

# Importance of Education and Nutrition Intervention on Drug Addiction Recovery

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## ABSTRACT

Addiction causes dietary and health problems that lead to malnutrition and psychological diseases. Therefore this research was carried out to study the impact of educational and nutritional intervention programs that focused on antioxidants and essential fatty acids especially omega 3. These programs aimed to improve the nutritional knowledge and modify attitudes, eating behavior, as well as to improve the nutritional status of the addicted patients.

The sample comprised 40 addicted males who were treated for rehabilitation at Maamoura Hospital of Psychiatric in Alexandria, Egypt. The required research data were collected using an especial questionnaire by interview, and they were treated statistically.

The duration of the educational program was 10 hours, among 5 days, and it was applied on all of the addicted sample, and individually for about an addition two hours, while the nutritional intervention program was applied for 30 days on 24 patients. Evaluation of the programs was done before, during and after application.

The results revealed that most of the patients were young, their ages were less than 30 years, and one third of them were suffering from health problems related to the liver, digestive as well as nervous systems. Before applying the nutritional education program, the percentage of patients who had right knowledge, positive attitudes and healthy practices were 25%, 47.5%, and 55%, respectively. These percentages increased after applying the program to be 100%, 60%, and 100%, respectively. The nutrition intervention program improved most of the nutritional studied parameters namely BMI, liver enzymes, and kidney functions, as well as decreased the percentage of patients who suffering from depression and improved their functional health.

So it was concluded that nutrition education and nutrition intervention programs are very important for treating addicted persons parallel with the medical and psychological treatments. These programs must be applied from the beginning phases of addiction treatment namely drug withdrawal and detoxification to help the liver and the other body organs to do their work efficiently.

## INTRODUCTION

Drug addiction is one of the serious problems that worry the Egyptian government, as it deals with young people within the age of work and productivity (UNAIDS, 2004).

According to a 2007 study, addicts in Egypt are spending 2.9 billion US Dollars on drug each year. Estimates on how many people are addicted vary greatly, but range between 600,000 and 800,000, the majority of them are between 15 and 25 years of age (El-Sawy *et al.*, 2010).

In Egypt about half of 130,000 people who entered drug rehabs in 2007 were addicted to cannabis, while 43 % were dependent on opiates of various types, and 7% were addicts of amphetamine-type stimulants ( El-Sawy *et al.*, 2010).

In 2009, 4.5 million people worldwide were receiving treatment for problems related to using illicit drugs ( European Monitoring Centre for Drug and Drug Addiction, 2011).

According to a WHO report (2012), about 230 million people, or 5% of the world adult population, are estimated to have used an illicit drug at least once in 2010. Heroin, cocaine and other drugs kill around 0.2 Million people each year. Also, the report indicated that illicit drugs underline economic and social development , crime, inability, insecurity and may be spread of HIV (WHO, 2012).

The primary goals of drug-abuse treatment are abstinence, relapse prevention, and rehabilitation. Therefore drug-abuse treatment follows three main phases namely withdrawer, detoxification, and rehabilitation.

Geramian, *et al.*( 2012) defined drug abuse as a result of interaction between the individual, substance, and environment, in addition to knowledge and attitude of individuals regarding drugs and their effects on health status.

Many studies on drug addiction have demonstrated nutritional deficiencies, including weight loss and changes in dietary patterns (Alves, *et al.*, 2011).

Ross *et al.* (2012) added that the forbidden drug use is a well-known risk factor for food insecurity and improper nutritional status. Drug addiction changes food consumption patterns, as eating fewer meals or often omission of some meals for an entire day and to depend on food availability.

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Karajibani *et al.*, (2014) stated that many factors affect the nutritional status of addicted including; lack of knowledge about negative effects of substances on bioavailability of nutrients, incorrect attitudes toward modification of food pattern, careless to food intake, low levels of self-confidence and lack of motivation and physical activity. Saeland (2014) found in her study entitled "eating on the edge" that most addicts exposed to poor dietary intake. She also mentioned that drug addiction is a disease due to the physical changes that occur in areas of the brain such as critical to judgment, decision making, behavior control, learning and memory.

Nutritional deficiencies can be a major cause of withdrawal-like symptoms such as fatigue, depression, irritability, and other conditions that block recovery and lead to relapse (Miller, 2012).

Many nutritionally-based programs find vitamin C to be one of the most essential ingredients in the treatment of addiction because it is a primary detoxifier of drugs and poisons from the body (Sathyanarayana *et al.*, 2008). Vitamin C also helps counterbalance some of the withdrawal difficulties and can help rebuild the liver, adrenals, and immune system. It also helps the brain chemicals work properly by supporting the conversion of the amino acid tryptophan into serotonin.

Battaglia (2008) concluded that good nutrition, relaxation, and exercise all play an important role in successful detoxification from alcohol and drugs abuse. Learning to make healthy food choices is important to achieve a healthy lifestyle. Because they have neglected their diet for long time, addicts experience gastrointestinal disorders such as diarrhea, constipation and an inability to digest foods properly, parallel with a poor appetite. As a result, they have a special need for foods that are high in nutrients to rebuild damaged tissues and organs and to regain appropriate functioning of the various systems including the nervous and gastrointestinal systems.

