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Oxytocin level among heroin users and its correlation with personality traits and perceived childhood neglect

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Abstract

Introduction: The oxytocin (OXT) levels and personality traits of heroin addicts and control participants are significantly different, which may be a sign of a general propensity to substance use disorders. The aberration of OXT secretion was also linked to unfavorable early experiences, such as neglect as a youngster.

Aim of the study: To determine whether there were any baseline variations in oxytocin levels between individuals with heroin use disorder and healthy controls, as well as the relationship between oxytocin levels and patients' assessments of childhood neglect.

Subjects and methods: The Structured Clinical Interview for DSM-5 Research Version (SCID-5-RV) and the Ain-Shams psychiatric sheet were used to diagnose the forty heroin users, who were chosen from the Psychiatric and Addiction Department of the Fayoum University Hospital. We recruited a sample of 40 healthy controls who were matched for age, sex, and marital status.

Results: The serum oxytocin levels of the two groups were significantly different: the control group's level was higher (139.9 pg/ml), whereas the mean level among patients was lower (68.6 pg/ml) ($P=0.001$).

Conclusion: It is crucial to consider how personality traits and serum oxytocin levels interact while treating individuals who are addicted to heroin.

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1. Introduction

There are 31 million persons with drug use problems worldwide. According to the World Health Organization (WHO), drug use claimed the lives of more than 450 000 individuals in 2015. The most dangerous substance, opioids, counted for 76% of drug-related fatalities. In several

nations, heroin usage surged because of the present opium production boom [1].

Oxytocin is a neuropeptide that has a variety of impacts on the central nervous system. Oxytocin has been shown to alter cognition, emotion, social interactions, personality, and personality traits [2,3].

It's critical to keep in mind that oxytocin has an impact on the dopaminergic system [4]. While dopamine and oxytocin pathways converge in the frontal cortex, ventral striatum, and ventral tegmental areas, oxytocin neurons in the hypothalamus express dopamine receptors [5]. Drug addiction is extremely influenced by the mesolimbic dopamine pathway, which emerges from the striatum and is one of the rewarding system's functions [6].

The oxytocin system seems to be broken, causing problems with social stress adaptation, anxiety, social memory, bonding, emotion recognition, empathy, and interpersonal trust [7]. Lin et al., 2015, found a significant negative correlation between novelty-seeking and blood plasma oxytocin levels in methadone patients, suggesting that low levels of oxytocin may be the psychological factor underlying the temperamental trait that predicts the onset of substance use and substance use disorders [8].

It would be necessary for oxytocin to alter the ratio of cortico-striatal loops' wanting and liking in order to accomplish

this, shifting from a reactive reward drive (wanting) to a stable appreciation of familiar social aspects (liking or "loving") and possibly increasing resilience in the face of stress and addiction [9].

Previous research has shown a relationship between early life adversity and oxytocin system malfunction in behavioral, psychiatric, and substance use issues. Early life adversity includes an insecure attachment to children, neglect, and abuse [10]. It has been hypothesized that individual variations in oxytocin levels, system responsiveness, and interactions with other systems affect general resiliency, drug effects, and vulnerability to developing problematic drug and substance use [11].

The study's main hypothesis was that oxytocin levels and personality characteristics, which may serve as a general indicator of susceptibility to substance use disorders, might differ significantly between heroin addicts and control volunteers. Additionally, we anticipated that early bad experiences, such as neglect as a kid, might be linked to the dysregulation of oxytocin secretions.

sample of 40 healthy controls who were matched for age, sex, and marital status.

2. Subjects and methods

2.1. Subjects

In the current case-control investigational study, forty heroin addicts were selected from the Psychiatric and Addiction Department of the Fayoum University Hospital. The diagnoses were made using the (SCID5-RV) and the Ain-Shams psychiatric sheet. We gathered a

2.2. Inclusion criteria

Only male patients were accepted for the trial. They had to be between the ages of 18 and 60, meet the DSM-5 criteria for substance use disorder diagnosis, have used heroin within the previous 12 months, and provide written informed consent.

