DETERMINANTS OF WEIGHT GAIN IN PEOPLE WHO USE DRUGS UNDERGOING REHABILITATION OR OPIOID SUBSTITUTION THERAPY IN LEBANON: A CROSS-SECTIONAL STUDY

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LIST OF ABBREVIATIONS

- AIDS: Acquired Immunodeficiency syndrome (AIDS)
- BMI: Body Mass Index
- CoNKQ: Consumer Nutrition Knowledge Questionnaire
- DRI: Dietary Reference Intake
- DSM-IV: Diagnostic and Statistical Manual of Mental Disorders 4th edition
- DSM-V: Diagnostic and Statistical Manual of Mental Disorders 5th edition
- DV: Dependent Variable
- HIV: Human Immunodeficiency Virus
- IPAQ: International Physical Activity Questionnaire
- IV: Independent Variable
- MENA: Middle East North Africa
- NGO: Non-Governmental Organization
- OST: Opioid Substitution Therapy
- PSQI: Pittsburgh Sleep Quality Index
- PWUD: People Who Use Drugs
- SGA: Subjective Global Assessment
- SPSS: Statistical Package for Social Sciences
- SUD: Substance Use Disorder
- TC: Therapeutic Community
- YFAS: Yale Food Addiction Scale

ABSTRACT:

Introduction: According to the Global Report on Drug Use, the prevalence of people who use drugs (PWUD) and hence require treatment are estimated to be more than a quarter of a billion worldwide. Malnutrition is highly prevalent among PWUD and hyperphagia is also present in the early phases of treatment.

Objective: This study aimed to assess the association between weight gain amongst PWUD currently undergoing treatment for recovery whether in the rehabilitation centers or the opioid substitution therapy (OST) program centers in Lebanon.

Methods: This was a cross-sectional study, where demographics and treatment-related characteristics, nutritional assessment, and biochemical data of the participants were collected. The factors possibly related to weight gain were examined: sleep quality, physical activity level, nutrition knowledge, food addiction, and self-reported weight change. The Statistical Package for Social Sciences (SPSS version 24.0) was used for data entry, management, and analyses. Finally, Chi-square tests, and t-tests were used to draw the associations between the mentioned factors and weight gain among the participants.

Results: 187 recovering patients from rehabilitation centers (n=90 from four centers) and OST program centers (n=97 from three centers) participated in the study. Furthermore, 66.8% reported weight gain. The average number of treatment attempts was lower in those who gained weight compared to those who did not (0.85 versus 2.58; p=0.02). Also, those who reported current use of medications, specifically psychiatric medications, have more likely gained weight during the treatment (56% versus 38.7%; p=0.03). Furthermore, the percentage of participants in the rehabilitation group who reported weight gain was higher than the percentage of those who reported weight gain in the OST program (57.6% versus 43.5%; p<0.0001). In addition, those who reported weight gain had a higher percentage of poor sleep quality (79% versus 67.7%; p=0.09), but this was not statistically significant. Finally, almost half of the studied sample reported low physical activity (49.2%); and poor nutritional knowledge (69.5%), but this was not statistically significant.

Conclusion: The type of treatment whether rehabilitation or OST, the number of previous treatment attempts, and the use of medications were associated with weight gain in recovering PWUD.

Keywords: PWUD, Rehab, OST, weight gain, nutritional status.

Introduction

Background:

Substance use disorder (SUD) is defined as an uncontrollable urge to obtain and consume illegal psychoactive substances resulting in immense adverse socioeconomic and health effects (Cami and Farre 2003; Justinova et al. 2009). The (DSM)-IV has clearly defined the following criteria for diagnosing (SUD): 1) clinical representation of tolerance and withdrawal, 2) ingestion of large amounts of drugs, 3) repeated attempts and failure of cessation, 4) spending considerable time on obtaining the substance, 5) discontinuing social and daily tasks due to the abuse, and 6) failure to stop the act even though severe physical or psychological problems might have risen (American Psychiatric Association 1994).

SUD is clearly defined in the domain of psychology and psychiatry as a neuropsychiatric disorder which is entitled by having a habitual urge to continue drug use despite serious adverse effects (Goldstein & Volkow 2002). Furthermore, this has a background which can be linked to genetics, as well as environmental and societal connections and influences. There are various substances consumed on a regular basis that can lead to SUD or addictive behavior, of which these are listed currently in the fifth revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (American Psychiatric Association 2013 & Zou et al. 2017) and the Tenth Revision of the International Classification of Diseases and Related Health Problems (ICD-10) (World Health Organization 2004; Zou et al. 2017). Alcohol, caffeine, and tobacco are chemical substances that are considered physiologically addictive but are not illegal. On the other hand, cannabis, hallucinogens, inhalants, opioids, sedatives, hypnotics, anxiolytics, cocaine, heroin, amphetamine and its derivatives are considered serious life-threatening addictive substances. Furthermore, these substances are in need of control in the field of medicine since their unsupervised use can lead to

abuse, addiction, and even death. According to the Global Report on Drug Use published by the United Nations in 2019, the prevalence of people who suffer from SUD and hence require treatment facilities are estimated to be more than a quarter of a billion worldwide with a percentage of 0.71 among the population aged 15-64 years old. As of 2017, 35 million people were estimated to suffer from SUD worldwide with more than half a million deaths attributed to this phenomenon. To date, opioids are the most harmful type of drugs used , while cannabis are the most widely used especially among population aged 15-64 years. In 2017, 66 per cent of the deaths from substance abuse were due to opioid addiction. The other groups of illicit drugs which contribute to the global addiction are: amphetamines and non-prescription stimulants, ecstasy, and cocaine. The Middle East North Africa or commonly referred to as the MENA region is composed of Arabian countries, that is the countries extending from Yemen to Algeria including Lebanon. . Detailed prevalence estimates of the drug domain including trafficking, production, and use are scarce in the region because research capacities (i.e. Data collection and analysis) are not as evolved in the third-world countries as they are in the developed world (International Drug Policy Consortium). However, the position of the MENA countries concerning drug trafficking, production, and consumption is very renowned. North Africa is considered the number one area worldwide where cannabis trafficking is seized. Morocco, Lebanon, and Egypt are considered noteworthy suppliers of cannabis in the region. Lebanon is also the home of “Captagon” tablets production which has been the culprit of the drug use pandemic in the region. Egypt as well has been implicated with the making of highly addictive opioid compounds sold under the name “Tramadol” (World Drug Report, 2013). Moreover,the political situation in the MENA region plays a vital role in the rise of drug trafficking (International Drug Policy Consortium). In addition, the MENA region accounts for the country of Afghanistan, which is the

world's leading supplier of heroin. This has led to the availability of pure and inexpensive drug-injecting substances, which highly contribute to the extensive consumption in the region.

According to Larney et al. 2017, drug use in the form of injection is considered present in every country in the region. Consequently, between 349,500 – 437,000 individuals inject drugs (Movaghar et al. 2018 & Degenhardt et al. 2017), with the majority (96.2%) having opioids as their primary drug addiction (Degenhardt et al. 2017).

There is prevalence of polydrug use in the region were the most common drugs available are heroin, cannabis, and cocaine, and to a lesser extent amphetamine substances which can also be accounted for a number of users in the region (MENAHRA 2017).

There are two main types of treatment forp SUD: Opioid substitution therapy (OST) and Rehabilitation .. OST aims to provide PWUD with an opiate agonist(buprenorphine or methadone) (Armstrong et al. 2010). under the supervision of a psychiatrist within a multidisciplinary treatment plan for addiction (Ministry of Public Health, Lebanon).

The effectiveness behind this treatment lies in being able to counteract the hazardous behavior related to opioid addiction which involves injecting the drug by a needle. This behavior poses PWUD to be at risk for Human Immunodeficiency Virus (HIV) infection because of administering used syringes amongst users, and further poses a risk of infection from the injection site through improper phlebotomy. Also, given that these patients have an altered state of mental health whilst using, they are also at risk of engaging in criminal activity when in desperate need of drugs and money which therefore poses further risk on their well-being, as well as the well-being of others, e.g. breaking the law (Mattick et al. 2004; Johnson et al. 2000; Lawrinson et al. 2008; Connock et al. 2007; Hubbard et al. 2003; & Gowing et al. 2008).

OST, along with psychosocial mediation, is a widely common interventional treatment for opioid dependence. Furthermore, current evidence clearly sates its effectiveness (Kourounis et al. 2016; Amato et al. 2005; De Maeyer et al. 2010; Farré et al. 2002; WHO/UNODC/UNAIDS 2004)by managingsymptoms of : cravings, overdose, and further withdrawal adverse effects (EMCDDA 2012a,b, 2015a,b; Lawrinson et al. 2008; Mattick et al. 2009; Weber et al. 2009; & WHO 2009).

On the other hand, the secondtreatment modality for PWUD is : rehabilitation post detoxification.

Detoxification is a medically supervised procedure where the drug user is put under medical surveillance during the first few days or weeks post discontinuing the intake of drugs. The aim of this is to be able to counteract the physically challenging and sometimes life-threatening symptoms of withdrawal. The patient is then treated with several medications such as sedatives, thereby termed "medically managed withdrawal", to lessen the severity of the unpleasant withdrawal symptoms.

Once the patient is medically stable, the type of treatment that precedes detoxification is a long-term residential treatment. The therapeutic community (TC) is a structured therapy model that aims at supervising the patients 24/7 in a non- hospitalized institutions with a treatment lasting from 6 to 12 months in a community based approach (NIDA 2020).

Residential treatment or commonly referred to as "rehab" is a rigorous on-site treatment approach for those with substance use disorders. The objective of this type of treatment is to provide recovery services within a stable environment for patients, along with therapeutic activities, to help the patients fulfill their psychosocial needs before their return to their previous unsupervised settings. The defining characteristic of all residential Level III programs is that they serve individuals who need safe and stable living environments in order to develop their recovery skills. Services offered at the residential treatment institutions are composed of mental health personnel and addiction

specialists. The TC is a well-established part of the residential treatment plan which focuses on the social and psychological causes of addiction to pave way for the recovery and the reincorporation in the society for patients (Reif et al. 2014).

Treatment facilities for substance use disorders are available in Lebanon but they are centralized in Mount Lebanon and Beirut areas (80% of the institutions). These facilities are mostly run by Non-Governmental Organizations and to a lesser extent private clinics and hospitals (MOPH, 2017).

The main structured programs that are available for PWUD in Lebanon and across the mentioned NGOs are: OST and Rehabilitation post detoxification. Rehabilitation services, detoxification centers, as well as OST programs are available in almost all of the countries in the MENA region. In Lebanon, the OST program has been made available to the public under the supervision of the ministry of public health (MOPH, 2017). In this paper, we will focus on these two types of treatments to assess and discuss the nutritional status of drug users in outpatient (OST) and inpatient/long-term residential treatment centers in Lebanon.

Substance use disorders are directly related to chronic adverse health effects (Hossain et al. 2007; Nazrul Islam et al. 2001; & Quintero-Platt et al. 2015). Apart from the most prominent health effect related to drug use which is HIV and hepatitis C communicable disease spread (Nabipour et al. 2014), other health issues such as liver cirrhosis, cardiovascular disease (Quintero-platt et al. 2015 & Zhang et al. 2008), lowered immune function (Housova et al. 2005 & Quintero-Platt et al. 2015), depression (Tolliver & Anton 2015) and many others are prevalent among chronic drug users and those suffering from addiction. Recovering from drug addiction requires the services of a multidisciplinary team, but very often, a crucial part is overlooked, which is addressing the

nutritional status of PWUD in a direct manner by incorporating nutrition therapy in the recovery plan.

Undernutrition is highly prevalent amongst PWUD (Cunningham, 2016; el- Nakah et al., 1979; Hossain et al., 2007; Housova et al., 2005; Nabipour et al., 2014; Neale et al., 2012; Sukop et al., 2016; Tang et al., 2011) . This could be attributed to to the insufficient intake of nutrient dense foods food insecurity in this population, and altered dietary habits leading to nutrient deficiencies (Himmelgreen et al., 1998; Neale et al., 2012; Schenker, 2003). (Housova et al. 2005; Forrester at al. 2004; Rajabizade et al. 2004). (Nazrul et al. 2002; & Saeland et al. 2009).