Grotzkyj-Giorgi (2009) stated that whatever the addiction, nutrition should be considered a powerful ally in the process of recovery, particularly during the initial stages of detoxification. A varied diet rich in good carbohydrates, good quality proteins (lean meat, fish and vegetable proteins), fresh fruit and vegetables, essential fats (oily fish, nuts) and plenty of water should be considered and utilized as a tool to help the recovery process.

Carson (2012) confirmed that alcohol and drug addicts have deficiencies of omega-3 and omega 6 fatty acids, and that adding them to their program greatly aided recovery.

Malnutrition associated with drug abuse can be either primary or secondary. Primary malnutrition occurs when substance abuse displaces, reduces, or compromises food intake. Secondary malnutrition occurs when the substance of abuse causes alterations in the absorption, metabolism, utilization, and excretion of nutrients due to compromised oral, gastrointestinal, circulatory, metabolic, and neurological health (Wiss, 2013).

The aim of this study is to evaluate the necessity of the inclusion of unique nutrition education and intervention into substance abuse treatment programs, as well as to measure the impact of these programs on knowledge, attitudes, and behaviors towards nutrition and health.

## SUBJECTS AND METHODS

**Subjects:** The present study is a descriptive and analytical study which included 40 addicted males. They represented all patients who were treated for rehabilitation at Maamoura Hospital of Psychiatric in Alexandria, Egypt. They spent about three months in the Hospital for withdrawal and detoxification treatments, and this study was done during their rehabilitation and recovery treatment (March to December, 2014).

**Methods:** The data were collected using a questionnaire by interview. The questionnaire comprised four sections. The purpose of the first section was to gather demographic information. The second section included anthropometric data (height, weight, BMI). The third section contained questions regarding appetite and health problems. The fourth section contained 3 tests to evaluate respectively the levels of knowledge, attitudes, and practices about foods and nutrition. Each test was applied using 3-item multiple choices. For each correct answer, 2 point, for false answer, zero, and for don't know or don't care, 1 point were considered.

Nutritional knowledge were evaluated using 30 statements. The answer choices were yes, no, and don't know. The mean score was calculated for each patient as three levels of low (0 -20), fair (21 -30), and high (31 -60).

Nutritional attitudes were assessed using 25 statements. The answer choices were agree, disagree, and don't care. The attitudes were evaluated as negative attitudes (0 - 16), attitudes needed modification (17 - 33), and positive attitudes (34 - 50).

The nutritional practices assay included 9 statements. The answer choices were usually, sometimes, and seldom or never. The practice were evaluated as unhealthy nutritional practices (0 -6), faire needed to modify (7 - 12), and healthy practices (13 - 18).

**Nutrition Education Program:** The nutrition education program was designed and performed by the researchers as face to face with the patients as groups and as well as individually. The program was implemented for 5 days, 2 hours a day, and individually for about an addition two hours. Educational tools were lecture supplemented with power point, booklet, pamphlet and poster.

The nutrition education program composed the following topics: food groups, food guide pyramid, principles of meal planning, antioxidant and its role in the detoxification process, and its food sources, good and bad fats, and the role of essential fatty acids in mood and healthy brain and body.

To evaluate the impact of the program on knowledge, attitude, and practice levels of the subjects, pre- and post-test were performed before and after the program.

**Nutrition Intervention Program:** Before implementing this program, the nutritional composition of the Hospital meals were analyzed using the Egyptian Food Composition Tables (National Institute for Nutrition, 2006). It is found that the quantity of the macronutrient were sufficient, but the meals were insufficient for addict persons in antioxidants and the essential omega-3 fatty acids which play very important role in the detoxification process in the liver, and in improving the mood and overall health status of the body (Table 5).

Therefore the following foods were suggested as good sources of antioxidants as well as the omega-3 fatty acids to add to the daily hospital meals and consumed as snacks: carrots, broccoli, beets, green pepper, guava, kiwi, pomegranate, flaxseed, yogurt, wheat germ, and green tea. Because of the patients didn't accept the taste of the broccoli, beets, and flaxseed, these foods were omitted and peanut was add instead as indicated in ( Table 1).

**Table 1. Food of nutrition intervention program**

Food	Amount (g) / day
Carrots	150
Guava	180
Kiwi	85
Pomegranate	290
Yogurt	120
Peanut	100
Wheat germ	5,5
Green tea (dry leaves)	2

All vegetables and fruits were consumed fresh. The wheat germ was added to the yogurt, and the green tea was used to make one drinking cup.

These foods provided approximately 530 mg vitamin C, 4125 mcg retinol activity equivalent (Vitamin A), 45 mg ATE (vitamin E), and 325 mg omega-3-fatty acids (Table 6).

The duration of the nutritional intervention program was 30 days, and it was applied on only 24 patients, who continued their rehabilitation treatment in the hospital. The patients were divided in two groups, 12 for each. Group (A) were given the regular hospital meals plus the foods rich in antioxidants and omega 3 fatty acids for 15 days, and then nutritional supplements were given instead of the added food for another 15 days. Group (B) were given in addition to the regular hospital meals the supplements for 15 days and then the rich foods for another 15 days. Evaluation of the program was done before, during and after its application.