2.3. Exclusion criteria

Patients had a history of an endocrine issue or hormone replacement medication as well as a co-morbid significant medical condition (such as renal, hepatic, or cardiac disease). Informed consent, a semi-structured interview sheet for addiction, a structured clinical interview based on the DSM-5 Research Version (SCID-5-RV) [12], the temperament and character inventory revised [13], or TCI [14], the Childhood Trauma Questionnaire (CTQ) [15] in Arabic, the Addiction Severity Index (ASI) version 5 [16], and the Arabic Version by [17] were all administered to patients.

2.4. Laboratory investigations

Serum oxytocin level

Venous samples were collected from all participants by aseptic venipuncture. The blood was added to serum separator vacutainer tubes within 30 minutes of collection and centrifuged at 3000 rpm. The separated serum was harvested in an Eppendorf tube and frozen till assay at -20°C. The measurement of oxytocin using a commercially available enzyme-linked immune sorbent assay (ELISA) kit.

2.5. Statistical Analysis

Data was analyzed using SPSS software version 22 (SPSS Inc., Chicago, IL, USA). The *P-value* < 0.05 was considered statistically significant.

3. Results

Table 1 and Figure 1 illustrated that there was a statistically significant higher percentage of positive family history of substance abuse and psychiatric disorders with *P*<0.05 among cases. On the other

hand, there was no statistically significant difference with *P*>0.05 as regards the family history of alcohol abuse, smoking, and legal problems.

Table 1: Comparisons of family history in different study groups.

Family history		Cases	Control	<i>P-value</i>
Substance abuse	Negative	16 (40%)	30 (75%)	0.002*
	Positive	24 (60%)	10 (25%)	
Alcohol abuse	Negative	30 (75%)	32 (80%)	0.39
	Positive	10 (25%)	8 (20%)	
Tobacco smoking	Negative	6 (15%)	2 (5%)	0.13
	Positive	34 (85%)	38 (95%)	
Legal problems	Negative	37 (92.5%)	40 (100%)	0.12
	Positive	3 (7.5%)	0	
Psychiatric	Negative	20 (50%)	34 (85%)	0.002*

disorders	Positive	20 (50%)	6 (15%)
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*Significant at $P < 0.05$.