Moreover, consuming illegal drugs is often related to a decreased appetite (Neale et al. 2012), as well as an altered metabolism (Tang et al. 2010) which further exacerbate the nutritional status of PWUD. Apart from protein-energy malnutrition which is quite prevalent in drug addicts, various micronutrients (thiamine, riboflavin, niacin, vitamin C & D, magnesium, calcium, copper and iron) have been shown to be below the reference intakes in the diets of PWUD (Saeland et al. 2011 & Hossain et al. 2007). On the other hand, serum copper levels have been shown to be higher than the reference values (Hossain et al. 2007; Saeland et al. 2011); presumably due to increased overall inflammatory status, stress, and frequent infections. Furthermore, PWUDshow a trend for having a lower body composition, Body Mass Index (BMI) and even Fat Mass (FM) as compared to healthy individuals (Ersche et al. 2013; Himmelgreen et al. 1998; Mysels and Sullivan 2010; Quach et al. 2008; Tang et al. 2011; Tang et al. 2010). After initiation of treatment, recovery, PWUD show a trend of improved weight gain (Varela et al. 1997; Neale et al. 2012; & Fenn et al. 2015). According to Montazerifar et al. 2012, who compared the nutritional status of drug users using anthropometrics before initiating methadone-maintenance therapy and after 8 weeks of active treatment, the majority of participants showed improvement in their Body Mass Index status towards proper nourishment.

In another context, substance use and eating behaviors share neuropsychological mechanisms since they both mediate reward in the brain's circuitry signaling, salience and motivation (Volkow et al. 2011). Moreover, they are both highly triggered by the individual's emotions and environmental stressors (Gibson 2012; Martin et al. 2016; & Vogele & Gibson 2017). Individuals who are at risk of disorders related to overeating share quite similar personality traits with those who are at risk of substance use disorders (Jeynes & Gibson 2017; Davis 2013; Krug et al. 2008; Vanyukov et al. 2012; Vogele & Gibson 2017; & Volkow et al. 2012).

Recovering fromSUD should incorporate a regimen that highlights nutritional interventions during the recovery process, yet (ADA 1990; Mohs et al. 1990; Wiss 2019).

this has not been adopted by official drug-fighting organizations, especially in residential settings (Wiss 2019).

Studies have initially shown the rise of a binge eating pattern specifically with the male gender in residential treatment settings for the first semi-annual recovery phase; in addition to that, after the first year and up to three years post recovery, struggling to lose weight has been documented as a main concern and is even considered a distressing factor for PWUD (Cowan et Devine 2008).

Similarly, women have also reported the same concerns and almost a half of the recovering women have even shared fears about their weight gain and a desire to control that up to a point where they mention it could be a cause for them to go back to drug dependency, or also known as experiencing relapse (Warren et al. 2013).

Hormonal imbalances and addiction-like eating are two main hypotheses that can explain potential excessive weight gain when drug use is discontinued, especially in individuals who were being

treated for stimulant-based addictions like cocaine use and amphetamine use since they suppress appetite during active drug use immensely (Glasner-Edwards et al. 2011 and Wiss 2019).

Moreover, factors that could explain weight gain after cessation of drug use are the following factors which will be discussed here on in this paper. To begin with, excessive food consumption, in other terms, in excess of the actual bodily needs, coupled with parallel inadequate physical activity are both considered to be the main culprits to unhealthy weight gain over a period of time and contribute highly to obesitye (Markwald et al. 2013).

Simultaneously, the number of subjects reporting insufficient sleep (less than 7 hours per night) has also risen along with the obesity epidemic, which has led to the hypothesis that they are in fact inter-related (Markwald et al. 2013; Knutson & Van Cauter 2008; Gangwisch et al. 2005; & Wright Jr 2006).

One way sleep impacts obesity is purely biological. To elaborate, sleep is associated with the reduction in the release of the hormone leptin, and an increase in the release of the hormone ghrelin . Ghrelin is responsible for the feeling of hunger thatis associated with the increased weight caused by insufficient sleep. Therefore, these individuals tend to be more hungry causing a positive energy balance thus affectingtheir weight status over time (Markwald et al. 2013; Spiegel et al. 2004(a) & Spiegel et al. 2004 (b)).

There is robust evidence in the literature supporting regular physical activity as a potential advocate for weight gain prevention in adults.

Public health initiativesworking on the obesity epidemic clearly state physical activity as part of the guidelines to reduce obesity rates and weight gain in terms of lifestyle modification therapy (Jakicic et al. 2019).

Evidence based theoriesshow thatsedentary behavior is correlated to reduced energy expenditure, development of metabolic anomalies such as metabolic syndrome and other cardio-metabolic disorders, and finally the build-up of unhealthy fat tissue leading to obesity (Stephens et al. 2011; Olsen et al. 2008; and Heinonen et al. 2013). Low physical activity implies reduced muscle work, causing the individual to having sustained unchanged levels of energy use, while simultaneously, there is usually an overconsumption of foods and specifically comfort foods, energy dense and highly palatable, and therefore leading to gradual weight gain (Hamiltion et al. 2007; Heinonen et al. 2013).

The main purpose of nutrition education programs implemented by local authorities and as a worldwide initiative is to promote a better dietary intake for the health of the community (Asakura et al. 2017; Lee et al. 2005; Powers et al. 2005; Morgan et al. 2010; & Heaney et al. 2011).
In fact, evidence strongly supports the association of a poor nutritional knowledge with absence of a proper control on chronic diseases arising from poor dietary intake and thus increased health costs on the community (Asakura et al. 2017; Eichler et al. 2009 and Vernon et al. 2007).

Substance use disorder is masked by a neurobiological and behavioral disequilibrium causing the individuals to continue the pursuit of habitual drug use despite its catastrophic implications on the individual's health and well-being. The same disequilibrium is proposed to be present and underlying another type of addiction, called food addiction (DSM-5 and Lee et al. 2012). The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) even compares "food addiction" to the combined pathology of "substance use disorder and addictive disorders", although further research is warranted (Meule & Gearhardt 2014; Lee et al. 2012; & Lee et al. 2014).

Experimental studies have demonstrated the addictive properties of highly palatable foods, also known as obesogenic foods, e.g. high in sugar, high in fat, energy dense, and low in nutrients. Moreover, neurobiological pathways regarding expressions of dopaminergic and opioid systems have shown quite a similarity between individuals who were exposed to these energy dense foods and between those who were exposed to drugs of abuse (Lerma-Cabrera et al. 2015).

As a result, treatment from drug use results in adverse weight gain in later stages of rehabilitation, the causes could be due to the factors assessed in the data collected whether it be physical activity, sleep, food addiction, nutritional knowledge, lifestyle factors in the rehab centers or during rehab, or they could simply be due to an alternative dynamic.

There is anecdotal evidence to support this pressing issue of weight gain in this population from previous published work that shows a weight gain trend in two-third of the assessed population, with significant changes in post-treatment BMI as compared to pre-treatment BMI in the underweight, normal, and overweight categories.

Apart from the beneficial weight gain during the early phases of recovery, hyperphagia has been observed during post-withdrawal and has led to unwanted weight gain and struggling with weight status in later phases of recovery (Edge et Gold. 2011).

Mahboub et al. (2021) showed that weight gain in the early treatment phases (1-6 months) was seen, as an indicator of health and improved self-confidence. However, in later stages of treatment (more than 6 months), they struggled to lose the weight which led to adverse psychological effects and a reason for relapse especially among females. This weight gain could be attributed to to the pharmacological aspect of the treatment itself and medications prescribed.

Rationale:

This population is unaddressed in terms of nutritional assessment and there are no interventions to tackle this although the rate of drug use is increasing. Literature does not address predictors of weight gain in this population whilst weight gain has detrimental psychological and metabolic effects on health especially on a vulnerable population. Furthermore, this study is important because weight gain can be prevented by detecting he major causes and targeting them as part of the treatment.

Objective of the study:

To assess the nutritional status and lifestyle practices , inaddition to identifying the determinants of weight gain of PWUD undergoing recovery from substance use disorder.

Research Question:

What are the factors related to weight gain and how can they be managed in recovery centers to provide better multidisciplinary care for treatment modalities in PWUD?

Hypothesis:

Weight gain inPWUD undergoing treatment forrecovery is related to the following lifestyle factors: sleep, physical activity, dietary intake, as well as nutritional knowledge, and food addiction.

Materials and Methods

I. Study Design:

This is a cross-sectional study, exploring the sociodemographic, medical, drug-related, and lifestyle and nutrition-related characteristics of PWUD and assessing the association between weight gain and lifestyle factors among recovering PWUD from two different treatment modalities: OST, and rehabilitation. Ethical approval was obtained from the Lebanese International University's Committee on Research Ethics (CRE) (case number: LIUIRB- 180122-NB1).

II. Sampling

1. Target Population:

The targeted population of this study is PWUD recovering from substance use disorder and above 18 years old, enrolled in treatment centers; either OST or rehabilitation across Lebanon. A convenience sample was selected from this population.

2. Inclusion/exclusion criteria:

Eligibility criteria included the following: 1) being Lebanese, 2) above 18 years of age, 3) undergoing treatment for more than one month.

3. Sample size:

Using the Epi Info 7 software, and in order to estimate the sample size needed to conduct this study, a statistical power analysis was performed using the software using its sample size and power analysis option.

The sample size calculation was based on Mahboub et al. (2021). Following an expected frequency of malnutrition (the main outcome of interest of that study) of 50%, a 10% confidence limit, a design effect of 1.5, and a confidence level of 95%, 138 participants were needed. Due to the lack of data on the prevalence of malnutrition in this patient-population, we used a frequency of 50% to result in the largest sample size. We inflated the sample size by 20% based on the response rate reported in similar studies (rehabilitation: 87-91% (Maehira et al. 2013); OST: 80-90% (Xuan Tran et al.

2016)), leading to a minimum required sample size of 166 participants. As 187 participants were included, the actual power was 92.6%.

In total, 369 people were approached, 214 accepted to participate in this study (response rate: 57.9%). Accordingly, 187 PWUD were selected and included in the study: 97 participants were undergoing OST, while the other 90 participants were in rehabilitation.

4. Sampling methods:

The types of treatments tackled in these centers where either residential rehabilitation centers post hospitalized detoxification, or locales that offered counseling and OST for PWUD. There existed seven rehabilitation and four OST centers in Lebanon, but only seven of these centers (… rehabilitation, … OST) gave us consent to conduct the study. Subsequently, eligible participants were selected using a convenience sampling technique.

III. Study instruments

1. Interview questionnaires:

The interview questionnaire included five parts consisting of 97 questions, and a cover page explaining the purpose of the study and ensuring anonymity and confidentiality, as well as the consent of study participants.

Part A consisted of questions about demographics, frequency and types of drugs used, duration of drug use, medical history, current medications, and type of treatment being administered for substance abuse.

Part B was the Consumer-Oriented Nutrition Knowledge Questionnaire (CoNKQ) which includes questions to assess the nutritional knowledge of the participants (examples of nutritional myths and facts)

Part C was the Subjective Global Assessment Questionnaire (SGA) to assess nutritional status. The SGA is a clinical technique which assesses the nutritional status based on five features of the medical history (weight loss and its rate, dietary intake in relation to the participant's usual intake patterns, presence of significant gastro-intestinal symptoms, functional capacity and metabolic requirements of underlying disease) and four features of physical examination (loss of subcutaneous fat, muscle

wasting, edema, and ascites). Based on the score of the above measurements, the nutritional status is classified as well-nourished (A), moderately malnourished (B), or severely malnourished (C).
Part D was the Pittsburgh Sleep Quality Index (PSQI) which is a validated universal scale to assess the sleep quality of the participants. It addresses the participants' sleep patterns over the past month.
Part E was the International Physical Activity Questionnaire (IPAQ) which allows the measure of duration and frequency of physical activity that were completed in the past seven days.
Part F was the Yale Food Addiction Scale (YFAS) that allows the screening of substance dependence on high fat/high sugar foods in a time frame of the past 12 months.

