay of the synthetic cannabinoids users was 26.37 ± 20 days, while it was 36.05 ± 19 days for non-users of synthetic cannabinoids ($p = 0.014$). The mean hospital stay of the heroin users (38.83 ± 19.6 days) was significantly longer than that of the non-users of heroin (28.97 ± 18.9 days) ($p = 0.011$). There were no significant differences in the mean hospital stays of

the other substance users and non-users ($p > 0.05$).

A comparison of the treatment completers and non-completers' substance use patterns and API scores is shown in Table 2. The API-motivational subscale scores of the female treatment non-completers were significantly higher ($p = 0.047$).

The most common type of psychosocial trauma was emotional neglect at 34% of the entire group. Emotional neglect was followed by physical abuse (33%), sexual abuse (15%), emotional abuse (11%) and physical neglect (7%). Table 3 shows a comparison of the treatment completers and non-completers' types and number of psychosocial traumas and CTQ-28 scale and subscale scores. Of the treatment non-completers, 44.2% ($n = 34$) had a history of emotional neglect ($p = 0.014$), and 28.6% ($n = 30$) of all the patients had a history of multiple types of childhood trauma. The female treatment completers had experienced significantly fewer traumas than the female non-completers ($p = 0.014$). Of the

Table 3. Comparison of the treatment completers and non-completers' psychosocial trauma types, number of traumas and CTQ-28 scale and subscale scores.

	Treatment completers n (%)	Treatment non-completers n (%)	p Value
Psychosocial trauma types			
Physical abuse	9 (32.1)	29 (37.7)	>0.05
Emotional abuse	1 (3.6)	12 (15.6)	>0.05
Sexual abuse	3 (10.7)	14 (18.2)	>0.05
Physical neglect	2 (7.1)	6 (7.8)	>0.05
Emotional neglect	5 (17.9)	34 (44.2)	0.014
	Mean ± SD	Mean ± SD	
Number of traumas	0.71 ± 0.81	1.23 ± 1.26	>0.05
Number of traumas (females)	0.57 ± 0.7	1.88 ± 1.36	0.014
Number of traumas (males)	0.76 ± 0.83	0.9 ± 1	>0.05
CTQ-28 total	36.32 ± 8.06	43.27 ± 17	>0.05
CTQ-28 total (females)	33.57 ± 9.38	52.35 ± 19.6	0.007
Emotional abuse (females)	6.14 ± 1.4	11.69 ± 5.1	0.002
Emotional neglect (females)	7.57 ± 2.6	12.88 ± 5.4	0.013
CTQ-28 total (males)	37.24 ± 7.6	38.65 ± 13.63	>0.05

CTQ-28: Childhood Trauma Questionnaire.

females who did not complete treatment, 57.7% ($n = 15$) had been subjected to emotional neglect, but this was not the case for any of the female treatment completers ($p = 0.009$). There was a significant difference in the mean CTQ-28 scores of the female treatment completers and non-completers (Table 3).

Conduct disorder was the most common comorbid diagnosis at 78.1% ($n = 82$), followed ADHD (72.4%, $n = 76$), major depression (61.9%, $n = 65$), alcohol abuse (22.9%, $n = 24$), oppositional defiant disorder (20%, $n = 21$) and PTSD (14.3%, $n = 15$). There were no significant differences in completion of treatment based on the types of their comorbidities, but the treatment completers had significantly lower numbers of comorbidities ($p = 0.018$).

The female treatment non-completers' mean HAM-D score was 8.96 ± 5.5, and the female treatment completers mean HAM-D score was significantly lower (3.86 ± 3.1) ($p = 0.024$).

The treatment completers' Conners-Wells Adolescent Self-Report Scale (CASS) behavioral, cognitive, anger control problems, DSM-ADHD, DSM-inattention, impulsivity and family problems subscale scores were significantly lower ($p = 0.012$, 0.008, 0.001, 0.011, 0.021, 0.027 and 0.01, respectively). The female treatment completers' CASS cognitive, anger control problems, DSM-inattention and family problems subscale scores were significantly lower ($p = 0.024$, 0.021, 0.032 and 0.007, respectively). The male treatment completers' CASS anger control problems and family problems subscale scores were significantly lower ($p = 0.023$ and 0.044, respectively).