The supplements provided almost the same amounts of vitamins C, A, E, but more omega-3- fatty acids (2000 mg).

**Anthropometric Measurements:** Height and weight were measured using a stadio-meter and digital scale. Body mass index (BMI) was calculated for each patient before, during, and after implementing the nutritional intervention program.

**Blood Analysis:** Blood analysis were done in the hospital lab. The analysis included : liver enzymes (ALT, AST), the serum urea, and the ceratinine.

**Functional Health Test:** Functional health test (Holford, 1998) provides investigation to understand the body functions. It examines: leaky gut syndrome, digestive issues, hormonal imbalance, thyroid imbalance, anemia, stress and depression, and chronic fatigue syndrome.

The scoring instructions are as follows : less than 10 points (excellent health status), (from 10-19 points) good health status but needed more balanced meals, (from 20 – 29 points) moderate health status and needed more balanced diets and improve the lifestyle, (from 30 – 40) poor health status that needed health and balanced diets as well as supplements.

**Hamilton Rating Scale for Depression:** Hamilton developed a rating scale for determination the depression levels of individuals suffering from different causes of depression (Hamilton, 1967).

Hedlund and Viewing, (1979) stated that Hamilton item questionnaire is used to provide an indication of depression, and as a guide to evaluate recovery from drug addiction.

The scoring instructions of Hamilton test for depression are as follows: 0-7 = normal, 8 – 13 = mild depression, 14-18 = moderate depression, 19-22= severe depression, and  $\geq 23$  = very severe depression.

**Statistical Analysis:** After the questionnaires were filled and collected, data was coded and entered the SPSS software, version 16, and analyzed. The mean and standard deviation was used for presentation of quantitative data. The (f) and (LSD) tests were used for comparison between means.  $P < 0.05$  was considered as the level of significant.

## RESULTS AND DISCUSSIONS

**Subjects' characteristics:** The results in Table (2) shows that more than half of the studied addicts (52.5%) aged less than 30 years. Concerning the educational level, the highest percentage of addicts in this study was that of preparatory and secondary school education (45%), while illiteracy was observed among (10%), and another (10%) for whom can read and write only.

**Table 2. Subjects' socio-economic characteristics (n = 40)**

Character	Number	%
<b>Age (years)</b>		
15 -Less than 30	21	52.5
30 – less than 40	12	30.0
40 and more	7	17.5
<b>Educational Status</b>		
Illiterate	4	10.0
Read and write only	4	10.0
Preparatory level	14	35.0
Secondary level	9	22.5
High education	9	22.5
<b>Occupation</b>		
Manual worker	30	75.0
Small business	4	10.0
Unemployed / students	6	15.0
<b>Marital Status</b>		
Married	16	40.0
Single	16	40.0
Divorced	8	20.0
<b>Monthly Income</b>		
Less than 2000 EGP	30	75.0
2000 - < 4000 EGP	7	17.5
4000 EGP and more	3	7.5

Manual workers represented the majority of sample size (88.2%), while the percentage of the unemployed was (5%), and the patients who were still studying represented (10%) of the sample. Addicts who married were found to be (40%), and a same percentage (40%) were single, while the rest (20%) were divorced.

The monthly income of (75%) of the studied patients was less than 2000 EGP, while it was more than 4000 EP for only (7.5%). These indicated that most of the sample may suffered from financial problems.

The data in Table (3) shows that the majority of studied addicts (90%) were abusing more than one drug, and the percentage of who were abusing three drugs represented (62.5%).

Heroin was abused among (77.5%), then hashish (65%), followed by morphine (45%), and then alcohol (30%) (Table 3). In addition, the data indicated that the majority of patients (95%) were current smokers.

**Table 3. Number of drug abused, times per day and type of drug (n=40)**

Terms	Number	%
<b>Number of drug abused</b>		
1	4	10.0
2	11	27.5
> 2	25	62.5
<b>Times per day</b>		
2	8	20
3	8	20
> 3	24	40
<b>Type of drug</b>		
Heroin	31	77.5
Hashish	26	65
Morphine	18	45
Stimulants	16	40
Amphetamine	15	37.5
Alcohol	12	30

The most motives for drug abuse were found to be peer pressure (75%), family troubles (25%), and seeking pleasure (17.5%). These results are in agreement with different studies such as those done in Bangladesh (Haque *et al.* 2014). The National Drug Intelligence Center (2011) suggested that factors such as peer pressure, physical, stress, and quality of parenting can greatly influence the occurrence of drug abuse and the escalation to addiction in a person's life.

Concerning multiple health problems that the subjects suffered from as they reported were liver (37.5%), digestive system (35%), nervous system (32.5%), and kidney (10%).

Because of addiction relapse, most of the patients (85%) were treated more than one time. The frequency of motives for seeking recovery treatment were found to be dissatisfaction with being addicts (77.5%), and health troubles (55%).