1- Measurement tools:

The measurement tools used in this thesis are:

Subjective Global Assessment Questionnaire (SGA): Nutritional status was assessed using the SGA (Hirsch et al. 1991; Bauer et al. 2002). This is a clinical tool that uses five features from the patient's medical history to conduct a proper nutritional assessment, as well as four features collected through physical examination. The medical history inquiry included: presence of weight loss and its rate, usual dietary intake patterns, occurrence of gastro-intestinal symptoms, functional capacity and metabolic requirements of an underlying disease. Moreover, the physical examination part included investigating loss of subcutaneous fat, presence of muscle wasting, edema or ascites. Finally, the total score of these features categorizes the participant into three groups: well nourished (A), moderately malnourished (B) or severely malnourished (C).

Self-reported weight change: which assessed as the difference between reported usual pre-treatment body weight (kg) and measured body weight (kg) at the day of the assessment.

Consumer-Oriented Nutrition Knowledge Questionnaire (CoNKQ): Nutritional knowledge was measured using the CoNKQ which was adapted from Spillman & Keller (2011). This is a validated questionnaire, with good internal reliability (Cronbach's alpha is 0.743), criterion, and construct validity. It consists of 20 comprehensive questions derived from consumer interviews and expert recommendations about healthy eating.

Yale Food Addiction Scale (YFAS): Food addiction is another parameter measured utilizing the YFAS (Gearhardt et al., 2009). This is a suitable tool for screening substance dependence on high fat/ high sugar foods. The questionnaire involves 27 parts that assess food patterns over the past year and allows identification of substance dependence criteria in a time frame of the preceding 12 months of the patient in terms of eating behaviors. These included having symptoms of tolerance and withdrawal, vulnerability in social activities etc.

Pittsburgh Sleep Quality Index (PSQI): Sleep quality is also assessed, as a predictor of weight gain, using the PSQI (Buysse et al. 1989). The questionnaire consists of four questions to estimate the duration of sleep, the time needed to fall asleep, the time needed to wake up, in addition to the duration spent in bed immediately after waking up. Moreover, the five other questions were used to identify possible reasons for troubled sleep if present. A total score of 5 or more, depending on the algorithm developed by the founders of the questionnaire, indicated poor sleep quality. Whereas a score less than 4.9 indicated good sleep quality.

International Physical Activity Questionnaire (IPAQ): Physical activity level was measured using a short form questionnaire of the IPAQ. By measuring the duration and frequency of all levels of physical activity (light, moderate, and vigorous) that were completed in the past seven days (Craig et al., 2003), this questionnaire is able to compute the metabolic equivalent of tasks or METs. This allowed a reliable estimation of the participant's physical activity level.

The Arabic version of the PSQI, culturally-adapted by Haidar et al. (2018) was used; whereas the CoNKQ, YFAS and IPAQ were translated back and forth by two independent expert bilingual translators (WHO, 2019). Furthermore, the translated versions of these questionnaires were pilot-tested on a group of participants from different treatment centers for validation, the results of which were discarded.

Multiple Pass Food Recall (MPR): Dietary intake for the past 24 hours was assessed using the United States Department of Agriculture's Multiple Pass Food Recall (MPR). This form of acquiring patients' recall on what they had consumed in the past day is adapted to minimize the bias (Moshfegh et al. 2008 and Raper et al. 2004). In addition, the presence of trained licensed dietitians

allowed for probing the participants in order to obtain portion sizes and help them recall forgotten foods/beverages consumed. Using the food composition data base of the Nutritionist Pro software (Nutritionist Pro, Axxya Systems, San Bruno, CA, USA, version 5.1.0,2018), total energy, micronutrient and macronutrient intake were computed from the recall form. The software from the data base was expanded by adding analysis of locally consumed foods and recipes (Pellet et al. 1970). Given that there are no gender or age specific Dietary Reference Intakes (DRI) for the middle eastern populations, values arising from the analyzed data were compared to the United States-based DRIs, as recommended by the institute of Medicine (Dietary Reference Intake Tables).

Anthropometrics: 1) height (cm) using a portable digital wall mounted height scale measured to the nearest 0.1 cm without shoes; 2) weight (kg) using a calibrated mechanical floor scale without shoes and with light clothes on; 3) Body Mass Index (BMI) calculated as the ratio of weight (kg) and height squared (m^2); 4) waist and neck circumferences measured to the nearest 0.1 cm, using a girth measuring tape; 5) body composition (%fat, %muscle mass, and %visceral fat) measured with a BOCA X1 body composition analyzer (Medigate, Korea); and 6) BP (mmHg) using a standardized mercury sphygmomanometer (ALPK2, Japan) in the seated position after five minutes of rest, without prior smoking and exercise on that day. Two consecutive readings of systolic blood pressure (SBP) and diastolic blood pressure (DBP) were taken on the same arm within a two-minute interval. The mean of the two measurements was used for analysis.

Biochemical parameters: a licensed phlebotomist drew 5 milliliters of blood from each participant in the fasting state. The sample was centrifuged immediately and transported to a laboratory using a thermally controlled box. Blood tests included complete blood count (CBC), fasting blood sugar (FBS) (mg/dl), total protein (g/dl), serum albumin (g/dl), cholesterol (mg/dl), high density lipoprotein-cholesterol (HDL (mg/dl), low density lipoprotein-cholesterol (LDL (mg/dl), triglycerides (TG (mg/dl)), aspartate aminotransferase (AST (IU/L)), and alanine amino transferase (ALT (IU/L)).

IV- Data Collection

Data collection began on January 2018 and was continued till March 2019 in the treatment centers.

Before participating in the study, an informed consent was obtained from study participants with a clear explanation of the purpose of the study, and the tools needed for data collection (interview and anthropometric measurements). Confidentiality and privacy of participants' identity were kept by not mentioning their names (identification number was used instead of names).

Finally, blood samples were collected by an experienced phlebotomist and a licensed nurse measured the blood pressure (BP). The total time for all data collection required 40-50 minutes per participant.

V. Variables:

- **Dependent Variable (DV):** Weight gain in PWUD.
- **Independent Variables (IV):** Age, gender, educational level, history of drug use, medications, type(s) of drug(s) used and/or injected, type of treatment, weight change, pre-treatment BMI, dietary intake, sleep quality, physical activity level, nutritional knowledge, and food addiction.

VI. Plan of analysis:

The Statistical Package for Social Sciences (SPSS), version 24.0 was used for data entry, management, and analyses. Continuous data were reported as means and standard deviation (±SD) and were compared between weight gain categories using the independent Student's T-test. On the other hand, categorical data were reported as numbers and percentages and were compared using the Chi-Square test. Bivariate analysis were also performed upon the type of treatment and weight gain.

RESULTS

III.1.1. Demographics, medical history, and history of drug use of the interviewed participants (n=187)

Out of the 187 PWUD who were undergoing treatment at the time of the data collection, 97 were in the OST program and 90 were in rehabilitation centers.

Table 1 lists the demographic characteristics of the sample, as well as their medical history pertaining to substance use disorder.

The majority of the sample were males (92%) more belonging to the OST group (OST: 96.9%; rehabilitation: 86.7%; p=0.010). The mean age of the participants was 32±8.35 years. Moreover, the majority of the studied group received intermediate or elementary teaching. Almost half of the sample was unemployed (47.6%), and the vast majority were single at the time of the assessment (71.1%). Around one-quarter of the participants were undergoing pharmaceutical treatment using antidepressant medications (25.7%) with the majority of those belonging to the rehabilitation group (OST: 17.5%; rehabilitation: 34.4%; p<0.05). More than one-third of the participants were on antipsychotic drugs (38.5%), and less than the quarter (22.5%) where on epilepsy-bipolar medications, with a significantly higher percentage in the rehabilitation group compared with the OST group (OST: 11.3%; rehabilitation: 34.4%; p<0.001).Details concerning the history and types of drugs used by the participants are further detailed in Table 1.

More than the half of the PWUD who were undergoing rehabilitation treatment have never been admitted to recovery centers before (54.4%) and this was less evident in those who were treated by OST (38.1%; p<0.001).

On average, participants were in treatment for 19.27 months; participants who were receiving OST have been in treatment for much longer than those in the rehabilitation group (OST: 31.08±25.09; rehabilitation: 5.75±5.39; p<0.001).

Table 1: Demographics, characteristics, medical and drug use history of the participants (n=187)

	OST (n=97)		Rehabilitation (n=90)		p-value	Total (n=187)	
	Mean	**SD**	**Mean**	**SD**		**Mean**	**SD**
Age (years)	33.78	8.20	30.27	8.16	0.004	32.09	8.35
	N	**%**	**N**	**%**		**N**	**%**
Gender							
Male	94	96.9	78	86.7	0.010	172	92.0
Female	3	3.1	12	13.3		15	8.0
Educational level							
Illiterate	8	8.2	2	2.2	0.267	10	5.3
Elementary/ intermediate	35	36.1	31	34.4		66	35.3
Secondary	26	26.8	24	26.7		50	26.7
University	28	28.9	33	36.7		61	32.6
Occupation							
Unemployed/ Retired	40	41.2	49	54.4	0.019	89	47.6
Employed	28	28.9	16	17.8		44	23.5
Self-employed	29	29.9	20	22.2		49	26.2
Student	0	0.0	4	4.4		4	2.1
Other	0	0.0	1	1.1		1	0.5
Marital status							
Single	65	67.0	68	75.6	0.133	133	71.1
Married	24	24.7	12	13.3		36	19.3

Divorced/ separated	8	8.2	10	11.1		18	9.6
Current housing							
Residence	97	100	25	27.8	<0.001	122	65.2
Rehabilitation	0	0.0	65	72.2		65	34.8
People with whom the participant Stays: pre-treatment (rehabilitation) and currently (OST)							
Alone	7	7.2	4	4.4	<0.001	11	5.9
Spouse/partner	27	27.8	2	2.2		29	15.5
Parents	61	62.9	14	15.6		75	40.1
Relative/colleagues	2	2.1	66	73.3		68	36.4
No response	0	0.0	4	4.4		4	2.1
Medications Used							
Antidepressants	17	17.5	31	34.4	0.008	48	25.7
Antipsychotic	31	32.0	41	45.6	0.056	72	38.5
Epilepsy-bipolar	11	11.3	31	34.4	<0.001	42	22.5
Type of drug previously used							
Drug use only	34	35.1	57	63.3	<0.001	91	48.7
Drug injection only	1	1.0	1	1.1		2	1.1
Drug use and injection	62	63.9	31	34.4		93	49.7
No response	0	0.0	1	1.1		1	0.5
Frequency of drug previously used or injected							
Up to 3 times daily	85	87.6	64	71.1	0.034	149	79.7
Once or more daily	9	9.3	17	18.9		26	13.9

Once or more weekly	3	3.1	6	6.7		9	4.8
Does not know or remember	0	0.0	1	1.1		1	0.5
No response	0	0.0	2	2.2		2	1.1
Previous treatment							
None	37	38.1	49	54.4	<0.001	86	46.0
OST	6	6.2	6	6.7		12	6.4
Rehabilitation	22	22.7	28	31.1		50	26.7
Rehabilitation and OST	10	10.3	4	4.4		14	7.5
Hospital detoxification	18	18.6	2	2.2		20	10.7
Hospital detoxification and rehabilitation	4	4.1	0	0.0		4	2.1
No response	0	0.0	1	1.1		1	0.5
Other addiction							
None	90	92.8	54	60.0	<0.001	144	77
Alcohol	1	1.0	29	32.2		30	16
Other	6	6.2	7	7.8		13	7
	Mean	**SD**	**Mean**	**SD**		**Mean**	**SD**
Duration of drug use (years)	11.45	7.23	10.93	7.32	0.632	11.21	7.25
Duration of drug injection (years) (among those	7.37	6.36	8.07	5.65	0.622	7.58	6.13

who reported drug injection)							
Age at first drug use and/or injection (years)	18.36	6.72	16.36	4.63	0.022	17.42	5.90
Number of previous treatment attempts	3.65	4.91	2.00	2.32	0.055	3.11	4.30
Treatment duration (months)	31.08	25.09	5.75	5.39	<0.001	19.27	23.04

OST:Opioid substitution treatment

III.1.2. Nutritional status, weight gain and anthropometric measurements

Most of the participants were well nourished (88.8%). The minority (11.2%) were in the moderately malnourished group, so there were no participants who were under the threshold of moderate nourishment. The findings were comparable in the two groups OST and rehabilitation ($p>0.960$). After comparing the weight status of the participants before they started their treatment with the time of the data collection, weight loss was present in 20% of the population ($p<0.001$). Furthermore, the average % of body fat was 25.66±7.91 with no statistical significance between the two treatment groups. Mean SBP and DBP were 125.09±14.20 and 77.32±13.78 mmHg respectively, with no statistical difference between groups ($p>0.05$). Other anthropometric measurements are detailed in Table 2.