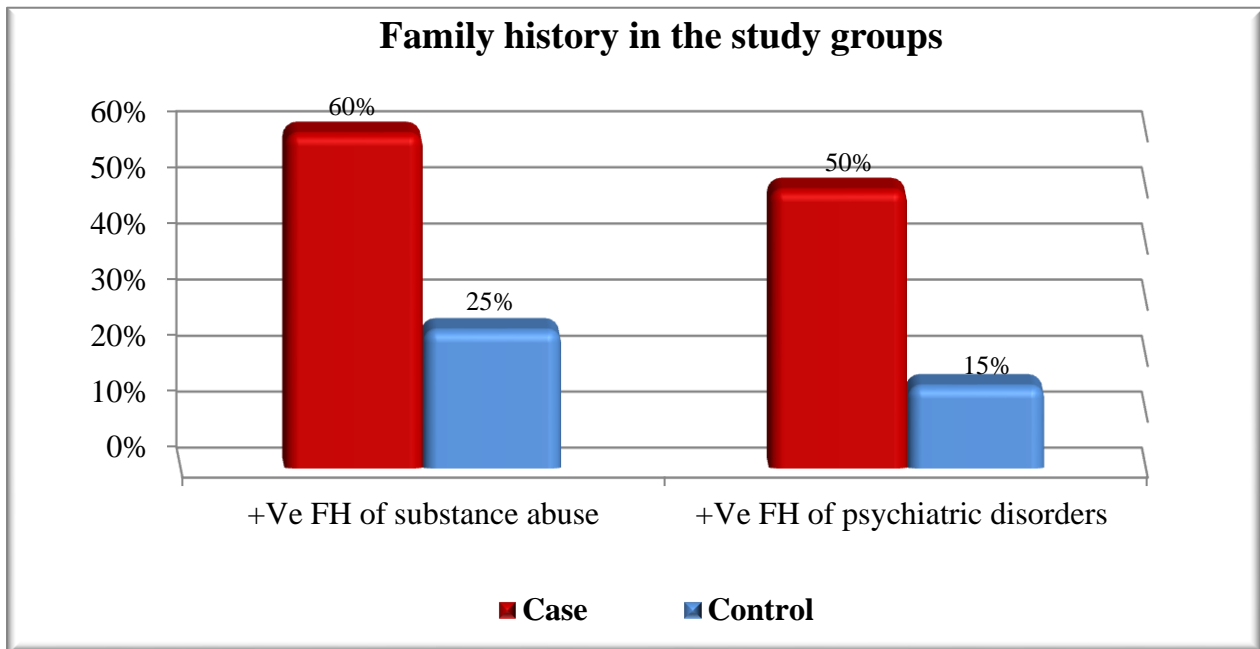


Figure 1: Family history among the studied groups.

The frequency of substance abuse among cases is shown in Table 2. The results showed that all cases were addicted to heroin substances during the last year. However, during the course of the illness, 100% had opiates, 50% used cannabis, 20% for Tramadol and alcohol, and 10% for sedatives. 82.5% were substance use

disorder for more than ten years, and 35% used substances for major problems for 8-10 years. As regards the route of substance abuse, 87.5% of them use the injection route, 65% of cases use substances by frequency of twice per day for the last year, while 35% used substances at a frequency of 3-5 times/day.

Table 2: Frequency of substance abuse among cases.

Variables (n=40)		Frequency	
T able 3 illustr ated that the preva lence of psych iatric co- morb iditie s amon g cases showed, 80% of cases had psychiatric comorbidities, and all were of secondary	Substances taken during course of illness Substance taken during last year Substance of major problem Duration of substance use disorder Duration of use of substance of major problem Route of administration of substance of major problem Average frequency of intake during last year	Cannabis joint 20 (50%)	onset.
		Tramadol tab 8 (20%)	There
		Sedatives tab 4 (10%)	37.5
		Alcohol bottle 8 (20%)	% of
		Opiates 40 (100%)	cases
		Heroin 40 (100%)	had
		Heroin 40 (100%)	mood
		8-10 years 7 (17.5%)	disor
		>10 years 33 (82.5%)	ders
		1-3 years 13 (32.5%)	follo
		4-5 years 11 (27.5%)	wed
		8-10 years 14 (35%)	by
		>10 years 2 (5%)	25%
		Nasal 4 (10%)	subst
		Injection 35 (87.5%)	ance- induc
Both 1 (2.5%)	ed		
Twice/ day 26 (65%)	anxie		
3-5 times /day 14 (35%)	ty		

Table 3: Frequency of Psychiatric co-morbidities among cases.

Psychiatric co-morbidities (n=40)	Frequency
Prevalence of psychiatric disorder	32 (80%)
Order of onset of axis I co morbidity	Primary 32 (80%)
	Secondary 0
Prevalence of mood disorders (MDD)	15 (37.5%)
Prevalence of psychotic disorders	6 (15%)
Prevalence of anxiety disorders	Panic 1 (2.5%)
	Substance induced anxiety 10 (25%)

4. Discussion

A condition of regulating substance use, substance use disorder is a psychobiological syndrome. It entails a lack of control over substance use, persistent use despite negative effects, and frequently increased tolerance and withdrawal symptoms [18]. Heroin is an opioid substance that is extremely addictive and an activator of the mu-opioid receptors (MORs) [19]. When heroin enters the brain, it is quickly converted to morphine, then preferentially combines with MORs to provide pharmacological effects [20].

In terms of education, cases had statistically lower levels of education than healthy controls. Only 25% of cases had completed secondary school, compared to 45% of healthy controls who had finished post-graduate work. That might result from the drug's negative effects on the brain's executive functioning, or it could be a concomitant conduct or behavioral disorder [21]. The sample was gathered from El Fayoum University Hospital, where it's possible that most of the patients are from lesser cultural backgrounds, so the study's location may possibly have contributed to the findings.