### Impact of nutrition education program on knowledge, attitudes and practices

The data in Table (4) shows a significant improvement in all of the studied nutritional parameters ( $P \leq 0.05$ ) namely knowledge, attitudes and practices. Before implementing the program the nutritional

knowledge level of (75%) of the patients was low, and only (5%) of them answered most of the nutritional test correctly. After implementing the program the nutritional knowledge level of all the patients improved to be high. The same trend was observed for the patients' eating practices. Only (55%) of the patients followed a healthy eating practices before the program increased to be (100%) after the program. On the other hand, because the difficulty of changing the attitudes in comparison with knowledge and practices, only (60%) of the patients had positive attitudes towered some foods after the program, while this percentage was (47.5%) before the program. These results indicated that the nutritional education program succeeded to inform the subjects about the importance of introduce healthy foods rich in antioxidants, and other micronutrients as well as the good fats which high in essential fatty acids especially the omega-3 fatty acids.

A study by Barbadora *et al.* (2011) investigated the impact of education programs on nutritional knowledge and behaviors of 58 alcohol dependent participants in an inpatient treatment facility in Italy. They found a positive effect of the nutrition education on the participants' knowledge among nutrition, food, and health rather than their behaviors.

Cowan and Devine (2013) mentioned that education process must be began early in recovering to emphasize the importance of choosing nutritious foods, as well as to understand the role that food plays in recovery from drug addiction.

This study shows that nutritional knowledge, attitude and practice were higher after performance of nutritional educational program for addict patients ( $P < 0.05$ ). This finding indicates that drug addicts were successful in receiving nutritional information through this nutritional program. In similar study, Richardson and Wiest (2015)

stated that given impact of nutrition on health for addicted is important aspect of drug treatment. Grant *et al.* (2004) found that nutrition education programs provided to the substance abuse population have been significantly improved three-month sobriety success rates. Therefore, patients must be educated about the importance of nutrition in their recovery process. They must be encouraged to understand how nutrition can play an important part in their recovery process, and they need help navigating the struggles that arise so they can achieve a healthful lifestyle

### The Nutrition Intervention Program

Table (5) shows the nutrient contents of the Hospital meals for four days, which repeated each week, as well as the mean quantities provided per person per day. The mean of the hospital daily meal provided, 2729 Kcal, 100 g protein, 90 g fat, 395 g carbohydrates, 101 mg vitamin C, and 686 mcg vitamin A (Retinol Activity Equivalent), 17 mg vitamin E (Alpha-Tocopherol Equivalent), and 490 mg omega-3 fatty acids. The means of vitamins and omega-3 fatty acids content of the hospital daily meal were suitable for healthy people, but not adequate for recovering from drug addiction (Hass, 2006, and Carson, 2012). Vitamin C, A, and E are powerful antioxidants that protect tissues and organs in the body from free radicals that are produced by toxins. The recommended dose of vitamin C for substance abuse detoxification is 2 to 3 grams per day, taken from supplements in divided doses (Hass, 2006, and Carson, 2012). Results from pharmacokinetic studies indicate that 200-300 mg/ day intake provided from consuming vitamin C rich foods are about four times higher than oral doses of the same amounts (Padayatty *et al.*, 2004). This is because the vitamin C in food is more bio-available than the supplements, therefore 600-700 mg of vitamin C per day are adequate for drug addicts.

**Table 4. Impact of the education program on level of nutritional knowledge, attitudes, and practices**

Levels	Before Program		After program	
	Number	%	Number	%
<b>Knowledge</b>				
Low	30	75	0	0
Moderate	8	20	0	0
High	2	5	40	100
<b>Attitudes</b>				
Negative	0	0	0	0
Needed modification	21	52.5	16	40
Positive	19	47.5	24	60
<b>Practice</b>				
Unhealthy	0	0	0	0
Needed modification	18	45	0	0
healthy	22	55	40	100

**Table 5. Calories and nutrients contents of the Hospital meals**

Nutrient	Calories Kcal	Protein g	Fat g	Carbohydrate g	Vit. C Mg	Vit. A RAE mcg	Vit. E ATE mg	n-3 FA mg
1 <sup>st</sup> day	3180	100	89	495	123	748	15	514
2 <sup>ed</sup> day	2622	110	96	330	80	618	23	481
3 <sup>ed</sup> day	3140	112	88	475	121	758	16	518
4 <sup>th</sup> day	2224	78	87	282	80	618	13	446
Mean/day	2792	100	90	395	101	686	17	490

RAE = Retinol Activity Equivalent, ATE = Alpha-Tocopherol Equivalent

Like vitamin C, vitamin E is an antioxidant that protects the cells from damage by inhibiting the development of free radicals. The recommended daily dose for addicts is 100 IU or 67 mg ATE (Carson, 2012).

Vitamin A (retinol + beta-carotene) has antioxidant properties, and its recommended daily intake for addicts is ranged from 4000 to 5000 mcg RAE (Hass, 2006). The daily requirements of omega-3 fatty acids for men is 2 g (FAO, 2008). Therefore the hospital meals were deficient in the antioxidant vitamins as well as the essential omega-3 fatty acids which very crucial for enhancing the detoxification process.

Table (6) shows the calories and nutrients content of the provided foods used as snacks in the nutrition intervention program for 30 days.