More than the half of the participants reported weight gain during recovery (66.8%); this finding was more common in the rehabilitation group (OST: 54.6%; rehabilitation: 80%).

Table 2: Nutritional status, weight change, and anthropometric measurements of the participants (n=187)

	OST (n=97)	**Rehabilitation (n=90)**	**p-value**	**Total (n= 187)**

	N	%	N	%		N	%
Subjective Global Assessment (SGA)							
Well nourished	86	88.7	80	88.9	0.960	166	88.8
Moderately malnourished	11	11.3	10	11.1		21	11.2
Weight change							
Weight loss	31	32.0	8	8.9	<0.001	39	20.9
No change	13	13.4	10	11.1		23	12.3
Weight gain	53	54.6	72	80.0		125	66.8
	Mean	**SD**	**Mean**	**SD**		**Mean**	**SD**
Pre-treatment BMI (kg/m^2)	25.93	4.64	23.82	4.93	0.003	24.91	4.88
During-treatment BMI (kg/m^2)	26.61	5.27	27.56	4.50	0.189	27.07	4.93
SBP (mmHg)	123.76	13.01	126.52	15.33	0.184	125.09	14.20
DBP (mmHg)	75.77	11.32	79.00	15.90	0.109	77.32	13.78
Percent body fat (%)	25.09	8.45	26.27	7.30	0.313	25.66	7.91
Waist circumference (cm)	91.04	14.12	93.44	12.28	0.218	92.20	13.28
Neck circumference (cm)	37.45	3.22	37.60	3.46	0.770	37.52	3.33
Male participants							
Percent body fat (%)	24.89	8.45	24.98	6.76	0.935	25.93	7.70
Waist circumference (cm)	91.34	14.07	94.66	12.56	0.109	92.85	13.46
Female participants							
Percent body fat (%)	31.40	6.55	34.62	4.94	0.356	33.98	5.20
Waist circumference (cm)	81.66	15.30	85.55	6.19	0.705	84.78	8.13

OST: OST:Opioid substitution treatment;BMI: Body mass index; SBP: Systolic blood pressure; DBP: Diastolic blood pressure.

III.1.3. Dietary Intake

Table 3 presents the usual self-reported nutritional intake of the participants in terms of calories, macronutrients and micronutrients. There was no significant differences between the overall nutritional intake of the participants within the two different treatment modalities.. , except for protein intake, which was reportedly higher in the OST group (OST: 1.16±0.73 g/kg; rehabilitation: 0.90±0.52 g/kg; p=0.005) . Interestingly, less than half of the participants had intakes below 0.8 grams of protein per kg body weight and this was more evident in the rehabilitation group (OST: 34.4%; rehabilitation: 48.9%; p=0.047). Fiber intake was also significantly lower in the rehabilitation groups than in the OST group (OST: 21.89±13.42 g; rehabilitation: 21.27±10.30 g ; p<0.038) with an average daily intake of 21.59±11.96 g for both groups.

Concerning the micronutrients distribution, vitamin A and potassium were statistically significantly lower in the rehabilitation group than in the OST group (OST: 826.18±1724.74 mcg; rehabilitation: 431.48±360.09 mcg; p=0.033 and OST: 2761.93±1584.78 mg; rehabilitation: 2300.23±1150.12 mg; p=0.025, respectively). Further values for detailed macronutrients and micronutrients are present in the Table 3 below.

Table 3: Intake of energy, macro- and micronutrients of the participants (n=187)

	OST (n=97)		**Rehabilitation (n=90)**		**p-value**	**Total (n=187)**	
	Mean	**SD**	**Mean**	**SD**		**Mean**	**SD**
Energy (Kcal)	2728.68	1494.72	2471.23	1013.51	0.173	2602.07	1283.88
Energy (Kcal/Kg)	34.85	21.16	30.84	14.76	0.140	32.88	18.36
Protein (g)	91.983	52.448	73.284	39.654	0.005	82.787	47.406
Protein (g/Kg)	1.16	0.73	0.90	0.52	0.006	1.04	0.64
Added sugar (g)	95.95	94.75	87.29	76.11	0.269	91.69	85.97
Fiber (g)	21.89	13.42	21.27	10.30	0.038	21.59	11.96
Calcium (mg)	816.28	571.46	736.61	425.23	0.285	777.10	505.07

Potassium (mg)	2761.93	1584.78	2300.23	1150.12	0.025	2534.87	1403.56
Iron (mg)	19.45	39.00	14.73	8.19	0.263	17.13	28.41
Zinc (mg)	11.97	9.24	10.21	6.19	0.133	11.10	7.92
Magnesium (mg)	322.01	242.79	278.31	116.28	0.121	300.52	192.06
Selenium (mcg)	118.39	75.62	94.31	54.16	0.014	106.55	66.86
Thiamin (mg)	1.95	1.10	1.73	0.80	0.125	1.84	0.97
Riboflavin (mg)	1.85	1.32	1.55	0.79	0.060	1.70	1.10
Niacin (mg)	25.71	19.67	19.85	14.95	0.024	22.83	17.71
Vitamin C (mg)	93.79	98.07	85.16	81.01	0.518	89.55	89.94
Vitamin A (mcg)	826.18	1724.74	431.48	360.09	0.033	632.07	1267.38
Vitamin D (mcg)	1.77	4.65	1.26	1.62	0.325	1.52	3.50
Vitamin E (mg)	10.83	9.67	9.91	5.46	0.425	10.38	7.88
Pyridoxine (mg)	1.69	1.12	1.25	0.76	0.046	1.47	0.99
Folate (mcg)	355.37	338.31	316.33	240.00	0.147	336.17	293.95
	N	**%**	**N**	**%**		**N**	**%**
Categories of energy intake							
<25 Kcal/kg	36	38.7	33	36.7	0.776	69	37.7
≥25 Kcal/kg	57	61.3	57	63.3		114	62.3
Categories of protein intake							
<0.8 g/kg	32	34.4	44	48.9	0.047	76	41.5
≥0.8 g/kg	61	65.6	46	51.1		107	58.5

OST: Opioid substitution treatment

III.1.4. Biochemical parameters

Biochemical parameters of the participants in terms of complete blood count, cholesterol, fasting blood sugar, and more, are listed in Table 4. The findings were similar in both groups concerning most parameters except for FBS which had a mean value of 89.77±13.60 mg/dl and this was statistically significantly higher in the OST group than in the rehabilitation group (OST: 94.21±16.82 mg/dl; rehabilitation: 85.48±7.41 mg/dl; p<0.001).

Liver enzymes showed a borderline value in both treatment modalities, but this finding was not significant different between groups (OST: 37.67±50.76 IU/l; rehabilitation: 32.38±26.55 IU/l; p=0.395).

Table 4: Biochemical parameters of the participants (n=187)

	OST (n=97)		**Rehabilitation (n=90)**		**p-value**	**Total (n= 187)**	
	Mean	**SD**	**Mean**	**SD**		**Mean**	**SD**
RBC (cells/mcl)	5.29	0.50	5.20	0.47	0.229	5.24	0.48
Hgb (g/dl)	14.72	1.51	15.05	1.22	0.127	14.89	1.38
Hct (%)	43.61	3.78	44.51	2.94	0.085	44.07	3.40
WBC (cells/mcl)	8.55	2.57	7.29	2.10	0.001	7.91	2.42
Platelet (cells/mcl)	259.85	63.58	249.25	66.28	0.291	254.46	64.99
Total Proteins (g/dl)	7.49	0.44	7.31	0.41	0.008	7.39	0.44
Albumin (g/dl)	4.34	0.27	4.28	0.31	0.135	4.31	0.30
FBS (mg/dl)	94.21	16.82	85.48	7.41	<0.001	89.77	13.60
Total cholesterol (mg/dl)	188.85	53.47	190.94	39.83	0.773	189.91	46.90
LDL (mg/dl)	115.10	44.32	115.93	33.17	0.891	115.52	38.93
HDL (mg/dl)	43.34	12.30	44.33	12.51	0.606	43.85	12.38
Males	43.06	11.85	43.81	12.88	0.708	43.42	12.32

Females	51.00	23.81	47.58	9.76	0.829	48.26	12.56
TG (mg/dl)	118.07	69.21	129.38	147.43	0.527	123.82	115.62
ALT (IU/l)	37.67	50.76	32.38	26.55	0.395	34.98	40.26
AST (IU/l)	32.78	29.76	32.10	25.25	0.873	32.43	27.48

OST: Opioid substitution treatment; RBC: Red blood cells; Hgb: Haemoglobin; Hct: Hematocrit; WBC: White blood cells; FBS: blood sugar; LDL: Low-density lipoprotein; HDL: High-density lipoprotein; TG: Triglyceride; ALT: Alanine amino transferase; AST: Aspartate amino transferase.

III.1.5. Lifestyle practices

Investigated lifestyle parameters are presented in Table 5.

Concerning sleep, more than three-quarters of the participants (75.3%) reported poor quality sleep, and this finding was more common in the rehabilitation group (OST: 68.8%; rehabilitation: 82.2%; $p<0.05$). In addition, almost half of the studied sample reported a low physical activity level (49.2%), with a higher percentage of people reporting a high physical activity level in the rehabilitation group (OST:8.2%; rehabilitation: 33.3%; $p<0.001$). Poor nutritional knowledge was quite evident in the studied population, with almost two-thirds of the sample (69.5%) having a poor knowledge score. Finally, no statistically significant difference was found concerning food addiction between OST and rehabilitation groups in this particular sample, but almost half of the population met the diagnosis for food addiction (No diagnosis: 51.1%; diagnosis: 48.9%; $p=0.307$).

Table 5: Lifestyle practices: sleep, physical activity levels, food dependence, and nutrition knowledge of the participants (n=187)

	OST (n=97)		**Rehabilitation (n=90)**		**p-value**	**Total (n= 187)**	
	N	**%**	**N**	**%**		**N**	**%**
Sleep quality index							
Good sleep quality	30	31.3	16	17.8	0.033	46	24.7
Poor sleep quality	66	68.8	74	82.2		140	75.3

Physical activity level							
Low activity level	69	71.1	23	25.6	<0.001	92	49.2
Moderate activity level	20	20.6	28	31.1		48	25.7
High activity level	8	8.2	39	43.3		47	25.1
Food addiction							
No diagnosis met	53	54.6	40	47.1	0.307	93	51.1
Diagnosis met	44	45.4	45	52.9		89	48.9
Nutrition knowledge							
Poor nutrition knowledge	71	73.2	59	65.6	0.257	130	69.5
Good nutrition knowledge	26	26.8	31	34.4		57	30.5

OST: Opioid substitution treatment

III.2 Bivariate Analysis

For the purpose of the study, and after finding that weight gain was evident in more than the half of the studied sample, it was pertinent to do the bivariate analysis to examine the factors that may be related to weight gain. Therefore, we have divided the sample in two groups, participants who gained weight and participants who did not.

III.2.1 Sociodemographic characteristics

As shown in Table 6, there was no significant difference between the PWUD who gained weight and those who did not report weight gain with reference to age, gender, and educational level.

Table 6- Sociodemographic characteristics

	No weight gain (n=62)	**Weight gain (n=125)**	**p-value**
Age in years	33.08 ± 8.09	31.61 ± 8.48	0.26

Gender			
Male (%)	60 (96.8)	112 (89.6)	0.15
Female (%)	2 (3.2)	13 (10.4)	
Educational level			
Illiterate (%)	2 (3.2)	8 (6.4)	0.86
Elementary/intermediate (%)	23 (37.1)	43 (34.4)	
Secondary (%)	16 (25.8)	34 (27.2)	
University (%)	21 (33.9)	40 (32.0)	

III.2.2 Treatment related characteristics

Table 7 which describes treatment related variables in the studied population, reveals significant differences between the two groups concerning the number of previous treatment attempts. The average number of treatment attempts was lower in participants who gained weight than compared with those who did not (0.85 versus 2.58; p=0.02). Similarly, the treatment duration in participants who reportedly gained weight was significantly higher than in those who did not gain weight. (16.26 months versus 25.36; p=0.02).