On the other hand, the findings might make people wonder if there is a connection between drug use and academic success, as well as between drug use tendency and poor stress management and maladaptive self-enhancement techniques. That finding was consistent with the Egyptian study by Mobasher *et al.*, 2021, who looked at personality factors and their relationship to desire and serum oxytocin in male opioid-dependent patients [22].

Regarding education, just 20% of all participants received a bachelor's degree, and 40% of patients did not complete secondary school, as opposed to 20% of controls.

Those with opioid use disorder (OUD) attained lower levels of education compared to the general population, according to a different study by Ellis *et al.*, 2020, conducted in the USA [23]. Two-thirds of cases (67.5%) reported opioids negatively impacted their capacity to complete their education. According to our findings, patients had a larger percentage of medical co-morbidity (57.5%) than controls (30%).

These findings are consistent with those of Han *et al.*, 2021, regarding multimorbidity and inpatient utilization among older adults with opioid use disorder in New York City [24]. They discovered that patients with high inpatient utilization had a higher prevalence of certain medical diseases, including COPD (36%), congestive heart failure (10%), and diabetes (26%), both of which had previously been identified as the top diagnoses of readmissions nationally [24].

Additionally, it is consistent with a study conducted by Baltazar *et al.*, 2021, to determine the prevalence of HIV, viral hepatitis B/C, and tuberculosis among drug users in Mozambique [25]. Their findings showed that HIV prevalence was assessed at 25.4%. While HBV positive was 5.5% across the board, HIV/HCV co-infection was also more common in patients who use drugs.

According to the results of the current study, there was a statistically significant difference between the two groups regarding the family history of substance abuse and psychiatric disorders. Of the cases, 60% had positive family histories of substance abuse, compared to only 25% of the control group, and 50% had psychiatric disorders, compared to only 15% of the control group. There was no statistical significance regarding a family history of tobacco abuse, alcohol abuse, or legal problems.

In accordance with Ramsewak *et al.*, 2020, study on substance use disorders and relapse in Mauritian male addicts, relatives appeared to be the most prominent users, with (58%) & (72.8%) of the respondents having a family member suffering from a psychiatric disorder associated to the high rate of respondents [26]. (27%) reported the non-involvement of their family members with drug use, while out of the (73%)

Conclusions

Heroin use affects oxytocin levels, which are lower than healthy controls. In comparison to healthy controls, heroin users had lower levels of education, a lower socioeconomic status, a greater rate of unemployment, a higher rate of divorce, medical comorbidities, a positive family history of substance misuse, and psychiatric

Ethics approval and consent to

participate: This study was approved by the Research Ethics Committee, Faculty of Medicine, Fayoum University. Contents of consent were clarified and written and completed by all participants.

identified positively for SUDs. Psychotic disorder (17.1%) was the psychiatric condition that affected the family member the most frequently.

The genetic attribution to substance use disorders, which has recently received attention in several studies, might be used to explain these findings. Numerous researchers have found that substance use, preferences, tolerance, and withdrawal have a well-established genetic pattern. However, a memory bias must be considered in studies like this when probands (i.e., the first members of a family or pedigree to seek medical assistance) are asked to recount their family history [22].

In the current study, the explanatory power of the TCI-R, CTQ scales, and oxytocin level were explored using a multivariate (logistic regression model) analysis, although no significant risk variables with a $P > 0.05$ were discovered.

disorders. Compared to controls, heroin users had more comorbid psychiatric diseases of a secondary order of onset. A larger sample size would help give more information and data, especially when regarding the correlation. Financial limitations affected the number of patients that we were able to include in the study.

Consent for publication: Not applicable.

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Authors' contributions: MS prepared the main idea, and contributed in writing the manuscript. MD and AM prepared the questionnaires, analyzed and interpreted the patient data regarding the clinical data and psychometric tools and was a major

contributor in writing the manuscript. HD was the major contributor in revising the manuscript. HA was the main supervisor of clinical chemistry work. All authors read and approved the final manuscript.

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