Data in Table (7) shows the total calories and nutrients contents provided to the patients during the nutritional intervention program.

As indicated from the data in Table (7) all of the amounts of the studied vitamins increased about 6 times

and the amount of the omega-3 fatty acids increased about two times after implementing the nutritional intervention program, and these amounts are more suitable for requirements of the patients.

#### Impact of the Nutrition Intervention Program on Nutritional Status

The body mass index was used as an indicator for the nutritional status of the patients. As indicated from the data in Table (8) one third of the total sample suffered from under weight before implementing the program decreased to one fourth and then to one eights after 15 days and 30 days, respectively. The percentage of the patients who had normal weight was 33.3% before the program, increased to 50% after 15 days and then to 66.7% at the end of the program, while the patients who suffered from overweight represented one third decreased to one fifth after 30 days of implementing the intervention program.

In general the nutritional status of the two studied groups were improved significantly ( $P \geq 0.5$ ).

**Table 6. Calories and nutrients contents of added foods suggested to the intervention program**

Food	Calories Kcal	Protein g	Fat g	Carbo- hydrate G	Vit. C mg	Vit. A RAE mcg	Vit. E ATE Mg	n-3 FA mg
Carrots	66.8	1.4	0.4	14.4	10.0	3698.0	1.0	3.1
Guava	122.1	4.6	1.7	22.1	410.0	335.0	1.3	202.0
Kiwi	47.2	0.9	0.4	10.0	78.1	22.0	1.3	36.0
Pomegranate	229.4	4.2	1.4	50.0	30.0	10.0	1.8	-
Yogurt	47.8	5.6	0.5	5.2	1.1	60.0	8.4	32.4
Peanut	566.2	25.0	45.0	15.3	0.8	-	11.2	10.0
Wheat germ	22.6	1.3	0.6	3.0	-	-	20.0	42.0
Green tea+ sugar	16.0	-	-	4.0	-	-	-	-
Total	1118.1	44.3	50.0	128.0	530.0	4125.0	45.0	325.5

**Table 7. Calories and nutrients contents provided to the patients during the nutritional intervention program**

Meal	Calories Kcal	Protein g	Fat g	Carbohydrate g	Vit. C Mg	Vit. A RAE mcg	Vit. E TAE mg	n-3 FA mg
Hospital	2792	100	90	395	101	686	17	490
Program	1118	44	50	128	530	4125	45	325
Total	3910	144	140	523	631	4811	62	815

**Table 8. Percentage distribution of patients according to nutritional status (BMI)**

BMI	Group A n = 12			Group B n = 12			Total n = 24		
	Before Program	15 days	30 days	Before program	15 days	30 days	Before Program	15 days	30 days
Under weight	16.7	8.1	0.0	50.0	41.7	25.0	33.3	25.0	12.5
Normal	33.3	58.3	75.0	33.3	41.7	58.3	33.3	50.0	66.7
Overweight	50.0	33.3	25.0	16.7	16.7	16.7	33.3	25.0	20.8

### Impact of the Nutrition Intervention Program on Health Status

#### Liver Function

Table (9) shows the mean and standard deviation of the serum liver enzymes (ALT) and (AST). The results show significant improvements in the serum levels of these enzymes, indicating that some liver health problems may occurred before applying the nutrition intervention program (especially group A), but consuming foods rich in antioxidants and essential fatty acids as well as supplements prevents the liver cells from damage caused by using the illicit drugs.

For the case of (group A), consuming the foods for 15 days caused (37.9 %) decrease in the ALT level, when followed by using the nutrient supplements for another 15 days, the decrease was (20.9%). While when the patients in (group B) received first the nutrient supplements for 15 days followed by consuming the foods, the decreases in the ALT levels were (12.7 %) and (30.4%), respectively. Almost the same trend was observed in the case of the liver enzyme AST.

The benefits of eating fruits and vegetables may be much greater as compared to the effects imparted by any of the individual antioxidants they contain because the various vitamins, minerals and phytochemicals in these

whole foods may act synergistically (Brown *et al.*, 1990, Zaidi and Banu 2004).

#### Kidney Function

Table (10) shows the mean and standard deviation of the serum content of urea and creatinine before and after implementing the intervention program. In general the studied patients had normal urea as well as creatinine levels. However the program improved significantly the level of serum urea in both groups (A and B).

#### Depression Level

Before applying the nutritional intervention program all the patients were suffering from very severe depression (Table 11). At the end of the program only 50% had some depression symptoms (41.7 % low, and 8.3 % moderate). These results confirmed that fresh food consumption is more effective than the supplements.

Table (12) indicates that (8.3%) of the total studied patients were evaluated as suffering from poor functional health. After implementing the nutrition intervention program (91.7%) of them improved their functional health to be excellent (41.7%), and good (50% %).