In addition to it was also apparent that those who reported the use of any medications had higher rates of weight gain during their treatment compared to those who were not on any medications(56% versus 38.7%; p=0.03); specifically, more people who were on antipsychotic medications reported weight gain in comparison to those who were not using these types of medications (44.8% versus 25.8%; p=0.01).

Table 7- Drug-use and treatment-related characteristics

	No weight gain (n=62)	**Weight gain (n=125)**	**p-value**

Duration of drug use in years	12.27 ± 8.09	10.68 ± 6.60	0.20
Number of previous treatment attempts	2.58 ± 4.97	0.85 ± 1.77	0.02
Duration of current treatment in months	25.36 ± 27.03	16.26 ± 20.24	0.02
Current use of antidepressants, Yes (%)	11 (17.7)	37 (29.6)	0.08
Current use of antipsychotics, Yes (%)	16 (25.8)	56 (44.8)	0.01
Current use of epilepsy/bipolar medications, Yes (%)	10 (16.1)	32 (25.6)	0.14
Current use of any medication, Yes (%)	24 (38.7)	70 (56.0)	0.03

III.2.3 Nutritional characteristics

Table 8 presents the nutrition-related characteristics of the sample. Mean self-reported pre-treatment BMI among those who reported weight gain was statistically significantly higher than the mean pre-treatment BMI of those who did not report weight gain (23.88 kg/m^2; p<0.0001). This variable is worth further investigation since the difference was statistically significant (p=0.03).

Moreover, the majority of the participants who did report weight gain also reported having a normal weight (54.4%) before the treatment, with only 28% reporting being overweight before initiating recovery.

Concerning reported caloric, protein, carbohydrate and fat intakes, as well as micronutrient intakes at the time of data collection, there was no statistical significance between them in the two groups of weight gain and no weight gain. 47.5% met the diagnosis for food dependence in the group that did not report weight gain (n=62) and similarly, 49.6% met the diagnosis in the group that did report weight gain (n=125). The majority of tboth the mentioned groups also reported poor nutritional knowledge (no weight gain: 67.7%; weight gain:70.4%; p=0.71). Although the values were comparable between both of the groups with respect to these two variables, there was no statistical significance to pursue justification.

Table 8- Nutrition-related characteristics

	No weight gain (n=62)	Weight gain (n=125)	p-value
Pre-treatment BMI in kg/m2	27.02 ± 5.08	23.88 ± 4.45	<0.0001
Pre-treatment BMI			
Underweight (%)	0 (0.0)	11 (8.8)	<0.0001
Normal weight (%)	22 (35.5)	68 (54.4)	
Overweight (%)	26 (41.9)	35 (28.0)	
Obesity (%)	14 (22.6)	11 (8.8)	
Caloric intake per Kg of body weight in Kcal/kg	35.30 ± 20.38	31.73 ± 17.29	0.22
Protein intake per Kg of body weight in g/kg	1.11 ± 0.68	1.01 ± 0.63	0.33
Percentage of carbs from total calories	48.77 ± 10.04	50.46 ± 11.40	0.33
Percentage of added sugar from total calories	2.75 ± 3.99	2.55 ± 3.45	0.74
Percentage of fat from total calories	38.93 ± 9.88	37.33 ± 10.71	0.33
Fiber intake in g	21.76 ± 12.97	21.51 ± 11.51	0.90
YFAS- food dependence			
No diagnosis (%)	31 (52.5)	62 (50.4)	0.79
Diagnosis met (%)	28 (47.5)	61 (49.6)	
COKQ- nutrition knowledge			
Poor knowledge (%)	42 (67.7)	88 (70.4)	0.71
Good knowledge (%)	20 (32.3)	37 (29.6)	

III.2.4 Lifestyle characteristics

Lifestyle practices including physical activity levels and sleep quality are presented in Table 9. Poor sleep quality was reported in the majority of both the groups (no weight gain: 67.7%; weight gain:79%; p=0.09). Likewise, low physical activity was the major finding in both of the groups (no weight gain:53.2%; weight gain: 47.2; p=0.44). Sleep quality and physical activity were comparable between the two groups but no statistical significance was deduced.

Table 9- Lifestyle-related characteristics

	No weight gain (n=62)	**Weight gain (n=125)**	**p-value**
PSQI- sleep index			
Good sleep quality (%)	20 (32.3)	26 (21.0)	0.09
Poor sleep quality (%)	42 (67.7)	98 (79.0)	
IPAQ- physical activity			
Low (%)	33 (53.2)	59 (47.2)	
Moderate (%)	17 (27.4)	31 (24.8)	0.44
High (%)	12 (19.4)	35 (28.0)	

III.2.5 Weight gain and type of treatment

The type of treatment is apparently associated with reported weight gain according to data presented in Table 10. More participants in the rehabilitation group reportedly experienced weight gain in comparison with the OST program (rehabilitation: 57.6%; OST: 43.5%; p<0.0001).

Table 10: association between weight groups and type of treatment

Type of treatment	No weight gain (n=62)	Weight gain (n=125)	p-value
OST (%)	44 (57.8)	53 (42.4)	<0.0001
Rehabilitation (%)	18 (42.2)	72 (57.6)	

DISCUSSION

This cross-sectional study provided an in-depth evaluation of the nutritional profile and some lifestyle practices of PWUD in two treatment modalities: rehabilitation post detoxification and OST across Lebanon. Moreover, it was able to address the factors that might be associated with weight gain PWUD tend to suffer from in recovery (Cowan & Devine 2008; Billing & Ersche 2015; Cocores & Gold 2009; Hodgkins et al. 2004; Nolan & Scagnelli 2007; Van Buskirk & Potenza 2010). Furthermore, this study was the first to compare the nutritional status of PWUD in terms of their treatment approach whether OST or rehabilitation, since literature is currently not available to display the key differences/similarities of the nutritional profile between these types of recovery programs, especially in the MENA region.

The study sample (n=187) was mainly composed of males (92%). The participants were well nourished according to the SGA tool without any signs of undernutrition. A similar study by Escobar et al. 2018 revealed similar findings, where the prevalence of underweight was relatively low among the participants who were in recovery from crack cocaine substance use in Brazil. However numerous other studies have shown contrasting findings where those admitted to recovery centers were in fact underweight and malnourished (Quach et al. 2008; Cowan & Devine 2008; Santolaria-Fernandez et al. 1995; Islam et al. 2001 & 2002; Ross e t al. 2012; and Tang et al. 2011).

In addition, before admission to treatment, and after analyzing demographic information which was self-reported by the participants during close-ended interview questionnaires, it was clear that a pattern of normal BMI (18.9-24.9 kg/m^2) was present in the sample's active drug use phase which increased to the overweight category during treatment (25.0-29.9 kg/m^2).

This study tried to establish an association between weight gain and the following lifestyle factors: quality of sleep, physical activity level, nutritional knowledge, food addiction, as well as the participants' usual dietary intake in a population who are recovering from substance use disorder.

However, interesting findings emerged that associated weight gain statistically and significantly with: the type of treatment whether rehabilitation or OST, treatment duration mean, the number of previous treatment attempts, sleep quality, and the use of medications.

Type, duration of, and number of previous treatment attempts and weight gain

The type of treatment seems to be associated with weight gain in this population. We argue that rehabilitation settings might have contributed to this weight gain (complete cessation of drugs, a secluded environment with nothing to do except the activities arranged by the center). Whereas, in the OST program, the settings differ greatly. It is mainly an unsupervised program, meaning that the participants return home after receiving their daily dose of treatment and therapy, so they might not be fully complying to abstinence of drugs. In addition, participants in the OST program are still receiving a pharmaceutical opioid dose, and so they are not fully abstinent. This might explain why those who are in rehabilitation may be more prone to overindulging in foods, as a way to raise their dopamine levels. To elaborate, drugs of abuse and obesity are both pathologies that share neurobiological pathways related to the disruption of brain dopamine (Volkow et al. 2013; Cowan & Devine 2008; and Wang et al., 2004). In fact, and according to Volkow et al. 2013's review, neurotransmitters implicated in drug-seeking behaviors are also implicated in food intake. Therefore, those in rehabilitation having no means of drugs of abuse are unlike those in the OST who are still receiving a certain dose of opioids, meaning they can be seeking dopamine-releasing alternate behaviors that can convey a similar reward system.

Another factor to discuss when comparing the two treatment modalities is the treatment duration mean which was higher in the OST group than in the rehabilitation group. First of all, a plausible argument linking the treatment duration to weight gain could be the fact that PWUD who are in OST programs and after one year of treatment might have not suffered from the weight gain anymore whereas those in rehabilitation who had a shorter duration period might have just started to see the changes and have not fully regulated to sobriety. According to Cowan and Devine's, a qualitative study upon the nutritional concerns of a sample of men in recovery from substance use disorder, their findings suggested that early recovery was accompanied by an amount weight gain that is substantial to the actual weight lost during active drug addiction.

Numerous studies have shown the excessive weight gain that is preceded by food deprivation. Disordered eating was also found in populations where there were correlations to food deprivations and restrained eating and bingeing (Lowe et al. 2001; Ouwens et al. 2003; Ricciardelli et al. 2001; Van Strien et al. 2000). Once abstinence was achieved and food became more available to the participants as they entered early recovery, recovering addicts gained excessive weight and

exhibited disordered eating behaviors such as binge eating and hoarding food, similar to those documented in the Minnesota Starvation Study (Keys et al., 1950).

More than the half of the sample were undergoing treatment for the first time, and this is worth investigating since it was associated with weight gain and particularly in the rehabilitation group. Being new in treatment suggests that participants are having a harder time to adjust to drug withdrawal, hence might be suffering from more hormonal, neurochemical imbalances than their older counterparts. This might explain their excessive weight gain on one hand, simply because they may be compensating the drug intake by overindulging in highly palatable foods which therefore puts them in a positive energy balance leading to weight gain.

Sleep quality and weight gain

The majority of the sample reported poor sleep quality; this may be a determinant of weight gain in this population, although our findings did not show so. Poor sleep is a determinant of weight gain in the general population, most likely because of the hormonal imbalances that ensue when not having enough sleep. According to a systematic review by Patel & Hu in 2008, there is a clear presence of an association between decreased sleep time and weight gain. Experimental studies have also shown a probable causal relationship between short sleep duration and obesity. The causal relationship is linked to increased hunger, because of an increased secretion of ghrelin (the hunger hormone), and decreased satiety due to the reduced secretion of leptin (the satiety hormone); altered thermoregulation as well as increased fatigue were associated with poor sleep leading to an overall decreased energy expenditure, which eventually cause a positive energy balance and a ultimately can be tied to obesity or weight gain (Patel & Hu et al. 2008).

Medications and weight gain

The literature has addressed the weight related side-effects of psychiatric medications and particularly antipsychotics. Therefore, it does not seem surprising to find that the majority of the sample gained weight and were also on medications. This can be argued as one of the leading causes of weight gain in PWUD because substance abuse is a psychiatric disease, and therefore a

pharmaceutical approach is a crucial part of the recovery plan, and given the known side-effects of psychiatric medications associated with weight gain, it which might explain the high prevalence of weight gain in this sample.

Most pharmacotherapies target the brain receptors of neurotransmitters/neuromodulators that are dysregulated as a result of the specific addiction (Douaihy et al., 2013). Medications for opioid addiction disorder include methadone and buprenorphine. This class of agonist pharmacotherapies has demonstrated a significant weight gain in patients recovering from substance abuse disorder. (Nohan & Scagnelli, 2007; & Rajs et al., 2004). In addition to OST, antidepressants are commonly used in adjunction with other medications to aid the recovery process, based on the profile of the patient and the type of addiction. Some of these medications can lead to significant weight gain in individuals as well.