There were no significant differences in the treatment completers and non-completers' Dissociative Experiences Scale (DES) scale and subscale scores, except for the dissociative amnesia subscale, on which the patients who completed treatment had significantly lower scores (15.32 ± 14.9 vs. 22.71 ± 15.5) ($p = 0.031$).

We also introduced linear regression to determine the factors that significantly affected hospitalization duration. CASS anger problems subscale scores and heroin use as drug of choice were the best combination of independent variables for predicting hospitalization duration. The model was significant ($p = 0.003$ and $F = 6.099$) and explained 10% of the variance. CASS anger problems subscale scores were related to reduced hospitalization duration (standardized beta: -0.216, $p = 0.025$, 95% CI: -0.928 and -0.063), and heroin use as drug of choice was related to longer hospitalization duration (standardized beta: 0.208, $p = 0.032$ and 95% CI: 0.736 and 15.745).

Discussion

The patients' treatment completion rate was 26.7%. Of them, 36.2% ($n = 38$) were prematurely discharged from inpatient treatment because of noncompliance issues (e.g. fighting, supplying drugs, using drugs or encouraging their use). The completion rates of outpatient treatment were 28% in a recent study (Andersson et al., 2018).

and 19% in another study (Clark et al., 2014). The low completion rate in this study may be related to poor motivation and low compliance with the inpatient clinic rules, considering both the patients' clinical status and their age group characteristics.

Of the patients, 21% of the females and 29% of the males completed the treatment. Some studies have found that females have better completion rates (Choi et al., 2015), but most of them, like our study, have found that gender is not a determinant factor (Taylor et al., 2017).

Like our study, other studies have found that being employed is related to completion of treatment (Clark et al., 2014).

In our study, the patients who used synthetic cannabinoids remained in inpatient for less time. Although previous studies have reached the opposing conclusion, it has also been found that cannabis use is associated with heroin-addicted patients' leaving treatment early (Epstein & Preston, 2003). Our result concerning synthetic cannabinoids may be associated with their severe withdrawal symptoms and being unable to offer substitution treatment for this new kind of addiction. The patients who used heroin were more likely to complete treatment. The results in the scientific literature about this issue are inconsistent (Clark et al., 2014; Stahler et al., 2016). The use of opioid substitution treatment (buprenorphine-naloxone or naltrexone) for patients who use heroin is a factor that increases their likelihood of staying in treatment (Doyle & Donovan, 2014).

The females who did not complete treatment had higher scores on the motivational subscale of the API. A recent study has reported that motivation has a positive effect on completion of treatment (Andersson et al., 2018). The reason for our result may be related to the fact that most of the patients were motivated at the beginning of treatment, but gradually lost motivation over time. Thus, completion of treatment may not always be related to motivation levels determined by initial psychiatric examinations.

History of emotional neglect significantly reduced the likelihood of completion of treatment and emotional abuse had no such effect. This is consistent with the research findings claiming

that neglect is more pathological than abuse (English et al., 2005). The researchers who argue this assert that abuse involves communication, however negative it may be, but that there is no such communication in cases of neglect. This leads to lack of supervision. Another study conducted with females has also found that emotional neglect is an obstacle to completing substance abuse treatment (Simons, 2008). Recent studies have found that, despite the tendency to focus was sexual abuse and overlook emotional and physical neglect, the effects of these types of psychosocial trauma are quite important (Schalinski et al., 2016). Another study found that physical and emotional neglect was associated with opiate users' early attrition from a buprenorphine treatment program (Kumar et al., 2016). Our study observed that as the number of female patients' traumas increased, their treatment completion rates decreased. Studies have reported that psychopathology related to traumas triggering substance abuse or traumas triggered by substance abuse may be more prominent in females, and that this may cause them to leave treatment early (Greenfield et al., 2007). In studies involving only female SUD groups, significantly fewer patients who described childhood traumatic experiences completed inpatient treatment. In our study, while the subscales associated with emotional trauma affected the treatment completion of the female patients, no such relationship was found for the male patients. This may be because females are more susceptible to trauma and/or because they experience trauma more frequently. Studies have also found that females with SUD have higher rates of PTSD than males (Sacks et al., 2008).