**Table 9. Mean levels of serum liver enzymes**

1- Alanine aminotransferase (ALT)						
Group	Normal level	Before Program	After 15 days	After 30 days	F	LSD
A(n=12)	<42 U/L	50.9 ± 7.77 <sup>a</sup>	31.6± 8.65 <sup>b</sup>	25.0± 9.75 <sup>c</sup>	S	7.314
% decrease	-	-	(37.9 %)	(20.9%)		
B( n=12)	< 42 U/L	34.5± 2.89 <sup>a</sup>	30.1± 12.6 <sup>a</sup>	21.5± 3.58 <sup>b</sup>	S	7.091
% decrease	-	-	(12.7 %)	(30.4%)		
2- Aspartate aminotransferase (AST)						
Group	Normal level	Before Program	After 15 days	After 30 days	F	LSD
A(n=12)	< 37 U/L	39.7 ± 0.39 <sup>a</sup>	28.1± 4.25 <sup>a</sup>	22.1± 1.13 <sup>b</sup>	S	8.675
% decrease	-	-	(29.2%)	(21.4%)		
B( n=12)	<37 U/L	28.2± 7.39 <sup>a</sup>	26.3± 2.56 <sup>a</sup>	19.9± 1.48 <sup>b</sup>	S	8.318
% decrease	-	-	(6.7 %)	(24.3%)		

S = significant at  $P \leq 0.05$

**Table 10. Mean levels of serum urea and creatinine**

Urea	Normal level	Before Program	After 15 days	After 30 days	F	LSD
A(n=12)	15 - 45 mg/dL	37.4 ± 3.97 <sup>a</sup>	29.0± 3.41 <sup>b</sup>	28.7± 2.60 <sup>b</sup>	S	2.073
% decrease	-	-	(22.3%)	(1.2 %)		
B( n=12)	15 - 45 mg/dL	37.4± 2.99 <sup>a</sup>	29.4± 3.23 <sup>b</sup>	27.5± 2.49 <sup>b</sup>	S	1.797
% decrease	-	-	(21.4%)	(6.3 %)		
Creatinine	Normal level	Before program	After 15 days	After 30 days	F	LSD
A (n=12)	0.6 – 1.4 mg/dL	1.03 ± 0.03 <sup>a</sup>	1.01± 1.40 <sup>a</sup>	1.20± 0.05 <sup>a</sup>	NS	0.3917
B (n=12)	0.6 – 1.4 mg/dL	1.04± 0.04 <sup>a</sup>	1.06± 0.03 <sup>a</sup>	1.24± 0.05 <sup>a</sup>	NS	0.2287

Data sharing a subscript letter in a row are not significantly different ( $P > 0.05$ )

**Table 11. Percentage distribution of patients according to depression level**

Group	Group A n = 12		Group B n = 12		Total n = 24	
Depression level	Before program	After program	Before Program	After Program	Before Program	After Program
None	0.0	66.7	0.0	33.3	0.0	50.0
Low	0.0	33.3	0.0	50.0	0.0	41.7
Moderate	0.0	0.0	0.0	16.7	0.0	8.3
Severe	0.0	0.0	0.0	0.0	0.0	0.0
Very severe	100.0	0.0	100.0	0.0	100.0	0.0

**Table 12. Percentage distribution of patients according to functional health status**

Group	Group A n = 12		Group B n = 12		Total n = 24	
functional healthstatus	Before program	After program	Before Program	After Program	Before program	After Program
Excellent	0.0	33.3	0.0	50.0	0.0	41.7
Good	33.3	50.0	33.3	50.0	33.3	50.0
Moderate	50.0	16.7	66.7	0.0	58.3	8.3
Poor	16.7	0.0	0.0	0.0	8.3	0.0

## CONCLUSION

The impact of nutrition education program was effective in improving the patient's knowledge and behavior in comparison with their attitudes. It is known that changing the attitudes required more time. Therefore, patients must be educated on the importance of nutrition in their recovery process. They must be encouraged to understand how nutrition can play an important part in their recovery process.

The nutrition intervention program provided food sources of the antioxidant vitamins (C, E, and beta-carotene) and may be other phytochemicals found in the provided foods that boost brain functions, as well as boost the detoxification process in the liver, and prevent all the body organs from free radicals damages.

Because of illicit drugs deplete omega-3 fatty acids from the brain (Somer, 1999), the intervention program provided food sources of omega-3 fatty acids, that give brain cells their ability to readily transport nutrients into

the cell and quickly remove waste products. Omega-3 fatty acids also help in regulating the hormone like components, which further influence brain function and the release of neurotransmitters which improve the mood and behavior.

## REFERENCES

- Alves D., A.F. Costa, D. Custódio, L. Natário, V. Ferro-Lebres and F. Andrade. 2011. Housing and employment situation, body mass index and dietary habits of heroin addicts in methadone maintenance treatment Association for the Application of Neuroscientific Knowledge to Social Aims. AU-CMS. 13(1):1592-638.
- Battaglia, E. 2008. Nutritional therapies for addiction. Drug-Rehab. Retrieved April 22, 2009. from: <http://www.drug-rehab.com/addiction-nutritional-therapy.htm>
- Barbadora, P., E. Ponzio, M.E. Pertosa, F. Alitta, M.M. D'Errico, E. Prospero and A. Minelli. 2011. The effect of educational intervention on nutritional behavior in alcohol-dependent patients. Alcohol and Alcoholism (Oxford, Oxford shine).46(1): 77-79.