Limitations of the study

Limitations of this study lie in the fact that this was a cross-sectional study. Associations can be drawn, but no causality can be made.

This study had a small sample size, and the data analyzed was collected through recall by the participants which might entail reporting bias.

In addition, further limitations are present which include the underrepresentation of the female gender, since the sample was mostly made up of male participants. Finally, dietary intake, a main variable considered in this study, was measured through a tool that is not highly specific for estimating the usual food intake of the participants, leading to the possibility of recall bias and thus hindering important data from being explored. In order to deeply explore the determinants of weight gain, further studies are needed such as a cohort that follows up PWUD throughout their treatment period and beyond with detailed nutritional assessment tools being used at each milestone in the recovery process.

Strengths of the study

This study is the first to address the nutritional status of PWUD in such depth. To begin with, parameters like sleep quality, 24 h food recall, food addiction, nutritional knowledge, and physical activity level have never been explored all-together in this community in any part of the world. It pioneered in providing insights into the nutritional parameters and lifestyle practices among PWUD, a vulnerable population to say the least. Moreover, it is the first of its kind in exploring the mentioned parameters in participants from the MENA region and specifically Lebanon. Another importance lies in the accuracy and reliability of the data collected, since the main investigators in this study are licensed dietitians, a phlebotomist, and a nurse; this can ensure that calibrated measurements were taken and assessed accordingly. Finally, the tools which were used to assess the various variables were all reliable including the SGA(Hirsch et al. 1991& Bauer et al. 2002); CoNKQ (Spillmann & Keller 2011); YFAS (Gearhardt 2009): PSQI (Buysse et al. 1989); IPAQ (Craig et al. 2003), although further validation amond PQUDin general, and those from Lebanon is required. In fact, the aim of this study was to pave way for future studies to be able to implement nutritional programs within the rehabilitation community as weight gain poses a serious public

health threat especially to a vulnerable population like PWUD. In addition, this study provided new insights on the importance of nutritional intervention as part of a multidisciplinary approach in treating substance use disorders.

CONCLUSION

This study aimed to assess the association between weight gain amongst PWUD who are in recovery in Lebanon whether in the rehabilitation centers or the OST programs and variables pertaining to the lifestyle practices of the participants: sleep quality, food addiction, physical activity level, and nutritional knowledge. Moreover, other factors such as the assessment of the participant's nutritional status were addressed. After analyzing the data though bivariate analysis, the variables associated with weight gain among the participants were in fact: type and duration of treatment, the number of previous treatment attempts, and medications. Other variables might definitely be associated with weight gain, and further studies with a larger sample size, a stronger design (prospective cohort,) with a follow up period can definitely explore the true causes of weight gain in this at-risk population. These findings are expected to inform the implementation of nutritional programs to help in the prevention of weight gain in PWUD who are already at a high risk for other health conditions that are substance-related. It is also important to mention that this study paves the way for future studies addressing the nutritional status of PWUD in the MENA region as these are currently quite scarce. In order to fully reach the impact this study tried to cover, future studies under the patronage and with initiatives coming directly from the Ministry of Public Health in Lebanon are urged to further understand the shortage in the nutritional guidance of PWUD for better, improved, and sustained treatment outcomes.

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APPENDIX 1

ID: _____ Date:_____

Blood withdrawal and questionnaire Consent Form

Determinants of Weight Gain in People Who Use Drugs undergoing Rehabilitation or Opioid Substitution Therapy in Lebanon: A Cross-Sectional Study

General Information

- You are being asked to participate in a research project. The data collected will be used to complete a PhD project by the investigator Cynthia Farsoun.
- Participation in this study is completely voluntary. You will not get a financial reward for participating.
- Right to Refuse or Withdraw: You do not have to take part in this research project if you do not wish to do so. You may stop participating in this study at any time you choose. It is your choice and your right will be respected. In addition, you may be taken off from the study without your consent if you do not follow the instructions of the research team or if the investigator thinks that further participation may cause you harm.
- There are no side effects associated with your participation. There may be some discomfort during the blood drawing; there is also minimal risk of bruising, temporary change in skin color or in rare instances the possibility of infection.

- The estimated required time is around one hour . A 10-ml sample of blood will be collected from you and you will be asked to fill out few questionnaires regarding your nutrition knowledge, food addiction, sleep quality, demographic information, 24 hour dietary recall , and physical activity habits.
- You will have to fast for 12 hours before the blood test.
- If you accept to participate in this study, your personal data will become part of this research. They will be seen only by the researchers associated with the study. Confidentiality will be maintained at all times. In this study, all the gathered personal information will remain confidential. No-one but the researchers will be able to see this information. All the personal information will have a number attached to it, but not the name of the participant. Only the researchers will know which number belongs to which participant; this information will be retained for 2 years after the research study ends.

Purpose of the Research:

Explore changes in nutritional status, biochemical indices and eating habits of users undergoing detoxification at different stages of their treatment: stage 1 (upon admission to the rehabilitation center) and stage 2 (three months post-admission).

Drug users is a high-risk group that has not been adequately addressed worldwide, and locally. The findings of this research will be used to develop a nutrition intervention program tailored to the needs of the patients and intended to be implemented in treatment facilities. This program will be aimed at the target population, health care workers and treatment facilities management, and addresses the phases of early recovery, later recovery and discharge.

Procedures and Protocol:

- Prior to your blood test, you will have to fast for 12 hours. When you arrive at the meeting site, blood samples will be collected by a qualified nurse and analyzed for the following: Total Cholesterol, HDL & LDL cholesterol, complete blood chemistry, serum albumin, total serum proteins and liver enzymes. There may be some discomfort during the blood drawing; there is also minimal risk of bruising, temporary change in skin color or in rare instances the possibility

of infection. The blood samples will be identified using a number and not your name; they will be sent to the specialized labs for analysis.

- Then a trained dietitian will collect the following measurements: height (cm), weight (kg), waist circumference (cm), subcutaneous fat and muscle measurements
- The dietitian will also carry out the following questionnaires: a demographic questionnaire, a general nutrition knowledge ,24 hour dietary recall, physical activity habits, sleep quality assessment ,in addition to a food addiction questionnaire.

Sharing the Results:

The knowledge that is gained from this research project will be available to the public (through future reports, articles or presentations by the research team) so other interested researchers and practitioners may learn from the findings. However, at no time will the confidential information be shared; the name of the participant will not be collected, hence will not appear in any reports, articles or presentations.

This informed consent form has been reviewed and approved by the Committee on Research Ethics (CRE) at LIU, which is a committee whose objective is to make sure that research participants are protected from harm; however, an in case of any wrongdoing-whether intentional or unintentional-neither the CRE nor the University bear any responsibility for such actions.

Statement by the Participant:

I hereby confirm that I have read and understood the information sheet dated ……....., for the above study. I have had the opportunity to reflect upon and understand the information, ask questions as well as receive answers to my questions. I therefore voluntarily consent to take part as a participant in this research project.

Signature of Participant _____

Date _____

Day/month/year

Statement by the Researcher/Person taking the consent:

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure he/she understood it.

I confirm that the participant was given the opportunity to ask questions about the study and I have answered his/her questions correctly and to the best of my knowledge. I confirm that the participant has not been coerced into giving consent, and that he/she has given the consent freely and voluntarily.

A copy of this document has been provided to the participant.

Print Name of Researcher/Person taking the consent_____

Signature of Researcher /Person taking the consent_____

Date _____

Day/month/year

APPENDIX 2

Interview Questions

PART A SOCIODEMOGRAPHIC DATA

التاريخ: _____ رقم التعريف: _____رقم التعريف بالعامل الميداني:_____

الاستبيان الخاص بالبيانات الديموغرافية

رقم التعريف بالمرفق					
نوع العلاج	☐ العلاج ببدائل الأفيونيات	☐ علاج إزالة السموم			
مدة العلاج (بالأشهر)					
النوع الجنسي	☐ ذكر	☐ أنثى			
تاريخ الولادة	اليوم: / الشهر: /السنة:	العمر (إن كان تاريخ الولادة غير معروف)			
المستوى التعليمي					
☐ غير ملمّ بالقراءة والكتابة	☐ ابتدائي/ متوسّط	☐ ثانوي	☐ جامعي	☐ لا جواب	
المهنة					
☐ غير موظف/متقاعد	☐ موظف	☐ صاحب مهنة حرّة	☐ طالب	☐ غيرها	☐ لا جواب
الوضع العائلي					
☐ عازب	☐ متأهّل	☐ مطلّق/ منفصل	☐ أرمل	☐ لا جواب	
عدد الأولاد (في حال لديه أولاد)					
نوع المخدّرات التي يتمّ تعاطيها					
☐ تعاطي بطرق غير الحقن	☐ تعاطي عن طريق الحقن	☐ تعاطي عن طريق الحقن وبطرق أخرى	☐ لا جواب		
نوع المخدرات التي يتمّ تعاطيها عادة عن طريق الحقن و/أو بطرق أخرى (الإشارة بواسطة علامة X)					

المخدّر	تعاطي	تعاطي عن طريق الحقن فقط	لا جواب
هيروين			
كوكايين			
كراك			
بيوبرينورفين (تايديجيزيك)			
ديكستروبروبوكسيفين			
أمفيتامين			
مهدّئات الأعصاب			
باربتيورات			
غيرها، يرجى التحديد			
العلاج ببدائل الأفيونيات فقط			

كم مرة تمّ فيها عادة تعاطي المخدرّات عن طريق الحقن و/أو بطرق أخرى				
□ لحدّ 3 مرات في اليوم	□ مرة أو أكثر في اليوم	□ مرة أو أكثر في الأسبوع	□ لا يدري/ لا يذكر	□ لا جواب

مدة تعاطي المخدّرات بطرق غير الحقن (بالسنوات)		□ لا جواب	
مدة تعاطي المخدّرات عن طريق الحقن فقط (بالسنوات)		□ لا جواب	
العمر في أول مرة تمّ فيها تعاطي المخدرات عن طريق الحقن و/أو بطرق أخرى		□ لا جواب	
العلاجات السابقة	□ لا شيء	□ العلاج ببدائل الأفيونيات	□ علاج إزالة السموم
نوع آخر من الإدمان	□ لا شيء	□ الكحول	□ غيرها: يرجى التحديد

الحالة الطبية (الإصابة بأي مرض)
□ ارتفاع ضغط الدم □ أمراض القلب والشرايين □ السكري □ فرط الشحميات في الدم □ التهاب الكبد □ فيروس نقص المناعة المكتسب / الإيدز □ السرطان □ قصور الكبد □ مرض الكلى □ أمراض الجهاز الهضمي □ أمراض الجهاز التنفسي □ غيرها: يرجى التحديد
الأدوية التي يتمّ تناولها (في حال يتمّ تناول أيّ أدوية)

السكن الحالي				
☐ منزل	☐ فندق/ سكن جامعي	☐ مكان عام	☐ مركز إعادة تأهيل	☐ لا جواب
الأشخاص الذين يقيم معهم (فقط للعلاج ببدائل الأفيونيات)				
☐ يقيم بمفرده	☐ الزوج/ الشريك	☐ الوالدان	☐ الأقارب/ الزملاء	☐ لا جواب
متوسط دخل الأسرة (بالليرة اللبنانية)				

PART B Consumer-Oriented Nutrition Knowledge Questionnaire (CoNKQ)

التاريخ: _____رقم التعريف: _____رقم التعريف بالعامل الميداني:_____

استبيان موجّه نحو المستهلك حول مدى الإلمام بالتغذية

(يسعى هذا الاستبيان إلى تقييم مدى إلمام مستهلكي الغذاء بالمعلومات الغذائية)

		صح	خطأ
1	تحتوي حبوب العدس على نسبة قليلة من المغذيات المفيدة فقط؛ وبالتالي، فإنّ فائدتها الصحية غير كبيرة.		
2	إذا تناولت أطعمةً تحتوي على نسبة عالية من الدهون، يمكنك عكس تأثيراتها من خلال تناول التفاح.		
3	تحتوي الكريمة المخفوقة على نسبة أقلّ من السعرات الحرارية من الكريمة السائلة.		
4	تتألّف الوجبة الصحية من نصف كمية من اللحوم، ربع كمية من الخضار، وربع كمية من الأطباق الجانبية.		
5	تحتوي الدهون على نسبة أقلّ من السعرات الحرارية مقارنةً بالكمية نفسها من الألياف.		