Like the studies in the literature, our study found that conduct disorder was the patients' most common comorbidity (Grilo et al., 1995; Wilens et al., 1997). The number of comorbidities adversely affected treatment completion. Although there are some inconsistencies between studies, it has been found that the presence of psychiatric comorbidities has a negative prognostic effect on completing treatment programs (Maremmani et al., 2016). There are some studies that link PTSD and ADHD diagnoses with leaving treatment early (Andersson et al., 2018), and

others have found that comorbidities have no effect on staying in treatment (Ali et al., 2017). Comorbidities had no significant effect on completion of treatment in our study. This may be due to the relatively small sample size.

The patients who did not complete treatment had significantly higher CASS behavioral, family, anger control, attention, impulsivity and cognitive problems subscale scores. Patients with ADHD are at risk of leaving treatment early because the disruptive behaviors possibly related with ADHD disrupt their adherence to treatment (Tamm et al., 2013). These results are important not only because of the behavioral component of ADHD, but also because cognitive and attention-related components, and family problems can interfere with adherence to treatment.

The studies of the effect of depression on the course of treatment have inconsistent results (Hersh et al., 2014). Our study found that the treatment completers had lower HAM-D scale scores.

Unlike other studies, our study found that the patients who did not complete treatment had higher dissociative amnesia subscale scores. Few studies have investigated the effect of dissociation on treatment completion. Karadag et al. determined that patients with dissociative disorder and substance use leave treatment earlier (Karadag et al., 2005). The dissociative amnesic symptoms of trauma victims can lead to self-blame by disrupting their narratives of traumatic events, thus reducing treatment response and adherence to treatment. Although dissociation, as noted in the studies, is a way of avoiding emotional stress, dissociation also causes stress by impairing neurocognitive processes, creating a sense of loss of control, reducing the ability to observe reality and increasing the severity of psychopathology (Lyssenko et al., 2018). It can also prevent completion of treatment.

Substance use treatment retention is a vital for improving substance use disorder outcomes. The major strengths of this study are its prospective design, interviewing the adolescents directly about their sociodemographic and clinical characteristics and determining psychopathology using a semi-structured schedule. Although this study addresses an important gap in the literature, it has some limitations. One limitation is that the study was conducted at a single addiction treatment center. The patients were not separated on the basis of addiction severity, and our sample consisted of adolescent patients who were voluntarily admitted to the inpatient treatment program, so the results cannot be generalized to the universe. Using retrospective information for comorbidities and not conducting family interviews may have affected the results. Trauma-related findings and possible dissociative symptoms may also have affected them. Due to the large number of analyses, clinicians may approach the results with caution for the possibility of Type 1 statistical errors.

Conclusion

Of the patients in our study, 26.7% completed their treatment. Failure to complete treatment and shorter hospitalization durations were found to be related with: unemployment, more comorbidities, more severe symptoms of dissociative amnesia, depression, ADHD, more psychosocial traumas, and more severe emotional neglect and/or abuse ($p < 0.05$). Synthetic cannabinoids use negatively affected the duration of hospitalization, and opioid use affected it positively. Low motivation at the beginning of treatment may not always be related to failure to complete the treatment. Further studies on this subject, especially with children and adolescents, are needed. In contrast to our expectations, family structure did not predict hospitalization duration or completion of treatment. Since our study is one of the few studies conducted with this age group, it provides important results. Reproducing its results with larger patient populations will increase our knowledge, so substance abuse treatment programs should adopt early assessment tools to identify the patients at risk for early attrition from treatment and provide targeted interventions for them.

Ethical approval

Our study was approved by the Istanbul Bakirkoy Prof. Dr. Mazhar Osman Mental Health and Neurology, Neurosurgery Research and Trainee

Hospital, Ethics Committee (document number: 2017/600) and meets all ethical considerations according to the 1964 Declaration of Helsinki and its later amendments. Prior to the patients' inclusion in the study, oral and written information was given to the patients, and their written consent form was obtained.

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Disclosure statement

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