- Brown, R.J., K. Blum and M.C. Trachtenberg.1990. Neurodynamics of relapse prevention: a neuronutrient approach to outpatient DUI offenders. *Journal of PsychoactiveDrugs*.22 (2): 173–187.
- Carson R.E. 2012. *The Brain Fix: What's the Matter With Your Gray Matter: Improve Your Memory, Moods, and Mind*. Health Communications Publisher.
- Cowan, J., Devine, C. 2008. Food , eating and weight concerns of men in recovery from substance addiction. *Appetite*.50 (1): 33-42.
- Cowan, J. and C. Devine. 2013. Diet and body composition outcomes of an environmental and educational intervention among men in treatment for substance addiction. *J NutrEducBehav*. 45 (2):154-158
- El-Sawy, H., M. Abdel Hay and A. Badawy. 2010. Gender Differences in Risks and Pattern of Drug Abuse in Egypt. *Egypt J Neurol Psychiat Neurosurg*. 2010. 47(3): 413-418.
- European Monitoring Centre for Drugs and Drug Addiction, Annual Report. 2011.*The State of the Drugs (1)*. .Problem in Europe (Luxembourg, Publications Office of the European Union.
- FAO. 2008. *Fats and fatty acids in human nutrition: Report of an expert consultation, 10-14 November, Geneva,Switzerland*.
- Hamilton, M. 1967. Development of a rating scale for primary depressive illness. *British Journal of Social and Clinical Psychology* 6: 278-96.
- Haque, M.M., M.R. Bhuiyan, S. Chowdhury, K. Islam. 2014. Nutritional Status and Dietary Intake Pattern of Male Drug Addicts Undergoing Rehabilitation. *J Nutr Health Food Eng* 1(1).
- Hass. 2006. *Staying Healthy with Nutrition*. 1<sup>st</sup> Edition. Library of Congress Cataloging, in Publication Data, USA.
- Hedlund, J.L., B.W. Vieweg. 1979. The Hamilton Rating Scale for Depression: A Comprehensive Review. *J. Operational Psychiatry*. 10:149-165.
- Holfordm P. 1998. *100% Health – The Drug Free Guide for Feeling Better, Living Longer, and Stay Free from Disease*. 1<sup>st</sup> Edition, Judy Piatkus Publ. ,LTD.
- Holford, P., D. Miller and J. Braly. 2008. *How to quit without feeling s\*\*t*. London: Piatkus Books.
- Islam, S.K.N., K.J. Hossain and A. Ahmed. 2002. Nutritional status of drug addicts undergoing detoxification . *Brit J Nut*. 88. (5): 507-13.
- Geramian, N., S. Akhavan, L. Gharaat, A.M. Tehrani and Z. Farajzadegan. 2012. Determinants of drug abuse in high school students and their related knowledge and attitude. *J Pak Med Assoc*. 62(3 Suppl 2):S62–6.
- Grant, L.P., B. Haughton and D.S. Sachan. 2004.Nutrition education is positively associated with substance abuse treatment program outcomes. *J Am Diet Assoc*. 104(4):604-610.
- Grotzkyj-Giorgi, M. 2009.Nutrition and addiction- can dietary changes assist with recovery. *Drug and Alcohol Today* 9 (2): 24-8.
- Karajibani, M., F. Montazerifar, A. Dashipour, K. Lashkaripour, M. Abery and S. Salari. 2014.Effectiveness of Educational Programs on Nutritional Behavior in Addicts Referring to Baharan Hospital, Zahedan (Eastern of IR Iran).*Int J High Risk Behav Addict*. Jun. 3(2): e18932.
- Kowalchuk, A. and B.C. Reed. 2016. Substance use disorders. In: Raket RE, Raket DP, eds. *Textbook of Family Medicine*. 9th ed. Philadelphia, PA: Elsevier Saunders;chap 50.
- Miller, R.P. 2012. *Nutrition in addiction recovery*. Many Hands Sustainability Center,USA. C.F. <http://manyhandssustainabilitycenter.org>
- National Drug Intelligence Center. 2011. *The Economic Impact of Illicit Drug Use on American Society*. Washington D.C.: United States Department of Justice. Available at: [http://www.justice.gov/archive/ndic/pubs44/44731/44731p.pdf\(PDF, 2.4MB\)](http://www.justice.gov/archive/ndic/pubs44/44731/44731p.pdf(PDF, 2.4MB))
- National Institute for Nutrition. 2006. *Food Composition Tables for Egypt*. 2ed Edition,Cairo, Egypt.
- Richardson, R.A. and K. Wiest. 2015. A Preliminary Study Examining Nutritional Risk Factors, Body Mass Index, and Treatment Retention in Opioid-Dependent Patients. *J Behav Health Serv Res*. 42(3):401-8.
- Ross, L.J., M. Wilson , M. Banks, F. Rezannah and M. Daglish. 2012. Prevalence of malnutrition and nutritional risk factors in patients undergoing alcohol and drug treatment. *Nutrition*. 28(7-8):738–43.
- Padayatty, S.J., H. Sun, Y. Wang, H.D. Riordan, S.M. Hewitt, A. Katz, R.A. Wesley and M. Levine. 2004. Vitamin C pharmacokinetics: implications for oral and intravenous use. *Ann Intern Med*. 6.140 (7): 533-537.
- Sæland, M.E. 2014.*Eating on the Edge*. A study focusing on dietary habits and nutritional status among illicit drug addicts in Oslo, Norway. Doctor Thesis. Department of Health, Nutrition and Management, Faculty of Health Sciences,Oslo and Akershus University College of Applied Sciences.
- Sæland, M.E., M. Haugen, F.L. Eriksen, A. Smehaugen, M. Wandel, T. Bohmer and A.Oshaug. 2009. A study focusing on nutrition and health of drug addict in Oslo, Norway. *Public Health Nutr*. 12 (5): 630-6.
- Sathanarayana, Rao. T.S., M.R. Asha, B.N. Ramesh and Rao. K.S. Jagannatha. 2008. Understanding nutrition, depression, and mental illnesses. *Indian J Psychiatry*.50(2):77-82.
- Somer, E. 1999. *Food and Mood*. The Complete Guide to Eating Well and Feeling Your Best. Second Edition. Henry Holt and Company. N.Y.
- Steel, R.G.D., J.H. Torrie and D. Dickey. 1997. *Principles and Procedures of Statistics*. A biometrical approach. 3rd ed. McGraw Hills Book Co. Inc. New York.
- UNAIDS. 2004. *Joint United Nations Program on HIV/AIDS. UNAIDS at Country Level Progress Report*.

Wiss, D.A. 2013. Nutrition and substance abuse. M.S. Thesis, Dept Family and Consumer Sciences, California State University, Northridge, USA. Retrieved from <http://hdl.handle.net/10211.2/3444>.

WHO. 2012. Global Health Risk: Mortality and Burden of Disease Attributable to Selected Major Risks. World Health Organization. 2010.

Zaidi, A. and N. Banu. 2004. Antioxidant potential of vitamins A, E and C in modulating oxidative stress in rat brain. *Clinica Chimica Acta* 340 :229–233.

## الملخص العربي

### أهمية التدخل التثقيفي والغذائي لعلاج إدمان المخدرات

سهير فؤاد نور، إكرام رجب سليمان، سميرة عالي الحامدي، ممدوح أبو ريان

صحية مرتبطة بالكبد والجهاز الهضمي والجهاز العصبي. قبل تطبيق البرنامج التثقيفي بلغت نسبة من كان لديهم معلومات غذائية صحيحة ٢٥%، ومن لديهم اتجاهات إيجابية نحو التغذية الصحية ٤٧,٥%، ومن يمارسون السلوك الغذائي الصحي ٥٥% فقط. بلغت تلك النسب بعد تطبيق البرنامج التثقيفي ١٠٠%، ٦٠%، ١٠٠%، علي التوالي. أما برنامج التدخل الغذائي فقد أدي تطبيقه إلي حدوث تحسن في معظم المعايير التي تم قياسها للمرضي و التي شملت مؤشر كتلة الجسم، ووظائف الكبد والكلبي، كما انخفضت نسبة من يعانون من الإكتئاب مع إرتفاع نسبة من تحسنت حالتهم الصحية الوظيفية.

استخلصت الدراسة أن برامج التثقيف الغذائي و التدخل الغذائي هامة جدا لعلاج المدمنين ويجب أن توجه للمرضي بالتوازي مع العلاج الطبي والنفسي، وأن تطبق في المراحل الأولى للعلاج والتي تشمل إنسحاب المخدر، والتخلص من سموم الجسم والتأهيل لمساعدة الكبد وأجهزة الجسم الأخرى علي أداء وظائفها بكفاءة.

يتسبب الإدمان في إحداث مشاكل تؤدي إلي سوء التغذية وأمراض نفسية. لذلك كان هدف هذه الدراسة هو التعرف علي تأثير برامج تدخل تثقيفية وغذائية تركز علي مضادات الأوكسدة والأحماض الدهنية الأساسية وخاصة الأوميغا ٣. كان الهدف من البرامج هو تحسين المعلومات وتعديل الاتجاهات والسلوك الغذائي للمدمنين، وأيضاً تحسين حالتهم التغذوية.

اشتملت عينة الدراسة علي عدد ٤٠ رجل مدمن في مرحلة التأهيل يعالجون في مستشفى المعمورة للأمراض النفسية بالإسكندرية. تم تجميع البيانات باستخدام استمارة استبيان بالمقابلة الشخصية، وعولجت البيانات إحصائياً. بلغت مدة البرنامج التثقيفي ١٠ ساعات علي مدار ٥ أيام لجميع أفراد العينة معاً، علاوة علي حوالي ساعتين مع كل مدمن منفرداً. بينما تم تطبيق برنامج التدخل الغذائي لمدة ٣٠ يوم علي عدد ٢٤ مدمن فقط، وتم تقييمه قبل وأثناء وبعد التطبيق.

أوضحت النتائج أن معظم المبحوثين كانوا من الشباب وأعمارهم أقل من ٣٠ سنة، وأن ثلثهم يعانون من مشاكل