6	إنّ صلصة السلطة المكوّنة من المايونيز صحية بقدر الصلصة نفسها المكوّنة من الخردل.		
7	للدهون تأثير سيّء على الصحة دوماً، وبالتالي من الأجدى تجنّبها قدر المستطاع.		
8	المعكرونة بصلصة الطماطم صحية أكثر من المعكرونة بصلصة الفطر والكريمة.		
9	يقوم النظام الغذائي المتوازن على تناول جميع الأطعمة بكميات مماثلة.		
10	تتمثّل الفائدة الصحية للفواكه والخضار فقط في ما يتوافر فيها من فيتامينات ومعادن.		
11	اللحم المقدّد كالقاورما يحتوي على نسبة أكبر من السعرات الحرارية مقارنةً باللحم المصنّع.		
12	تحتوي الأسماك المشبعة بالزيوت (كالسلمون) على نسبة أكبر من الدهون الصحية مقارنةً باللحم الأحمر.		
13	لأكلٍ صحيّ، يجدر بك تناول نسبة أقلّ من الدهون، ولا يهمّ ما إذا تناولت كمية أكبر من الفواكه والخضار.		
14	إنّ مغرفة من الآيس كريم بنكهة الشوكولا صحية بقدر مغرفة من السوربيه بنكهة الحامض.		
15	تحتوي قطعة من ستيك لحم البقر على العدد نفسه من السعرات الحرارية الموجودة في الكمية نفسها من صدر الدجاج.		
16	يحتوي مقدار من السكر على العدد نفسه من السعرات الحرارية الموجودة في المقدار نفسه من الدهون.		
17	يحتوي السندويش بجبنة الموزاريلا على العدد نفسه من السعرات الحرارية الموجودة في السندويش بجبنة الغروييز.		
18	لتغذية صحية، ينبغي تناول كمية من مشتقات الحليب تعادل الكمية التي تتناولها من الفواكه والخضار.		
19	يحتوي الحليب المقشود على نسبة من المعادن أقلّ من تلك الموجودة في الحليب الكامل الدسم.		
20	السكر الأسمر صحيّ أكثر من السكر الأبيض.		

التاريخ: _____رقم التعريف: _____رقم التعريف بالعامل الميداني:_____

PART C Subjective Global Assessment Questionnaire (SGA)

Subjective Global Assessment Form

MEDICAL HISTORY

Patient ID: _____ Date: _____ /_____ /_____

NUTRIENT INTAKE

1. ☐ No change; adequate
2. Inadequate; duration of inadequate intake _____
   ☐ Suboptimal solid diet ☐ Full fluids or only oral nutrition supplements ☐ Minimal intake, clear fluids or starvation
3. **Nutrient Intake in past 2 weeks***
   ☐ Adequate _____ ☐ Improved but not adequate _____ ☐ No improvement or inadequate _____

WEIGHT

Usual weight _____ **Current weight** _____

1. **Non fluid weight change past 6 months** Weight loss (kg) _____
   ☐ <5% loss or weight stability ☐ 5-10% loss without stabilization or increase ☐ >10% loss and ongoing
   If above not known, has there been a subjective loss of weight during the past six months?
   ☐ None or mild ☐ Moderate ☐ Severe
2. **Weight change past 2 weeks*** Amount (if known) _____
   ☐ Increased ☐ No change ☐ Decreased

SYMPTOMS (Experiencing symptoms affecting oral intake)

1. ☐ Pain on eating ☐ Anorexia ☐ Vomiting ☐ Nausea ☐ Dysphagia ☐ Diarrhea
   ☐ Dental problems ☐ Feels full quickly ☐ Constipation
2. ☐ None ☐ Intermittent/mild/few ☐ Constant/severe/multiple
3. **Symptoms in the past 2 weeks***
   ☐ Resolution of symptoms ☐ Improving ☐ No change or worsened

FUNCTIONAL CAPACITY (Fatigue and progressive loss of function)

1. No dysfunction
2. Reduced capacity; duration of change _____
   ☐ Difficulty with ambulation/normal activities ☐ Bed/chair-ridden
3. **Functional Capacity in the past 2 weeks***
   ☐ Improved ☐ No change ☐ Decrease

METABOLIC REQUIREMENT

High metabolic requirement	☐ No	☐ Yes

PHYSICAL EXAMINATION

Loss of body fat	☐ No	☐ Mild/Moderate	☐ Severe
Loss of muscle mass	☐ No	☐ Mild/Moderate	☐ Severe
Presence of edema/ascites	☐ No	☐ Mild/Moderate	☐ Severe

SGA RATING

☐ **A**	Well-nourished Normal	☐ **B**	Mildly/moderately malnourished Some progressive nutritional loss	☐ **C**	Severely malnourished Evidence of wasting and progressive symptoms

CONTRIBUTING FACTOR

☐ **CACHEXIA -** (fat and muscle wasting due to disease and inflammation) ☐ **SARCOPENIA -** (reduced muscle mass and strength)

*See page 2 SGA Rating for more description.

April 2017

Canadian Malnutrition Task Force* | le Groupe de travail canadien sur la malnutrition*

Subjective Global Assessment Guidance For Body Composition

SUBCUTANEOUS FAT

Physical examination	Normal	Mild/Moderate	Severe
Under the eyes	Slightly bulging area	Somewhat hollow look, Slightly dark circles,	Hollowed look, depression, dark circles
Triceps	Large space between fingers	Some depth to fat tissue, but not ample. Loose fitting skin.	Very little space between fingers, or fingers touch
Ribs, lower back, sides of trunk	Chest is full; ribs do not show. Slight to no protrusion of the iliac crest	Ribs obvious, but indentations are not marked. Iliac Crest somewhat prominent	Indentation between ribs very obvious. Iliac crest very prominent

MUSCLE WASTING

Physical examination	Normal	Mild/Moderate	Severe
Temple	Well-defined muscle	Slight depression	Hollowing, depression
Clavicle	Not visible in males; may be visible but not prominent in females	Some protrusion; may not be all the way along	Protruding/prominent bone
Shoulder	Rounded	No square look; acromion process may protrude slightly	Square look; bones prominent
Scapula/ribs	Bones not prominent; no significant depressions	Mild depressions or bone may show slightly; not all areas	Bones prominent; significant depressions
Quadriceps	Well defined	Depression/atrophy medially	Prominent knee, Severe depression medially
Interosseous muscle between thumb and forefinger (back of hand)**	Muscle protrudes; could be flat in females	Slightly depressed	Flat or depressed area

FLUID RETENTION

Physical examination	Normal	Mild/Moderate	Severe
Edema	None	Pitting edema of extremities / pitting to knees, possible sacral edema if bedridden	Pitting beyond knees, sacral edema if bedridden, may also have generalized edema
Ascites	Absent	Present (may only be present on imaging)	

A - Well-nourished no decrease in food/nutrient intake; < 5% weight loss; no/minimal symptoms affecting food intake; no deficit in function; no deficit in fat or muscle mass **OR** *an individual with criteria for SGA B or C but with recent adequate food intake; non-fluid weight gain; significant recent improvement in symptoms allowing adequate oral intake; significant recent improvement in function; and chronic deficit in fat and muscle mass but with recent clinical improvement in function.

B - Mildly/moderately malnourished definite decrease in food/nutrient intake; 5% - 10% weight loss without stabilization or gain; mild/some symptoms affecting food intake; moderate functional deficit or recent deterioration; mild/moderate loss of fat and/or muscle mass **OR** *an individual meeting criteria for SGA C but with improvement (but not adequate) of oral intake, recent stabilization of weight, decrease in symptoms affecting oral intake, and stabilization of functional status.

C - Severely malnourished severe deficit in food/nutrient intake; > 10% weight loss which is ongoing; significant symptoms affecting food/nutrient intake;severe functional deficit **OR** *recent significant deterioration obvious signs of fat and/or muscle loss.

Cachexia – If there is an underlying predisposing disorder (e.g. malignancy) and there is evidence of reduced muscle and fat and no or limited improvement with optimal nutrient intake, this is consistent with cachexia.

Sarcopenia – If there is an underlying disorder (e.g. aging) and there is evidence of reduced muscle and strength and no or limited improvement with optimal nutrient intake.

**In the elderly prominent tendons and hollowing is the result of aging and may not reflect malnutrition.

Canadian Malnutrition Task Force* | le Groupe de travail canadien sur la malnutrition*

Advancing Nutrition Care in Canada / Améliorer les soins nutritionnels au Canada

PART D Pittsburgh Sleep Quality Index (PSQI)

التاريخ: _____رقم التعريف: _____رقم التعريف بالعامل الميداني:_____

مؤشّر بيتسبرغ لجودة النوم

التعليمات: تتعلّق الأسئلة التالية بعادات النوم لديك على مرّ الشهر الماضي فقط. ينبغي لإجاباتك أن توفّر المعلومات الأكثر دقة لمعظم الأيام والليالي خلال الشهر الماضي. يرجى منك الإجابة عن جميع الأسئلة.

خلال الشهر الماضي،

1. في أيّ ساعة كنت تخلد للفراش ليلاً؟ وقت النوم المعتاد: _____
2. كم من الوقت (بالدقائق) يمرّ قبل أن تغفو كلّ ليلة؟ عدد الدقائق: _____
3. في أي ساعة تستيقظ صباحاً؟ وقت الاستيقاظ المعتاد: _____
4. أ. ما عدد الساعات التي تقضيها فعلياً في النوم ليلاً ؟ _____

   ب. ما عدد الساعات التي تقضيها في السرير؟ _____

التعليمات: في كلٍ من الأسئلة المتبقية، ضع علامةً بجانب الإجابة الأفضل. يرجى الإجابة عن الأسئلة كافة.

5. خلال الشهر الماضي، كم مرةً وجدت صعوبةً في النوم لأنّك...

	ليس خلال الشهر الماضي (0)	أقلّ من مرة في الأسبوع (1)	مرة أو مرتين في الأسبوع (2)	ثلاث مرات أو أكثر في الأسبوع (3)
أ- لا تتمكن من النوم في غضون ثلاثين دقيقة				
ب. تستيقظ في منتصف الليل أو في الصباح الباكر				
ج. تستيقظ لتدخل الحمّام				
د. تعجز عن التنفّس بشكلٍ طبيعي				
ه. تنتابك نوبات السعال أو تشخر بصوتٍ عالٍ				
و. تشعر بالبرد الشديد				
ز. تشعر بالحرّ الشديد				
ح. ترى الكوابيس				
ط. تشعر بالألم				
ي. أسباب أخرى، يرجى التوسّع فيها، بما في ذلك ما تواتر تكرار عدم تمكنك من النوم بسبب ذلك				

	ليس خلال الشهر الماضي (0)	أقلّ من مرة في الأسبوع (1)	مرة أو مرتين في الأسبوع (2)	ثلاث مرات أو أكثر في الأسبوع (3)
6. خلال الشهر الماضي، كم مرة تناولت الأدوية (بناءً على وصفة طبيب أو تلك المتوافرة من دون وصفة) لمساعدتك على النوم؟				
7. خلال الشهر الماضي، كم مرة وجدت صعوبةً في البقاء مستيقظاً أثناء القيادة، أو تناول الطعام، أو المشاركة في نشاط اجتماعي؟				

	ليس خلال الشهر الماضي (0)	أقلّ من مرة في الأسبوع (1)	مرة أو مرتين في الأسبوع (2)	ثلاث مرات أو أكثر في الأسبوع (3)
8. خلال الشهر الماضي، لأيّ مدى وجدت مشكلةً في أن تحافظ على حماستك حيال إنجاز أمور معينة؟				

	جيّدة جداً (0)	جيّدة إلى حدّ ما (1)	سيّئة إلى حدّ ما (2)	سيّئة جداً (3)

9. خلال الشهر الماضي، كيف تقيّم جودة النوم لديك إجمالاً؟				

PART E International Physical Activity Questionnaire (IPAQ)

التاريخ: _____رقم التعريف: _____رقم التعريف بالعامل الميداني:_____

الاستمارة الموجزة لقياس مستوى النشاط البدني في الأيام السبعة الماضية

نحن مهتمون بمعرفة أنواع الأنشطة البدنية التي يقوم بها الأفراد كجزء من حياتهم اليومية. تتطرّق الأسئلة التالية إلى الوقت الذي قضيته في ممارسة أنشطة بدنية خلال **الأيام السبعة الماضية**. يرجى الإجابة عن كل سؤال من الأسئلة التالية حتى وإن كنت تعتبر نفسك غير نشيط بدنياً. فكّر في الأنشطة البدنية التي تمارسها خلال عملك، وكجزء من أعمالك المنزلية، وأثناء تنقلك من مكان لآخر، وتلك التي تقوم بها في وقت فراغك بغرض الترفيه أو ممارسة التمارين أو الرياضة.

فكرّ في جميع الأنشطة البدنية **المرتفعة الشدّة** والتي قمت بممارستها خلال **الأيام السبعة الماضية**. الأنشطة البدنية التي **المرتفعة الشدّة** هي تلك الأنشطة التي تتطلّب منك بذل جهدٍ بدني شديد وتجعل تنفّسك أكثر صعوبةً من المعتاد. أدرج *فقط* الأنشطة البدنية التي قمت بها لمدة عشر دقائق على الأقلّ في كلّ مرة.

1. خلال **الأيام السبعة الماضية**، ما هو عدد الأيام الذي مارست فيه أنشطةً بدنيةً **مرتفعة الشدّة** من قبيل رفع الأثقال، أو الحفر، أو تمارين الأيروبيكس، أو قيادة الدرّاجة الهواية بسرعة؟

_____ **يوم في الأسبوع**

☐ لم أقم بأيّ نشاط مرتفع الشدّة ***انتقل إلى السؤال رقم 3*** ←

2. ما الوقت الذي قضيته في ممارسة الأنشطة البدنية **المرتفعة الشدّة** في أحد هذه الأيام؟

_____ **ساعة في اليوم**

_____ **دقيقة في اليوم**

☐ لا أدري/ لست متأكداً

فكر في جميع الأنشطة البدنية **المعتدلة الشدّة** والتي قمت بممارستها خلال **الأيام السبعة الماضية**. الأنشطة البدنية **المعتدلة الشدّة** هي تلك الأنشطة التي تتطلّب منك بذل جهدٍ بدني معتدل الشدة وتجعل تنفسك أكثر صعوبةً نسبياً من المعتاد. أدرج **فقط** الأنشطة البدنية التي قمت بها لمدة عشر دقائق على الأقلّ في كلّ مرة.

3. خلال **الأيام السبعة الماضية**، ما هو عدد الأيام الذي مارست فيه أنشطةً بدنيةً **معتدلة الشدّة** من قبيل رفع الأوزان الخفيفة، أو قيادة الدراجة الهوائية بسرعة عادية، أو لعب مباراة زوجي في كرة المضرب؟ لا تدرج المشي ضمن هذه الأنشطة.

_____ **يوم في الأسبوع**

☐ لم أقم بأيّ نشاط معتدل الشدّة ← ***انتقل إلى السؤال رقم 5***

4. ما الوقت الذي قضيته في ممارسة الأنشطة البدنية **المعتدلة الشدّة** في أحد هذه الأيام؟

_____ **ساعة في اليوم**

_____ **دقيقة في اليوم**

☐ لا أدري/ لست متأكداً

فكّر في الوقت الذي قضيته في ممارسة **المشي** خلال **الأيام السبعة الماضية**. ويشمل ذلك المشي في مكان العمل، وفي المنزل وعند التنقّل من مكانٍ لآخر، وأي نشاط مشي آخر قمت به بهدف الترفيه أو الرياضة أو ممارسة التمارين أو الترويح عن النفس.

5. خلال **الأيام السبعة الماضية**، ما هو عدد الأيام الذي مارست فيه **المشي** لعشر دقائق على الأقل؟

_____ **يوم في الأسبوع**

☐ لم أمارس المشي ← ***انتقل إلى السؤال رقم 7***

6. ما الوقت الذي قضيته في ممارسة **المشي** في أحد هذه الأيام؟

_____ **ساعة في اليوم**

_____ **دقيقة في اليوم**

☐ لا أدري/ لست متأكداً

يتمحور السؤال الأخير حول الوقت الذي قضيته في الجلوس في بحر الأسبوع **خلال الأيام السبعة الماضية**. أحسب الوقت الذي قضيته جالساً في مكان العمل، وفي المنزل، وأثناء الدرس وفي وقت الفراغ. وقد يشمل ذلك الجلوس إلى طاولة المكتب، أو أثناء زيارة الأصدقاء، أو المطالعة، أو أثناء الجلوس أو الاستلقاء عند مشاهدة التلفزيون.

7. ما الوقت الذي قضيته في **الجلوس** في أحد هذه الأيام؟

_____ ساعة في اليوم

_____ دقيقة في اليوم

☐ لا أدري/ لست متأكداً

تمّ الاستبيان، شكراً جزيلاً لك على المشاركة.

Interview Questions

PART F Yale Food Addiction Scale (YFAS)

التاريخ: _____رقم التعريف: _____رقم التعريف بالعامل الميداني:_____

مقياس يال لإدمان الطعام

يتطرّق هذا الاستبيان إلى عادات الأكل لديك في العام الماضي. يجد الناس في بعض الأحيان صعوبةً في السيطرة على تناولهم لبعض الأطعمة من قبيل:

- **الحلويات كالبوظة، والشوكولا، والدوناتس، والكوكيز، والكاتو، والبونبون**
- **النشويات كالخبز الأبيض، والخبز الصغير، والمعكرونة، والأرزّ**
- **الوجبات الخفيفة المملّحة كرقائق البطاطا، والبرتزل، والمقرمشات المملّحة**
- **الأطعمة الغنية بالدهون كالستيك، واللحم المقدّد، والهامبرغر، والتشيز برغر، والبيتزا، والبطاطا المقلية**
- **المشروبات الغنية بالسكر كالمشروبات الغازية**

عندما يشار في الأسئلة التالية إلى "أطعمة معينة" نرجو منك التفكير بأي أطعمة شبيهة بتلك المدرجة في مجموعة الأطعمة أو أي مأكولات أخرى سبّبت لك مشكلة في العام الماضي

في الأشهر الاثني عشر الماضية	أبدا	مرة في الشهر	2-4 مرات في الشهر	2-3 مرات في الأسبوع	4 مرات أو أكثر في الأسبوع أو يومياً
1. ألاحظ أنني عندما أبدأ بتناول أطعمة معينة، أتناول منها كمية أكبر بكثير من الكمية المقرّرة.					
2. ألاحظ أنني أستمرّ بتناول أطعمة معينة حتى وإن لم أعد جائعاً.					
3. آكل لدرجة أشعر بعدها بأنّني متعب جسدياً					

4. إنّ امتناعي عن تناول أنواع معينة من الطعام أو التخفيف من بعض الأطعمة أمر يسبّب لي القلق.					
5. أقضي وقتاً طويلاً وأنا أشعر بالكسل أو التعب نتيجة الإفراط في تناول الطعام.					
6. ألاحظ أنني أتناول أطعمة معينة باستمرار طوال اليوم.					
7. ألاحظ أنّني عندما لا أجد أطعمة معينة متوافرة لديّ، أقوم بالمستحيل للحصول عليها كأن أقصد المتجر لشراء أطعمة معينة رغم توافر أطعمة أخرى لدي في المنزل.					
8. مرّت عليّ أوقات كنت أتناول فيها أطعمة معينة بكثرة أو بكميات كبيرة لدرجة أنني بتّ أتناول الطعام بدلاً من العمل، أو تمضية الوقت مع العائلة أو الأصدقاء، أو القيام بنشاطات مهمة أو ترفيهية أستمتع بها.					
9. مرّت عليّ أوقات كنت أتناول فيها أطعمة معينة بكثرة أو بكميات كبيرة لدرجة أنني كنت أقضي الوقت في السيطرة على مشاعري السلبية الناتجة عن الإفراط في الطعام بدلاً من العمل، أو تمضية الوقت مع العائلة أو الأصدقاء أو القيام بنشاطات مهمة أو ترفيهية أستمتع بها.					
10. مرّت عليّ أوقات كنت أتجنّب فيها بعض اللقاءات المهنية أو الاجتماعية التي تقدّم خلالها أطعمة معينة خوفاً من إفراطي في تناولها.					
11. مرّت عليّ أوقات كنت أتجنّب فيها بعض اللقاءات المهنية أو الاجتماعية لأنني لم أكن قادراً على تناول أطعمة معينة تقدّم خلالها.					
12. عانيت من أعراض الانسحاب من قبيل التوتر والقلق الشديد، أو من أعراض جسدية أخرى عندما كنت أخفف من تناول أطعمة معينة أو أتوقف عن تناولها. (يرجى عدم إدراج أعراض الانسحاب بسبب التخفيف من المشروبات الغنية بالكافيين كالمشروبات الغازية، والقهوة، والشاي، ومشروبات الطاقة، وغيرها).					
13. كنت أتناول أطعمة معينة تجنّباً لمشاعر التوتر والقلق الشديد، أو أعراض جسدية أخرى كانت تنتابني. (يرجى عدم إدراج أعراض الانسحاب بسبب التخفيف من المشروبات الغنية بالكافيين كالمشروبات الغازية، والقهوة، والشاي، ومشروبات الطاقة، وغيرها).					
14. لاحظت أنني أشعر برغبة متصاعدة أو باندفاع لتناول أطعمة معينة عندما أتوقف عن تناولها أو أخفف منها.					
15. إنّ سلوكي حيال الطعام والأكل يسبّب لي التعاسة.					
16. أواجه مشاكل كبيرة في قدرتي على أداء وظائفي بفعالية (الأشغال الروتينية اليومية، الوظيفة/المدرسة، النشاطات الاجتماعية، النشاطات الأسرية، معالجة مشاكلي الصحية) بسبب الطعام والأكل.					

في الأشهر الإثني عشر الماضية	كلا	نعم
17. إنّ تناولي للطعام قد تسبّب لي بمشاكل نفسية كبيرة من قبيل الإحباط، أو القلق الشديد، أو كره الذات، أو الإحساس بالذنب.		
18. إنّ تناولي للطعام قد تسبّب لي بمشاكل جسدية كبيرة أو فاقم من مشاكلي الجسدية الموجودة.		
19. واصلت تناول أنواع أو كميات الأطعمة نفسها بالرغم من المشاكل النفسية و/أو الجسدية التي كنت أعاني منها.		
20. مع مرور الوقت، لاحظت أنني بحاجة لتناول كميات أكبر للحصول على الشعور الذي أريده، كالتخفيف من العواطف السلبية أو زيادة الشعورة بالسعادة.		
21. لاحظت أن تناولي للكمية نفسها من الطعام لا يخفّف من مشاعري السلبية أو لا يزيد من شعوري بالسعادة كما كان يحدث في السابق.		
22. أريد التخفيف من تناول أنواع معينة من الطعام أو التوقف عن تناولها.		

23. حاولت التخفيف من تناول أنواع معينة من الطعام أو التوقف عن تناولها.		
24. نجحت في التخفيف من تناول أنواع معينة من الطعام أو التوقف عن تناولها.		

25. كم مرة في العام الماضي حاولت التخفيف من تناول أنواع معينة من الطعام أو التوقف عن تناولها؟	مرة واحدة	مرتين	3 مرات	4 مرات	5 مرات او اكثر

26. يرجى وضع دائرة حول جميع الأطعمة التي تسبّب لك مشكلة:

البونبون	الكاتو	الكوكيز	البروكولي	الدوناتس	التفاح	الشوكولا	البوظة
رقائق البطاطا	المقرمشات المملّحة	الأرز	الفراولة	المعكرونة	الخس	الخبز الصغير	الخبز الأبيض
التشيزبرغر	الهامبرغر	اللحم المقدّد	الموز	الستيك	الجزر	البطاطا المقلية	البرتزل
البيتزا	المشروبات الغازية	ولا أي طعام من الأطعمة أعلاه					

27. يرجى إدراج أي أطعمة أخرى سبّبت مشكلةً لديك ولم تكن مدرجة أعلاه:
